

Administration Report -
of the Department -
of Fisheries - Madras
1954-55



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**ADMINISTRATION REPORT
OF THE DEPARTMENT OF
FISHERIES—MADRAS**

FOR THE YEAR

1954-55

1062/89

**PRINTED BY THE SUPERINTENDENT
GOVERNMENT PRESS
MADRAS
1956**

Price, 1 rupee 10 annas

1062/89

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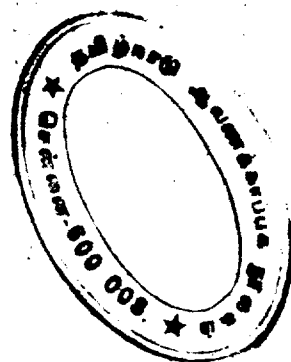
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ADMINISTRATION REPORT OF THE FISHERIES DEPARTMENT FOR THE YEAR 1954-55.

I. DIRECTION.

Sri E. P. Royappa, M.B.E. (Mily.), I.A.S., Director of Industries and Commerce, was in charge of the Fisheries department till his transfer as the Collector of Madras. Sri T. K. Palaniappan, M.A., I.A.S., assumed charge as the new Director on 10th December 1954 afternoon and continued in that office till the end of the year.

Sri V. John, B.A., F.Z.S., and Sri D. D. Peter Devadass, B.A., continued as Deputy Directors of Fisheries (Marine) and (Inland), respectively, during the year. A reorientation of the jurisdiction of the Deputy Directors on a functional basis in the residuary State was found necessary and adopted for better supervision of the implementation of the different development schemes. Sri S. Varadarajan, M.A., acted as Deputy Director of Fisheries (Inland), for a period of two months during the absence of Sri Devadass on leave.

II. FISHERIES RESEARCH.

Madras State can take the legitimate pride of being the pioneer State in India for initiating fisheries research and conducting it for well over three decades. Research for the proper elucidation of many of the problems in Fisheries Biology and Technology was given due importance in the activity of the department during the year under report. Revival of the departmental publications of scientific papers and technical documents was a welcome feature during the year. It was also proposed to publish a Fisheries Year Book annually, which will include Fisheries Research Station reports and papers of scientific and technical interest giving a correct appraisal of the progress of research work in the different fields of study. Government were pleased to accept this proposal and the First Year Book is under print.

Although many of the research problems were being successfully tackled at the different research stations, an assessment of the research programme so far followed was found necessary to draw up plans for future work. Government suggested the need for the appointment of a research committee for the proper assessment of the investigations so far conducted and, if need be, reorientate the research programme of the various institutions on the basis of the knowledge so far gained by the vast accumulated data so far collected and correlated.

A. MARINE FISHERY RESEARCH.

Sri P. I. Chacko, M.A., F.Z.S., F.A.Z., continued to be in charge of the Marine Fishery Research Section throughout the year.

During the year progressive investigations on the marine fishery resources of the State were continued at the four Marine Biological Stations. Problems connected with the biology, fecundity, age and shoaling of the pelagic fishes

of the West Coast, particularly the Oilsardine and the Mackerel, formed the major part of the investigations at the West Hill Biological Station. At the Krusadai Biological Station, studies on the Rainbow Sardine and the Big-jawed jumper and survey of the composition and fluctuations of the fisheries of the Rameswaram Island were pursued. At the Ennore Research Station, special attention was paid to the study of estuarine fisheries. Researches on pearl and chank fisheries continued to be conducted at the Tuticorin Biological Station and towards the end of the year a pearl fishery was conducted. The programme of work was satisfactorily pursued in all the stations as indicated below :—

1. Marine Biological Station, West Hill.

1. *Meteorology and hydrography of the Kozhikode Coast.*—The maximum air temperature of 92°F was reached in April and May and the minimum of 60°F in July. The south-west monsoon was heavy during the year, with a rainfall of 104.70 inches of which 56.86 inches was in June. The total rainfall for the year was 138.85 inches as against 81.9 inches in the previous year. The maximum atmospheric humidity ranged from 82 per cent in February to 95 per cent in July-August and the minimum from 64 per cent in November to 87 per cent in August. The direction of the wind was from north-west to south-east from April to September and in the reverse direction from October to March. The prevailing current was from north to south from April to October and from November to March in the opposite direction. The surface temperature of the coastal waters ranged from 24.9°C in June and 29.35°C in April and March. The maximum and minimum specific gravity were 1.029 and 1.019 in July. The pH was high (8.6–8.7) from December to February and low (8.0) from April to August. Salinity of the sea water was high (30.72–35.05 per mille) from December to March and low from May to October. Carbonate content was 10.65 mg. per thousand in October and 5.5 mg. per thousand in August. Phosphate content was greater (24.3–23.08 mg. per cubic meter) in September and October, moderate (80.0–98.0 mg. per cubic meter) from December to January and insignificant in other months. Silicate content showed high value of 108.0 mg. per cubic meter in September and low readings (12.2 mg. per cubic meter) in October.

2. *Plankton cycle of Kozhikode Coast.*—Surface plankton was collected and analysed on 49 days. The average sedimentation per litre was 122.0 c.c. in October, 96.0 c.c. in March, 70.0 c.c. in November and January, 60.0 c.c. in August and 24.0 c.c. in April and July. Plant organisms (*Phytoplankton*) were dominant in May (53 per cent), July (87 per cent), December (78 per cent), January (77 per cent), February (75 per cent) and March (88 per cent) whereas zoo-plankters were abundant in April (53 per cent), August (72 per cent), September (76 per cent), October (79 per cent) and November (62 per cent).

The seasonal distribution of the important organisms were as follows: The diatom *Coscinodiscus* was present throughout the year; but showed two maxima in May-August (15–18 per cent) and August-October (12–11 per cent). In January its frequency came down to 2 per cent. *Biddulphia* was abundant in November when it formed seven per cent of the total plankton. It had another peak of 4 per cent in April. *Chaetoceras* was the commonest diatom with 2 maximal periods in July and December. From 2 per cent in April it showed a steady rise to 49 per cent in July, but thereafter showed a decline from 8 per cent in August to trace in October, wherefrom it showed

another rise (16–36 per cent) till the end of the year. *Asterionella japonica* was more common in February. With two peaks in November (12 per cent) and January (13 per cent), *Rhizosolenia* was a constant diatom in the plankton. *Nitzschia* also had two peaks in April (7 per cent) and January (6 per cent). *Thalassiothrix* was absent from August to November but was present in the other months with a peak period from April to July (10–16 per cent). *Fragillaria* was a major diatom in the coastal plankton and occurred throughout the year with two peaks in August-September (7–8 per cent) and December (15 per cent), *Bacteriastrum* was common in January (21 per cent) and *Ditylum* in March (15 per cent). Other diatoms like *Planktoniella*, *Pleurosigma*, *Eucampia*, *Navicula*, *Lauderia*, *Melosira*, *Thalassiosira*, *Hemidiscus*, *Streptotheca* and *Schroederella* were observed occasionally. There was a swarming of *Trichodesmium* in March. The dinoflagellate *Noctiluca* was present throughout the year but appeared in swarms in May, August, September, October, January and February. Other flagellates like *Gymnodinium*, *Prorocentrum*, *Dinophysis* and *Peridinium* were scarcely present from July to December. *Ceratium* were prominent in November (23 per cent). Copepods were the most common zoo-plankters and had two maximal periods in April to November when they formed 16 and 20 per cent of the hauls. Their larval stages were dominating from April to May and from December to January. The peak month for *Evadne* was October when it contributed to 15 per cent of the plankton. Other forms like *Acanthometron*, *Pleurobrachia*, *Sagitta*, larval polychaete, larval bivalves, zooea and megalopa larvae and *Stomatopod* larvae occurred in small numbers at various times.

3. *Investigation of mackerel fisheries.*—The mackerel (*Restrelliger kanagurta*) fishery was not very favourable during the year, the total landings being only about 5½ lakhs maunds of which 2 lakhs were captured in November. Shoaling of mackerel first commenced in June with zero year group in 5–6 fathoms along with white-baits and in July contributed to about 92 per cent of the commercial catches. From August onwards, one, two and three year, classes composed of 47, 34 and 19 per cent of the shoals. But in September there was a dominance of 2-year old ones (75 per cent) the rest being 1 and 3-year old individuals. In October there was a fresh recruitment of zero year group to the extent of 54 per cent, but 1, 2 and 3-year ones continuing to constitute 23, 13 and 10 per cent of the landings. In November 1 and 2-year forms were equally present, but in December the shoals were comprised of 1, 2, 3 and 4-year old individuals to the extent of 15, 40, 35 and 10 per cent. In January 82 per cent of the shoals were of 2-year ones, 35 per cent of 3-year ones and 10 per cent of 4-year fish. In February there was another recruitment of zero year individuals to the extent of 21 per cent, 1, 2, and 3 years constituting the rest. In March only 2, 3 and 4-year individuals were present as 30, 65 and 5 per cent. The size of the shoals ranged from 6 to 25 cm., but mackerels with fully ripe gonad could not be observed during the year in the Kozhikode area. The appearance of zero-year group as late as October and February with fairly good percentage of 1–3 year ones, gives further indication that maturation in the Indian mackerel is intermittent and spawning is protracted.

The rate of feed of the mackerel was 1.7 c.c. in July with 65 per cent of phytoplankters like *Coscinodiscus*, *Fragillaria*, *Thalassiothrix*, *Biddulphia*, *Nitzschia* and *Pleurosigma* and 35 per cent of zoo-plankters like *Ceratium*, *Acartia* and *Prorocentrum*. In August the rate of feed ranged from 0.2 to 1.2 c.c. and 73 per cent of the food was composed of zoo-plankters like

Evadne, *Acartia*, *Ceratium*, larval bivalves and megalopa larvae. In September and February, phytoplankton formed 36 and 55 per cent of the stomach contents, whereas in the other months, zoo-plankters were dominant up to 80 per cent. *Peridinium* and *Dinophysis* were found among the food organisms in September and November and *Trichodesmium* in March.

4. *Investigations on fisheries of the Oilsardine.*—During the year about 12 lakhs maunds of the Oilsardine (*Sardinella longiceps*) were landed along the West Coast. The commercial catches were chiefly composed of 15 cm. groups, in May 17 cm., in June and July, 18 cm. in August, 5–8 cm. in September, 10–11 cm., in October, 12–13 cm. in November, 13–14 cm. in December, 14 cm. in January and February and 14–16 cm. in March. From June to August, oil sardine with fully mature gonads occurred in the shoals. The test is measured 2 cm. in length and 6 grams in weight (14 per cent of the total weight of fish) and the ovary 6.5 cm. in length and 5 grams (10 per cent of total weight of fish). It was seen that new broods had entered into the fishery from September, indicating a better fishery in the next season.

The stomach contents in mature and gravid oil sardines examined in July showed an average feed of 1 c.c. with *Coscinodiscus*, *Fragillaria*, *Thalassiothrix*, *Rhizosolenia*, *Prorocentrum*, *Evadne*, *Acartia*, *Euterpina* and larval bivalves. There was no case of starvation. *Biddulphia* and *Ceratium* which formed the main food of the mackerel during the period were absent in the oil sardines. The rate of feed of baby sardines (below 8 cm.) obtained in September was 0.2 c.c. with 94 per cent of phytoplankters like *Coscinodiscus*, *Fragillaria* and *Biddulphia*. *Dinophysis*, *Evadne* and *Acartia* formed the other components. Zoo-plankters dominate the food of larger forms (17–20 cm.) with forms like *Acartia*, *Euterpina*, *Centropages*, *Prorocentrum*, *Dinophysis* megalopa larva and larval prawns. Other organisms met with in the food of the Oilsardine occasionally are *Pleurosigma*, *Planktionella*, *Trichodesmium*, *Ceratium*, *Peridinium* *Microsetella*, megalopa larva and polychaete larvae.

5. *Study of the biology of horse-mackerels.*—Eleven species of horse-mackerels contribute to a lucrative fishery on the West Coast with an average annual landings of over one lakh maunds. They occur within the 12 fathom line throughout the year and are captured with gears like boat seine nets, drift nets, cast nets, long lines and whiffing lines. The food of the various species shows interesting variations. *Caranx*, *kalla* feeds on diatoms and algae, *Decapterus*, *russelli*, *Caranx crumenophthalmus* *C. djebada* and *C. melampygus* consume diatoms, copepods and other macrozooplanktonic organisms, *Caranx* *mate*, *Caranx oblongus* and *Caranx malabaricus* feed on prawns and shrimps and *Megalaspis cordyla*, *Atropus atropus* and *Caranx carangus* consume small clupeoids and prawns. The horse-mackerels spawn within the 10 fathom line with the exception of *C. crumenophthalmus* which recedes into deeper waters of the offshore region from November to March. *Decapterus russelli* also breeds during this period. *Caranx carangus* breeds in August and September and the other species from October to December. During these months the temperature, specific gravity and salinity are not high. The eggs of this group of fishes is characterized by a vacuolated yolk and a large single oil-globule. Pigments appear on the latter when the embryo folds are formed. The pectoral fins develop about 24 hours after hatching. The mouth is formed generally after 48 hours and the eyes become black simultaneously. There is a slight backward shifting of the anus. In the post-larval development, scutes on the lateral line appear when the

young ones are about 3 cm. and these scutes increase in number with the growth of the fish. Spawning appears to take place about midnight. Hatching occurs from the next forenoon to afternoon, eggs of smaller size (*Caranx djebada* and *C. kalla*) hatching earlier and those of larger size (*C. crumenophthalmus* and *Decapterus russelli*) later.

6. *Statistical survey of the trend of the fisheries of the West Coast.*—Statistics of fish landings along the coast as obtained from the staff of the fish-curing yards were tabulated and maintained. The fishing operations were moderate along the coast, the landings of oil sardines and mackerel having gone down by about 50 per cent of the previous years. The oil sardine fishery occupied the first rank, the total yield being about 12 lakhs maunds. The peak period was October–November and January. The landings along the South Kanara coast was poor being only 3 lakhs maunds. The total landings of mackerel amounted to about 3½ lakhs maunds of which nearly 2 lakhs were landed in South Kanara. The inverse relationship between the fisheries of these two important fishes were clearly evident during this year also. The Mullan (Silver bellies) fishery occurred from April to November with a total capture of about 4 lakhs maunds, the peak period being in July and August. There were prawn fisheries throughout the year, with a total landing of about 2½ lakhs. The peak period was from June to September. The shark fishery was moderate with 40,000 maunds with peak period being in October–November. The total landings of skates were only 22,000 maunds. The cat fish fishery was about 40,000 maunds, the chief shoaling being in October–November. The white bait fishery was limited to May–November with a landing of 32,000 maunds. The Manthal (Sole) fishery was prominent in September and November. The total landing was about 3 lakhs maunds. About 1 lakh maund of champan (Goggler) was landed from September to October. The total landings of all fisheries was about 40 lakhs maunds.

A scheme sponsored by the Indian Council of Agricultural Research, New Delhi for evolving a suitable sampling technique was worked out during the year and the data forwarded to the Council for drawing inferences.

II. *Krusadai Biological Station.*

1. *Meteorology and hydrography of Kundugal Channel.*—The atmospheric temperature was at the maximum of 86.3°F in May and minimum of 79.3°F in January. The second maximum and minimum were 85.15°F and 83.05°F in October and July. Thus a double oscillation in temperature was observed. The pressure was low from May to August and maximum from October to March. The general trend was between 26.26 and 30.372 inches. The maximum speed of wind was 16 m.p.h. in January. The north-east monsoon brought 19.34 inches of rainfall and the south-west monsoon 10.3 inches. Humidity showed a double oscillation with maximum (92 per cent) in December and minimum (73 per cent) in June. There was a unimodal oscillation in the surface temperature of sea water with a maximum (29.1°–30.4°C) in April–May and minimum (26.0°–26.2°C) in December–February. The water temperature was always higher than the air temperature. The specific gravity was maximum (1.026) in July–October and minimum (1.018) in January. pH ranged between 8.4 and 8.22; salinity was maximum (36.00–36.89 parts per mille) during August–October and minimum (26.41 parts per mille) in January. Dissolved oxygen was maximum (4.7 cc. per litre) in January and minimum (2.8 c.c. per litre) in April and May. The average residual alkalinity (carbonates) ranged from 0.487 gm./litre in April to 0.830 gm./litre in February. Calcium content was 0.420 gm./litre in June and

5.80 gm./litre in November. There was higher silicate content (100—125 mg./cubic meter) from August to December and low (68 m./cubic meter) in February. Phosphates and nitrates were unusually high (68 and 52 mg./cubic meter) in April and low (5.6 and 5.0 mg./cubic meter) in August.

2. *Plankton of sea around Krusadai Islands*.—The phytoplankton was low (13—15 per cent) in January and February and from March onwards showed an increase culminating in a maximum of 86 per cent in June. This predominance continued till another maximum of 86 per cent was reached in October. Diatom maximum was in September. About 31 genera of phytoplankters were determined. Of these *Coscinodiscus*, *Rhizosolenia*, *Chaetoceras*, *Thalassiothrix*, *Oscillatoria* and *Ceratium* occurred in regular abundance. *Biddulphia*, *Pleurosigma*, *Nitzschia* and *Trichodesmium* also appeared regularly but in few numbers. Zooplankton was abundant only from January to April. Copepods of 14 genera formed the most common element and had their maxima in March and minima in June. Other important zooplankters were *Leucifer reynaudi* (December to April), *Cresgis arcuata* (March to June) and *Sagitta* (April to January).

3. *Study of fish eggs and larvae*.—One hundred and fifty samples of fish eggs and larvae were collected from the Kundugal channel and adjoining mud flats, and determined as follows. This information was useful for knowing the breeding season and grounds of the species concerned :—

- (1) *Elops saurus*.—Larvae (3–12 mm.) in February–March.
- (2) *Chanos chanos*.—fry (14 mm.) April–June and March.
- (3) *Dussumieria hasseltii*.—larval and post larvae from April.
- (4) *Anchoviella Indica*.—larvae (4–16 mm.) in November–December.
- (5) *Hemiramphus* sp.—large number of eggs—September.
- (6) *Mugil waigiensis*.—larvae (15–25 mm.) in October–March.
- (7) *Therapon jarbua*.—post larvae (12–25 mm.) in December to April.
- (8) *Lethrinus* spp.—post larval stages in rocky pools in September.
- (9) *Sillago sihama*.—post larvae in December.
- (10) *Platycephalus indicus*.—larvae and post larvae (4–14 mm.) in December.
- (11) *Scatophagus argus*.—Post larvae forms in April–May.
- (12) *Atherina forskali*.—larvae and post larval forms (4–14 mm.) in November–December.
- (13) *Gerres filamentosus*.—post larvae (10–20 mm.) in March and June.
- (14) *Triacanthus brevirostris*.—post larvae (10–18 mm.) in December and January.
- (15) *Syngnathus* sp.—larvae (4 mm.) in November and December.

4. *Biology of the rainbow sardine, Dussumieria hasseltii*.—This species contributes to an important fishery around the Rameswaram Island. Individuals ranging from 4.5 to 13.5 c.m. formed the bulk of the commercial catches. The shoals comprised of fish not more than 18 months old. In the otoliths of the fish only one growth-zone could be distinguished. The species attain sexual maturity when 12 mm. long. The spawning season extends from October to March. This protracted spawning is evidenced by the variations in diameter of intra-ovarine eggs. The food of the fish consists of planktonic organisms.

5. *Biology of the big-jawed jumper, Lactarius lactarius*.—This fish contributes to a commercial fishery at Thangachimadam from April to October, with a peak period in May. The catches are composed of individuals 80 to 200 mm. in size and 1 to 3 years old. This species is piscivorous in habit and consumes more than ten kinds of fish.

6. *Survey of fisheries of Rameswaram Island*.—There is fishing around the island throughout the year. The crafts and tackles employed are varied, such as catamarans and Tuticorin-type canoes, drift nets, boat-seines, shore-seines, cast nets, long lines, stake nets and hand lines. The main fishing centres in the order of importance are Thangachimadam, Dhanushkodi, Kundugal Point, Rameswaram Road, Pamban and Rameswaram. The main fishery from January to March is from the Gulf of Mannar side, when the sprat (*Sardinella fimbriata*, *S. gibbosa* and *S. albella*) fishery rank first with a total landing of about 2,000 maunds. From April to October, Silver bellies (*Leiognathus*) forms the major fishery. In November and December, seer fish (*Scomberomorus commersoni*) are common. The other commercial fishes are *Chirocentrus dorab*, *Lactarius lactarius*, *Sciaena* spp., *Upeneus* spp., *Mugil* spp. and *Sillago sihama*. The total landings of all fishes during the year under report amounted to be about 40,000 maunds.

7. *Studies on the utilization of sea weeds*.—Eight genera and 134 species of algae were provisionally identified from the waters around Krusadai Island. Of these special attention was paid to the brown algae (*Phaeophyceae*) as they are the raw materials for algin. By a survey it was estimated that about 75 tons of these algae are cast ashore every year around Krusadai and Rameswaram Islands. By laboratory tests it was ascertained that the *Fucales* in general and *Sargassum* spp. in particular were the best algin-yielders of this area. There was a seasonal fluctuations in the algin and dry matter content, but not so marked as in the case of temperate waters. The maximum in algin content coincided with the minimum in the dry matter content and *vice versa*. The dry matter variations coincided with the variations in temperature and salinity of the water, whereas the algin variations showed an inverse relationship. The effect of the temperature of water on the algin and dry matter contents was immediate and instantaneous but the effect of salinity appeared to be expressed only in succeeding months. Further observations are in progress.

III. Tuticorin Biological Station.

1. *Meteorology and hydrography of Tuticorin Bay*.—The maximum atmospheric pressure was 30.25 inches in November and minimum was 29.756 in March. The atmospheric temperature ranged from 75.0° F in December and January to 96.0° F in June. The maximum surface temperature of sea water varied from 26.5° C to 31.8° C and the minimum from 23.9° C to 28.6° C in May. The pH value was 8.3 to 8.5. The specific gravity fluctuated between 1.020 in February to 1.028 in September. The salinity was at its maximum (38.295 parts per 1,000) in February and minimum (26.202 parts per 1,000) in June. Dissolved oxygen fluctuated from 0.0041 to 0.0068 gm./litre in April and November. The average residual alkalinity (carbonates) ranged from 0.1 gm./litre in June to 0.298 gm./litre in April. Phosphate content was uniform throughout the year, its range being 0.028–9.88 mgm./cubic meter. Silicate content also showed little variations from 51.4 to 69.55 mm./cubic meter. The calcium content was 1.898 gm./litre in May and 2.80 gm./litre in January. The plankton hauls consisted mostly of zooplanktonic organisms like Copepods, *Sagitta* and *Ceratium*.

2. *Study of pearl fisheries.*—A detailed inspection of 27 pearl banks was completed early in April 1954 revealing the presence of oyster population in 16 of them. Of these the Thollayiram par, Athombathu par, Koothandiar par, Vadaombathu par, Saithombathu par, and Pulipoondi in the northern area were found to contain about 3 crores of oysters 2 to 3½ years old. The southern banks were found to bear about 2 crores of immature oysters. Another brief inspection of the northern banks made in January-February 1955 revealed that the Athombathu and Pulipoondi pars were affected by sand-drift, killing their oyster population and that the oysters of the other four pars were in fair condition. A small-scale pearl fishery was therefore commenced from 19th March 1955. By the end of the year about 912,787 oysters were fished. The fishery, though handicapped by labour trouble and adverse weather conditions, progressed till the middle of May 1955 and a total of about 36 lakhs oysters were lifted. During the fishery it was found that the pearl banks were affected by certain adverse factors. The sand-drift was found to have extended over the entire area of Saithombathu and Vadaombathu pars, two-thirds of Koothandiar par and one-third of Thollayiram par. Besides, the northern one-sixth of the Thollayiram par, had developed a thick growth of slimy sea weeds to a height of about 18 inches. Immediately south of this portion there was an area of heavy spat-fall. These baby oysters (about three months old) were so crowded (about 2,000 per square yard) that the adult oysters got overcrowded. Indications were available of an invasion of the Saithombathu and Vadaombathu pars by shoals of oyster-eating rays (*Rhinoptera*). Many bitten and broken shells were obtained in evidence of this. The small portion of the Koothandiar par left unaffected by the sand-drift were reported with thick masses of sea weeds brought by under-currents. Even the one-third portion of the Thollayiram par not covered by sand-drift was encroached upon by the spiny star fish (*Pentaceros linki*) and by fouling organisms like black and red sponges, gorgonids and alcyonarians, which like weeds on agricultural fields had choked and thinned the oyster population. Considering all these facts the number of oysters lifted during the fishery is about 50 per cent of the originally estimated number on that portion of the Thollayiram par unaffected by the sand-drift. Further investigations are in progress.

3. *Studies on chank fisheries.*—The chank fishery lasted from 19th December to 18th March. Marking experiments were conducted during the year and it was ascertained that contrary to expectations, chanks migrate long distances, as much as one furlong a day. A free exchange of shells from one bed to another exists. The maximum rate of growth in length is 1.4 mm. and in diameter 1.8 mm. per month. On the average, the conch attains 24 mm. at the end of the first year, 60 mm. in 2½ years and 140 mm. in six years. The range of size of chank increases with the depth up to 6 fathoms.

4. *Trend of fisheries of Tuticorin.*—The total landings of fish at Tuticorin during the year, was estimated to be 800 tons. There were good catches of sardines (*Sardinella fimbriata*, *S. gibbosa*, *S. leiogaster* and *Dussumieria hasseltii*) from July to March. During the same period anchovies (*Engraulis spp.*) were obtained in large numbers with pachuvalai. Perches (chiefly *Serranus* and *Lethrinus*) were landed throughout the year with hand lines. From June to September good catches of Seer (*Cybium*) and horse-mackerels (*Caranx spp.*) were obtained by whiffing. Landings of all fishes were at their peak in the month of July, August and March and poor in April.

IV. Ennur Biological Station.

1. *Meteorology and hydrography of Ennur estuary.*—The maximum atmosphere temperature was 96° F in May and minimum 74° F in January. The surface temperature reached its maximum (94° F) in May and minimum (75° F) in December and January. Turbidity of water ranged from 43 c.m. in January to 107 c.m. in August. Specific gravity and pH fluctuated between 1.000 and 1.032 and 7.8 and 8.5 respectively. There was a rainfall of 40.10 inches and the humidity was maximum (95 per cent) in October and December and minimum (51 per cent) in July. The salinity of the estuary ranged between 31.9 and 1.8 parts per mille the maximum being in the month of June.

2. *Plankton of Ennur estuary.*—The plankton hauls were predominated by diatoms like *Coscinodiscus*, *Rhizosolenia* and *Nitzschia* in the first quarter. In the second quarter zooplankters like mysids, larval worms, larval bivalves and larval gastropods were abundant, indicating that many estuarine animals breed during this period. Copepods and their nauplii though a constant feature, were common in the third quarter. There was another predominance of phytoplankters during the last quarter. The plankton constituents of the oyster beds were similar to those of the estuary excepting that forms like *Asterionella* and *Fragillaria* were more common on the former.

3. *Bionomics of cerres filamentatus.*—Observations on this perch which was common in the estuary showed that the fish grows at the rate of 1 c.m. per month. The maximum size attained was 25.0 c.m. It attains maturity at the end of the first year when it is 10—12 mm. in size. The main spawning season is from September to November, though late spawning was observed up to April. The males were greater in proportion in the catches. Shrimps and young prawns were the main items of the food of the young ones. The adults were found to feed at the bottom on polychaete worms.

4. *Studies on the biology of the edible oysters.*—The food of the edible oyster, as revealed by gut contents was found to comprise of diatoms like *Nitzschia*, *Pleurosigma*, *Navicula*, *Coscinodiscus*, *Rhizosolenia*, *Bacillaria*, *Thalassiothrix* and *Melosira*. Co-relating these organisms with the diatoms met with on the top of the shell-covers, it was seen that *Nitzschia*, *Pleurosigma*, *Thalassiothrix* and *Melosira* were common to both the plankton and the gut-contents; *Navicula*, *Coscinodiscus*, *Rhizosolenia* and *Bacillaria* were not found in the plankton and in their stead were found *Eucampia*, *Hemidiscus* and *Bacteriastrum*. So, *Navicula*, *Coscinodiscus*, *Rhizosolenia* and *Bacillaria* found in the gut must have come from the plankton of the estuary.

5. *Trend of fisheries of the Ennur estuary.*—The common fishes that contributed to the fishery of the estuary were species of *Mugil*, *Leiognathus*, *Elops*, *Gerres*, *Chatoessus*, *Etroplus*, *Stolephorus* and *Belone*. During the first quarter prawns were common. The catch effort of the different types of nets varied as follows. Oyevalai 38—72 lb., thuthuvalai 25—38, melivalai 27—47 lb., irigavalai 37 lb., kalluvalai 34—52 lb., siruvalai 21—40 lb. and othuvalai 30 lb. per day.

6. *Trend of fisheries of the Ennur Coast.*—Sharks, rays, ribbon fishes, seer, horse-mackerels and jew fishes occurred throughout the year. In the month of April giant cat-fishes occurred in large shoals, the catch by a single periaivalai being 2,250 lb. In the second quarter the fishing was poor and limited to lepeoids. The ribbon fish fishery was at its peak in the third quarter. In

the last quarter pomfrets were common, their daily landings being about 500 lb. The average catch effort of the thurivalai ranged from 25 to 100 lb. per day.

PROGRAMME OF INVESTIGATIONS TO BE CARRIED OUT AT THE MARINE BIOLOGICAL STATIONS IN 1955-56.

I. West Hill Biological Station.

1. Plankton cycle of Calicut Coast and its correlation with meteorological and hydrographical conditions;
2. general survey of the fisheries of the West Coast with reference to the seasonal trends;
3. shoaling, length and age frequency, feeding, maturity and spawning of oil sardine with a view to forecast its fishery for the next year;
4. shoaling, length and age frequency, feeding, maturity and spawning of mackerel with a view to forecast its fishery for the next year;
5. biology and fisheries of the white bait;
6. biology and fisheries of the ribbon fish;
7. sporadic inshore migration and fisheries of padamanthal;
8. general biology of local fishes.

II. Krusadai Biological Station.

1. Plankton and hydrography of the Kundugal channel;
2. general survey of the fisheries of the Rameswaram Island with reference to seasonal trends;
3. biology of the big-jawed jumper;
4. biology of the sprat;
5. analysis of catches of departmental deep-sea fishing unit at Pamban;
6. general biology of local fishes;
7. culture of milk-fish;
8. growth, spawning and culture of the pearl oyster;
9. ecology of chank beds of Rameswaram;
10. ecology and systematics of sea weeds;
11. extraction and seasonal variation of algin from sea weeds.

III. Tuticorin Biological Station.

1. Hydrobiology of Tuticorin Bay.
2. shoaling, size-frequency, feeding, maturity, spawning and fisheries of the local sardines;
3. biology of fishes of pearl banks;
4. survey of pearl banks with reference to ecology of pearl oysters and their population;
5. migration and growth of chank;
6. analysis of catches of departmental deep-sea fishing unit at Tuticorin.

IV. Ennur Biological Station.

1. Meteorology, hydrography and planktology of (a) Ennur estuary and (b) Ennore coast.
2. bionomics of fishes of the Ennore estuary;
3. catch-effort statistics of fisheries of Ennore estuary with a view to assess fluctuations;
4. bionomics of fishes of Ennore coast;
5. catch-effort statistics of fisheries of Ennore coast;
6. biology of the edible oyster with special reference to reproduction;
7. spawning and growth of the common green crab.

B. INLAND FISHERIES RESEARCH.

The hydrological and algological wings of the Fresh Water Biological Station have been working at Bhavanisagar from the beginning of the year under report. The Biological Wing of the Fresh Water Biological Station comprising of Assistant Director of Fisheries (Fresh Water Biology), Research Assistant (Fresh Water Biology) and Research Assistant (Fluviatile) was shifted to Bhavanisagar as per G.O. No. 3384, Agriculture, dated 19th November 1954, in January 1955 and this also started functioning at Bhavanisagar from 12th January 1955. The post of Public Health Fish Officer was retained at Madras to be in charge of the Chetpet Fish Farm and Public Health Fish Research Unit at Madras.

From 1st March 1955 the administrative and executive control of the Fisheries activities of Coimbatore and Nilgiris districts also were taken away from Assistant Director, Madurai, and placed under the Assistant Director (Fresh Water Biology), Bhavanisagar. Now Assistant Director, Madurai, is in charge of Madurai and Ramanathapuram districts only.

Staff-Personnel.

- (1) Sri M. Devidas Menon, M.A., continued as Assistant Director of Fisheries (Fresh Water Biology), throughout the year.
- (2) Sri R. Srinivasan continued as hydrologist throughout the year.

Programme of research work.

The programme of research work conducted at the Fresh Water Biological Station can be broadly classified as follows:—

- (1) Limnology of Bhavanisagar Reservoir;
- (2) limnology of Bhavanisagar Fish Farm ponds;
- (3) determination of optimum condition for the growth of Phytoplankton;
- (4) studies on the pollutional effects of factory effluents on the fisheries of inland waters;
- (5) hydrobiological surveys of inland waters;
- (6) population studies on the fishes of Bhavanisagar Reservoir;
- (7) segregation of fish fry;
- (8) studies on *Trichogaster fasciatus*;
- (9) investigations on the spawning of mirror carp;
- (10) trout fisheries and trout streams of Nilgiris;
- (11) investigations on tilapia mossambica;

- (12) natural history of the riverine fishes of Cauvery;
- (13) experiments on food conversion factors;
- (14) studies on the eel and spiney eel culture;
- (15) paddy-cum-fish culture investigations;
- (16) fish mortality and fish parasites;
- (17) experiments on the transport of fish seed;
- (18) miscellaneous.

1. *Limnology of Bhavanisagar Reservoir.*—Limnological studies of the Bhavanisagar Reservoir were made throughout the year with a view to follow the physico-chemical changes and fluctuations in the plankton biomass to assess their influence on the fish population. This study is of great importance in the estimation of populations, movements of fishes and the assessment of optimum catch.

Physico-chemical Factors.—Vide statement appended (Appendix I).

Temperature.—The maximum temperature was recorded in April after which there was a gradual decrease till September when it rose again. From October, the temperature again fell reaching the minimum in December and rose again to maximum in April.

Relative humidity has been more or less uniform ranging from 60.5 per cent to 83.7 per cent.

Total rainfall.—The maximum rainfall of 11.05 inches occurred in the north-east monsoon period (October–November), 8.12 inches of rainfall fell in summer months of March to May, 4.78 inches in the south-west monsoon season of June to September and 4.38 inches in the cold weather period of December–February. There was no rainfall in September.

Wind velocity.—Increased from May to September and gradually decreased till next May. It ranged from 2.35 miles per hour in January to 11.52 miles per hour in September.

Reservoir level.—The reservoir water level reached a minimum of 59 feet in May and increased gradually till August when it surplused. From September there was a gradual fall.

Surface water temperature.—Ranged from 77.9°F in December to a maximum of 85.1°F in April. The surface temperature closely followed the fluctuations in atmospheric temperature.

Turbidity of water.—The water was more turbid during the months of May, June, July, October and November than in the other months.

Hydrogen-ion concentration.—pH value varied from 7.3 to 8.3, the highest values being reached in May. Lowest values were reached in months following the flood-months.

Dissolved O₂.—Varied from a minimum of 53 per cent in January to a maximum of 96.6 per cent in July. From May to December, the water was oxygenated almost near saturation.

Free carbon dioxide Co₂.—The Co₂ fluctuation inversely followed the dissolved oxygen (B₂) content.

Bicarbonates.—Ranged from 9.27 p.p.m. in October to 100.65 p.p.m. in May. The lower values were reached after the flood months and the high values during the cold and summer months.

Phosphates were present only in very minute amounts.

Phytoplankton production.—The rate of production has been highest in the month of June. The lowering of water level in the two preceding months April and May, combined with higher temperature and longer hours of bright sunshine have resulted in the increased production of Cyanophyceae mainly microcystis. The succession of the phytoplankton was as follows for the year :—

Cyanophyceae—March to June.

Diatoms—July.

Green Algae—August and September.

Diatoms—October.

Dinoflagellates—November to February.

Fish catches.—The maximum catches per unit effort were during the months of October to December. Of the meteorological factors, wind seems to have the maximum influence on the catch per unit effort, a higher return closely following a sudden drop in the wind velocity. The catch per unit effort appears to increase after the reservoir stops surplussing. The investigations are being followed up in detail.

2. *Limnology of Bhavanisagar Fish Farm.*—A weekly study of the physico-chemical and planktological conditions of the pond waters of Bhavanisagar Fish Farm, was made with a view to ascertain their seasonal variations and their influence on fish life. The data collected, besides throwing light on the behaviour of newly constructed fish ponds towards productivity, will be of use in the manuring of tanks and connected experiments that are to be undertaken in the next year. The data are under analysis and the study is being continued.

3. *Optimum conditions for the growth of phytoplankton.*—Detailed investigations on the optimum conditions for the culture and growth of microcystis, Spirogyra and Navicula were made in the laboratory. These experiments were started to find out the minimum requirements for production of these organisms in order to apply this to the actual field in the manuring of ponds. The studies also have a bearing on the role of these organisms in the survival and mortality of fishes.

Initial experiments done with different culture solutions like Beijerinck's Detmer's, Knops and extracts of garden soil, pond soil and sand revealed that pond soil extracts gave the most encouraging results probably indicating the necessity of certain trace elements. In order to fix up these trace elements, detailed work with microcystis has been taken up.

4. *Studies of the pollutional effects of factory effluents on the fisheries of inland waters.*—The following three cases of pollution of inland waters by factory wastes were studied during the year and suitable remedial measures were suggested to compensate the damage done to commercial fish stocks :—

(i) *Effluents from the Erode-Cauvery Textiles, Limited, Bhavani and their effect on the fisheries of the Cauvery river.*—The Erode Cauvery Textiles, Limited, at Bhavani, process unbleached handloom cloth and let into the adjacent Cauvery river about 21,000 gallons of waste waters for one batch of 15,000 yards of cloth processed in 72 hours. The effluents were turbid and acidic with a pH ranging from 5.2 to 5.4. The Bio-chemical Oxygen Demand (3 days) of the wastes varied from 1,000 to 1,600 p.p.m. and the suspended solids from 60 to 180 p.p.m. as against 20 p.p.m. of B.O.D. and 30 p.p.m. of suspended matter prescribed for the general standard effluent by the Royal Commission on Sewage Disposal. The admixture of the effluents with the river water was

found to change the character of the rheo-plankton which became rich in chlorophyceae (*Ankistrodesmus*, *Mougeotia*, *Pediastrum simplex* and *Spirogyra*) which are usually associated with polluted conditions of a river. Laboratory experiments with test fishes like *Labeo* spp., *Cirrhina reba*, *Barbus hexagynolepis*, *B. Carnaticus*, *B. Chrysopoma* revealed that the untreated effluents were harmful to fish life and that to render them innocuous, they have to be diluted 2,000 times or treated with 20 grains of lime and 10 grains of alum per gallon of effluent and allowed to settle for about eight hours. But this dilution cannot always be ensured in the river as the flow of water in both the Cauveri and Bhavani rivers is controlled by dams constructed above Bhavani and so on occasions, especially during summer months, may be very low. The factory authorities were therefore asked to treat the effluents as described above and discharge the treated wastes in the middle of the river where there is maximum flow.

(ii) 2. *Studies regarding the disposal of waste waters from the United Bleachers, Limited, Mettupalayam, into the Bhavani river.*—The United Bleachers, Limited, at Mettupalayam, is engaged in the bleaching and finishing of grey cotton cloth received from its constituent mills. The ultimate processing capacity of the plant is about 20,000 lb. of material per day; but at present only 5,000 lb. of cloth (i.e., 20,000 to 25,000 yards) are being deterged and about 175,000 gallons of effluents are being discharged daily into the adjacent Bhavani river. The effluents are made of the concentrated waste liquors from desizing, kiering, grey sour, chemicking and antichlor operations of the wash waters from the above process. The concentrated waste liquors had high suspended and putrescible organic matter and were highly alkaline on some occasions and highly acidic on certain other occasions depending upon the processes treatment taking place. The wash waters were comparatively less harmful. Further experiments are in progress to determine the minimum dilution or treatment of the wastes necessary for the safety of fish life in the Bhavani river.

(iii) *Pollution of Ellis surplus channel by factory wastes from the Mettur Chemical and Industrial Corporation, Limited, Mettur.*—This was investigated in the previous years and suggestions had been made for the diversion of the effluents drain to the main river where sufficient dilution of the wastes would be ensured. But the above suggestions were not implemented due to certain practical difficulties in the laying of the suggested pipe line along the rock-cut near the Ellis surplus. The possibilities of alternative methods of disposal of the effluents were therefore reinvestigated during the year. The factory authorities have now agreed to soak the effluents in a portion of their lands near the factory instead of letting them into the river or Ellis surplus.

5. *Hydrobiological surveys of inland waters.*—At the request of regional Assistant Directors, hydrobiological surveys of the following inland waters were made to find out their suitability for fish culture and increasing the production :—

(1) *Kodai Fish Farm.*—The ponds on the Kodai fish farm at Kodai-kanal in upper Palni Hills were examined in April 1954 at the request of the Assistant Director of Fisheries, Madurai. The pond waters were turbid and acidic with a pH of 6.6 and soft with a temporary hardness of 25 p.p.m. and were poor in phytoplankton which was represented by a few individuals of *Ankistrodesmus*, *Ulothrix*, *Cosmarium*, *Navicula Fragillaria*, *Melosira*, *Oedogonium*, *Staurostrum* and *Synedra*. Lime treatment was suggested to make the pond waters alkaline and more productive.

(2) *Quarry pools at Virudhunagar.*—The quarry pool No. 4 at Virudhunagar which is proposed to be taken up by the department for pisciculture was examined in July 1954. The pool had a waterspread of 1.5 acres and a maximum depth of 15 feet. The pool water was alkaline with a pH of 7.8 and brackish with a chlorinity of 1,840 p.p.m. Suggestions were made for stocking the pools with salt water fishes like *Chanos chanos*, *Etrophus suratensis* *Mugil* spp. and *Tilapia mossambica*.

(3) *Temple tanks at Srivilliputtur.*—The Thirumukkulam tank owned by Sri Nachiar Devasthanam and the Sivagangaitheppam attached to Sri Vaidyanathaswami temple at Srivilliputtur, were examined in July 1954 for their suitability for fish culture. The Thirumukkulam tank is about 8 acres in extent and is used by people for bathing and washing clothes. The tank water was brownish and turbid with a pH of 7.4 and phytoplankton composed of *Scenedesmus*, *Oedogonium* and *Pediastrum*. The Sivagangaitheppam was only about two acres in waterspread but was greenish in colour with a bloom of blue green algae like many other temple tanks. Suggestions were made to take up both the above tanks for the culture of fishes like *Catla catla*, *Labeo* spp., *Chanos chanos* and *Cyprinus carpio*.

(4) The Mangalam reservoir was surveyed in May 1954 when it was under construction. The Mangalam reservoir when completed will have a waterspread of 900 acres with a maximum depth of 55 feet. The existing fishery of the Cherukkan Puzha across which the dam is being constructed, consisted of the following absolutely uneconomical fishes : *Rasbora daniconius* (31 per cent), *Danio malabaricus* (22 per cent), *Discognathus lamta* (15 per cent), *Nuria danrica* (12 per cent), *Barbus ticto* (6 per cent), *Callichrous malabaricus* (4 per cent), *Danio nilgiriensis* (4 per cent) and *Barbus filamentosus* (3 per cent). The fishery was poor giving only a yield of 1.2 oz. of fish per fishing effort with cast net. The pool formed already at the dam site showed a high planktonic content and alkalinity with a pH of 8.8. When fully formed, the reservoir will cover rich verdant areas that will increase the productivity of the water. Suggestions were made to the Assistant Director of Fisheries, Malabar, to stock the reservoir after its formation with the following fishes :—

	Nos.
<i>Labeo (fimbriatus and L. kontius)</i>	100,000
<i>Cirrhina cirrhosa</i>	100,000
<i>Barbus dubius</i>	50,000
<i>Catla catla</i>	50,000

(5) *Webster moat, Tanjavoor.*—A hydrobiological survey of the Webster moat at Tanjavoor was made in November 1954 to ascertain the cause for the phenomenal growth of *Tilapia mossambica* in this moat. There was a thick and almost permanent bloom of the blue green algae *microcystis* spp. in the moat, providing an unlimited supply of food for the fish. The moat seems to be freely used as a public latrine and as such was rich in organic matter and nutrients. Phosphates were present in rich proportions ranging from 0.3 to 0.4 p.p.m. The continuous presence of these nutrients, warmth and sunshine in optimum conditions in the moat may account for the permanent bloom of the cyanophycean element.

(6) *Brackish water fish farms in South Kanara.*—At the request of the Assistant Director of Fisheries, Mangalore, the proposed sites for the brackish water fish farms at Kolichikambala near Mulki and Pavanji were inspected in

March 1955. An examination of the water, soil and plankton samples collected from the sites confirmed the high productivity and suitability of all the water pieces selected for the farm. However, suggestions were made for the construction of only one fish farm to begin with at Kollichikambala near Mulki as it is a small compact piece of water branching off from Mulki backwaters about $\frac{1}{2}$ mile from the mouth of river like an arm of it. The arm ends as a blind alley and has an average depth of 1.5 feet to 4 feet of water at high tide. This can be easily bunded off into three compartments, providing the first compartment with an alley way for the diversion of flood water during rains. The availability of great numbers of *Mugil dussumieri*, *Mugil jerdoni*, *Leiognathus splendens*, *Gerres*, *Cyena*, and *Peneus indicus* and the occurrence of a good number of planktonic organisms reveal a high productive capacity of these waters.

6. *Population studies of the fishes of Bhavanisagar Reservoir.*—The studies have been undertaken with regard to the *Barbus* fishery of the reservoir. Only after the shifting of the entire research station to this place, this work has been systematically attended to. The studies conducted so far reveal that *Barbus hexaganolepis* and *B. dubius* form the mainstay of the *Barbus* fishery of the reservoir, that each of these species is composed of five age classes in the commercially exploitable stage and that the present intensity of fishing does not affect the population in any deleterious way. The investigations are proceeding with the examination of age classes and recruitment of new broods. Studies on fecundity and correlation of it with fish production are now being followed up.

The Honorary Research Scholar at this station has taken up similar studies on the population of cat fishes of the reservoir.

7. *Segregation of Bhavani carp fry.*—Preliminary experiments on the segregation of carp fry collected at Bhavani were made on the basis of their carbon-dioxide tolerance, oxygen tension and reaction to varying intensities of different coloured lights. The work so far conducted have shown the possibility of segregating the fry into three bulks containing differential percentages of various species of economical and uneconomical fishes. The work is being continued.

8. *Studies on Trichogaster fasciatus.*—The population and bionomical studies on *Trichogaster* have been completed and the results are under tabulation for publication. The main factor that has come out as a result of the studies is that unlike the accepted belief, *Trichogaster* is not at all a good cyclopcidal fish.

9. *Investigations on the spawning of Mirror carp.*—Detailed investigations were made on the spawning of Mirror carp in Ootacamund lake, Yercaud lake and Palanamkurichi tank, Palghat. In the light of these investigations experiments have been undertaken on the breeding of Mirror carp in the ponds and tanks of the plains on Indonesian methods. Definite recommendations were made for the successful breeding of Mirror carp in the Ootacamund and Yercaud lakes.

10. *Trout fisheries and Trout streams of the Nilgiris.*—The existing knowledge on the food, age, growth and taxonomy of the Nilgiri Trout was assessed and the alleged depreciation in the quality and population of the Trout of the Nilgiris were critically examined. Hydrological data and catch

details were reviewed and specific recommendations were submitted to improve the Trout fisheries of the Nilgiris. The investigations showed the following:—

(1) The food available in the Trout streams is sufficient for the subsistence of the present population in a healthy condition.

(2) The rate of growth compares very favourably with the trout waters in other countries.

(3) The size group of 8 inches to 12 inches was very heavily overfished. The size limit has to be raised to 12 inches when the quantity of the catchable trout will improve.

The details of the work have been sent for publication.

11. *Investigations on Tilapia Mossambica.*—(1) Detailed investigations were made on the food, rate of growth and breeding of *Tilapia mossambica* and its effect on the food and growth of other indigenous fishes. The investigations showed the following:—

(i) Grows to a size of 10 cms. in 90 days.

(ii) Breeds for the first time in 90 to 95 days.

(iii) After the first breeding, it breeds every 28th to 35th day.

(iv) The fish becomes sterile when it is 16 to 20 cms. in length in 16 to 18 months.

(v) The fish feeds mostly on filamentous algae like *Spirogyra*, *Oscillatoria* and *Ulothrix* and Hydrophytes like *Hydrilla*.

(2) In a pond infested with very large quantities of *Microcystis*, *Tilapia* is found to grow very quickly to 10 inches in 15 months. It is also found to feed on raw sewage also.

(3) A comparative percentage analysis of food of *Tilapia* and the major carps is given below:—

		Phylo plankton.	Zoo plankton.	Filamentous algae.	Hydrophytes.	Other crustaceans.	Insecta.	Fish.	Molluscs.	Worms.	Mud and sand.
<i>Tilapia</i>		21	5.6	52	12	1	..	0.1	..	..	6
<i>Catla-catla</i>		28	15.0	10	30	..	..	..	3.0	..	4
<i>Labeo fimbriatus</i>		26	1.0	38	..	4	3	..	..	..	28.0
<i>L. Kontius</i>		21	4.0	16	19	3	9	..	..	6.0	22.0
<i>Cirrhitina cirrhosa</i>		52	22.0	19	..	7	..	..	..	..	..

(4) *Relationship in growth with other carps.*—Detailed investigations had been done on the growth of carps alone and with *Tilapia*. The carps selected were *Catla-catla*, *Labeo fimbriatus*, *Labeo kontius*, *Cirrhitina cirrhosa* and *Cirrhitina reba*. The growth of all carps except *Labeo fimbriatus* did not show any variations between pure culture and mixed culture with *Tilapia* both in length and weight for a period of 14 months.

(5) The investigations done over the past two years show that *Tilapia* is a minor competitor for food only with *Labeo fimbriatus* amongst major carps. Even here the difference in the rate of growth of *Labeo fimbriatus* alone and together with *Tilapia* has been only 3 cms. in length and 9 gms. in weight which are negligible in a pond culture. All the other major carps did not show variation at all.

(6) *Tilapia* first makes a small depression in the bottom called Redd where the female lays the eggs. The eggs are then fertilized by the male after which the female keeps the eggs inside the mouth. The eggs and the

young ones are retained in the mouth till 10 or 12 days after hatching. At each breeding 80 to 400 eggs are laid.

(7) (a) *Tilapia* grows and breeds in a salinity of 42 parts per mile, and also in the sweetest water. It grows and breeds even in an altitude of 7,500 feet. The fish grows and breeds normally in a depth of water of 4 to 5 inches.

(b) If the water level is kept below 1 foot, *Tilapia* is found to mature at a size of 55 to 60 mm. They breed also at this size. The generations of young ones taken from the stock given by this "precaution" spawners grow, however, to normal size if planted in water retaining a depth of over one foot.

(8) (a) The best conditions for culture of *Tilapia* are found to be—

- (a) a bottom of clay and sand mixture;
- (b) a very fair vegetation of hydrilla;
- (c) a pH of 8.5 to 9.4;
- (d) a flow of sewage into the pond; and
- (e) a minimum average depth of 5 feet of water.

Under the above conditions, *Tilapia* has grown to a size of 12 inches (30 cms.) and a weight of 1½ lb. in 22 months. Specimen up to 14 inches were recorded in the Webster moat at Tanjavoor.

(b) Comparative yield shows that in a pond of 20 feet by 20 feet by 2 feet (retaining water for five months) 37 lb. of *Tilapia* can be taken with availability of plants like Hydrilla. This is an yield of nearly 3,700 lb. per acre.

12. *Natural History of Riverine Fishes.*—The natural history of the Cauvery fishes was taken up for study and monthly collections and observations were made from the various collection centres. The observations conducted so far have yielded the following preliminary results, which are not to be taken as yet conclusive :—

(1) In the Cauvery-Coleroon irrigation system, the various regulators and shutters bring about a rich congregation of fish below them which can be easily caught and thus may lead to serious damage to the natural fishery unless exploited judiciously.

(2) The fishery worth of the various river branches and channels was computed from their rental values in the absence of any other suitable method for an assessment. This study has shown that—

(a) Water courses maintained for irrigation alone yield the highest fishery. This may be due to the greater ayacut under them which helps to bring in more fish to the rivers from the paddy fields, where the eggs and larvæ get washed down during the floods.

(b) Rivers maintained for both irrigation and drainage come next in the yield of fishery. This is explained by the fact that fish always tend to swim against current and are not drained into the river along with its drained water.

(c) Rivers maintained for drainage alone yield the lowest fishery.

(3) Samples of fish collections made from various regulators have shown that a diurnal cycle in the appearance of the various varieties could be probably due to differential Metabolism, viz., Minnows like *Rasbora*, *Nuria*, *Amblypharyngodon*, *Labuca* (*Perilampus*), etc., generally appear in larger numbers in the early morning from about 5 a.m. *Cirrhina reba* and *Barbus* appear in larger numbers. After 8 p.m. the collections had good numbers of *Cirrhina cirrhosa*. The night collections (after 10 p.m.) generally were dominated by *Chela*.

More detailed work on this has to be done and if this diurnal cycle could be clearly fixed up, the collection and segregation of economic carp seed will be eased to a very great extent.

(4) Random samplings have shown that of the carps of Cauvery system, roughly 30 per cent are *Cirrhina*, 30 per cent *Labeo* and *catla* nearly 3 per cent. The balance are made up of *Barbus*, etc.

(5) Size frequency studies of the fishes sampled at the various regulators have revealed :—

(a) that there is a succession of spawning activity amongst the major carps at short intervals, there being at least four spawning activities; and

(b) that annual recruitments to the fishery of all the connected rivers should be from one source, or if the fish are spawning anywhere in the length of the river, the spawning should approximately be at the same time everywhere.

(6) Big tanks like temple tanks and those that are very deep and are not fishable, reservoirs like Veeranam and Mettur, play an important part in maintaining adult fish stocks for repopulating the river stretches. The fishes spawn with the onset of floods in the rivers, when connections get established with the tanks. The spawn get washed down to the paddy fields and smaller irrigation tanks where they grow up. When they are sufficiently grown up to withstand the velocity of water in the rivers and channels, they start migrating in their millions and reach the river system, because of the fact that during summer months almost the entire river stretch get dried up and those deep pools called "madugus" also get deprived of their fish stock by intense fishing with dynamite, etc. The absence of major irrigation tanks or reservoirs in river system like that of river Tambraparni, account for the low fish population in those rivers.

(7) Field observations made in river Bhavani have shown that in the different streamlets falling into the main river, different varieties of young fishes could be collected during the floods and that pure collections of the main river usually show the presence of large numbers of the young ones of economic varieties of fishes like *Cirrhina* and *Labeo*. This has given an indication that different velocity of water play a significant role in the investigation of spawning runs of different fishes more than other factors like temperature, turbidity, pH, etc. as even in the bund of tanks of Bengal it is seen that fish not only spawn at the shallow inlet where only well-oxygenated muddy water flows but also at deeper outlet areas where water runs out and where approximately an equal velocity exists as at the inlet.

(8) A point of interest was noticed in the Zoo-geography of the fishes of the Cauvery system, this year in the deltaic areas, viz., the appearance in fair numbers of *Barbus hexagonolepis* at various regulators. The distribution of this fish is usually limited to the upper reaches of the rivers, being a typical hill-stream fish. Even the fishermen of the delta area reported that they had not caught so much *B. hexagonolepis* in previous years. The coming into existence of one more fish in the fishery of the delta seems prospective. This fish was originally a good fishery in the Bhavani river more than in other rivers. The extension of its distribution to delta areas is probably the result of the construction of the Bhavanisagar Dam.

(9) *Bionomical notes*—(a) *Catla-catla*.—This is a plankton feeder. It breeds with the onset of rains in July. The growth of this fish in its natural surroundings as revealed by length frequency distribution is about 25 mms. per month during the months of study till now. The young ones of this fish appeared late this year as compared to last year.

(b) *Labeo fimbriatus*.—The food of this consists mainly of phytoplankton and hydrophytes. This also breeds with the onset of monsoon. The growth of this fish in the Cauvery river is seen to be about 16 mms. per month. Length frequency studies indicate about four spawnings of this fish this year.

(c) *Labeo kontius*.—It is also a plankton feeder growing about 13 mms. per month. A good percentage of the food consists of mud and sand. Fry of this fish appeared in July.

(d) *Cirrhina cirrhosa*.—It is a plankton feeder. The growth of this fish is about 17 mms. per month in the rivers. Young ones appeared in late July.

(e) *Cirrhina reba*.—It is a plankton feeder. It grows to about 11 mms. per month.

(f) *Chela argentea*.—The average food of this fish is about 0.5 c.c. and it is predominantly an insectivore. The percentage of males were by far greater than the females. The fecundity is about 1,500 and diameter of the ovarian ovum is 0.65 mm.

(g) *Chela clupeoides*.—This grows bigger than *C. argentea* and the average food of this is about 0.35 c.c. This is predominantly a cyclopsidal fish, nearly 80 per cent of its food being cyclops. The fecundity is from 3,500 to 15,000 the ovum measuring 0.6 mms. in diameter. The percentage of males in the population is not so much as in *C. argentea*.

(h) *Danio malabaricus*.—The food of this fish is about 0.1 c.c. and consists mainly of remains of insects. Percentage of males is greater in the population. Fecundity varies from 1,000 to 4,000 depending on size of fish and the diameter of the ovum is 1 mm. in diameter.

(j) *Perilampus spp.*—It is an insect feeder. Fecundity is from 1,500 to 2,000 the ovum measuring 1 mm. in diameter.

(k) *Barilius gatensis*.—It is an insect feeder. Fecundity is from 1,500 to 2,000 the ovum measuring 1 mm. in diameter.

(l) *Barbus mahecola*.—It is mainly an insect feeder. The presence of good percentage of sand in its food confirms its habitat being near the shore line.

(m) *Barbus filamentosus*.—Insects and copepods form its diet in fairly equal proportions.

13. *Experiments on food conversion factors*.—The question of full utilization of available food in a piece of water by the fish for giving maximum yield leads to the consideration of the efficiency of food conversion. The conversion factors denote the unit weight gained by the fish per unit of food taken. Experiments for determination of this factor have been completed for *Saccharin branchus fossilis*. They are under investigation for *Tilapia mossambica*.

14. *Studies on Eel and Spiny Eel culture*.—This work was commenced only towards the end of January 1955. 275 young eels (*Anguilla sppn.*) have been introduced into experimental ponds at Chetput and their growth and feeding are under observation.

Field data on Spiny Eel and their bionomics are collected at Bhavani-sagar.

15. *Paddy-cum-fish culture*.—The biostatistical and hydrological work connected with paddy-cum-fish culture was conducted by the Freshwater Research Station. 353.5 acres of the paddy fields selected for paddy-cum-fish culture were brought under the investigation by this section. Stocking was done according to randomized members planned by the Director of Statistics, Madras. In order to find out the suitability of the species, three species, viz.,

Labeo fimbriatus, *Cirrhina cirrhosa* and *Barbus chrysopoma* were used. Three intensities of stocking, viz., 500 per acre, 100 per acre and 1,500 per acre were applied. At the end of kuruvai harvest, *Labeo fimbriatus*, and *Cirrhina cirrhosa* showed an increase of 25 per cent in length and 29 per cent in weight. The hydrological data showed that—

(a) the temperature fluctuations were within range of tolerance by fish;

(b) pH was more on the alkaline side and so favourable for the growth of carps;

(c) that the oxygen content was sufficient for the requirements of the fish;

(d) the soils being rich in ammonical and nitrate nitrogen, phosphorous and calcium, ensured a good supply of these nutrients for the growth of fish food; and

(e) that the turbidity of water alone was slightly inimical to fish.

The production of phytoplankton and zooplankton was sufficiently rich to suggest an intensity of stocking of 5,000 per acre. The results of kuruvai showed a production of 180 lb. per acre in two months. With this in view intensified stocking was done for the sambai. Before any results could be got, the paddy fields had to meet with two heavy floods and the experiments had to be stopped further.

16. *Fish mortality and Fish parasites*.—The following three cases of fish mortalities were investigated during the year to find out the causes and suggest suitable measures to prevent their recurrence:—

(i) *Fish mortality in Virudhunagar quarry pools*.—Frequent cases of sudden and large-scale mortalities of fish in Virudhunagar quarry pools were reported. Investigations conducted revealed that the ponds were poor in macrophytic vegetation and on certain occasions were deficient in dissolved oxygen. The organic pollution by washing and cleaning of men and cattle was also in excess causing very high alkalinity and production of green and blue green algae in one pond. The introduction of some floating vegetation like water hyacinth and pistia, occasional agitation of the water to aerate and prevention of indiscriminate pollution of these pools, will considerably help in decreasing the incidence of such mortalities.

(ii) *Mortality of fish in Bhavani river*.—A case of drifting of dead fish on large scale in the Bhavani river was reported by the people of Mettupalayam and Sirumugul on 27th December 1954 and was immediately investigated. The fishes affected were *Barbus carnaticus*, *B. dubius*, *B. dorsalis*, *Mastacembelus spp.*, *Marcones spp.* and *Chela spp.* ranging from 3 inches to 18 inches in length. The investigations showed that the mortality was not due to any epidemics or disease or parasites or limnological disturbance. The only possible causative factor of this mortality appeared to be the poisoning of some pools in the upper reaches by human agencies. The fishery conservancy measures already in existence in this area have to be stiffened for preventing such recurrences.

(iii) *Mortality of fish in Moyar river*.—A case of large-scale mortality of fishes in Moyar river near Patti village was investigated on 9th and 10th March 1955. The fishes affected were mostly cat fishes like *Macrones spp.*, *Wallago spp.* and *Callichrous spp.*, besides very few carps and cyprinodonts (Tooth carps). The studies revealed sudden flood conditions in the Moyar river with consequent high suspended matter amounting to as much as 156 parts per mile. The gills of all the affected fishes and intestines of many were clogged with mud. These indicated that the mortality has been the result of clogging of the gills of these fishes with mud derived from the flood waters.

Fish Parasites—(a) *On the Black grub, Diplostomum spp. infection in Catla*.—In the collections of catla fingerlings, a black "variety" of fingerlings was often noticed which were stunted in growth when cultured. In the investigations conducted, it was found that this "black variety" was infested with cysts of the Black grub parasite "*Diplostomum*". Experimental infection of the parasites on ducks did not reveal any fixation of the intermediary host. Work on the causative factor of this "black" nature and the systematics of the parasite has been completed. Experiments on the effect of infection on the growth of fish and methods of eradication of the parasite are under way. A paper on the parasite has been published in the "Nature" 1954.

(b) *Parasites of Bhavanisagar fish*.—Investigations undertaken by the Honorary Research Worker have revealed a high rate of infection of the leay trematode, *Isoparorchis trisimilitubis*, in the air bladder of the Bhavanisagar cat fishes "*Wallogopia attu* and *Macrones aop*". Several other trematodes, nematodes and cestode parasites have also been collected and these are under study.

17. *Experiments on the transport of fish seeds*.—Detailed experiments were conducted to reduce the mortality of *Etiopius suratensis* fingerlings during the stages of acclimatization and transport. The experiments revealed the following:—

(1) Mortality is found to be primarily due to rough handling, rapid acclimatization and lack of enough oxygen during transport to meet the increased oxygen demand of the fingerlings.

(2) These could be overcome by

(a) using a net like Tallu valai that does not disturb the bottom sediment;

(b) by hauling only for 2 or 3 minutes at a time;

(c) by using only small hauls in the nursery and removing only 15 to 20 fingerlings in each haul;

(d) by gradual transference of fish from salt water to fresh water in four definite stages, each stage being separated by a time interval of four hours.

Salt water, first stage	80 per cent of salt water.
4 hours later, second stage ..	40 per cent of salt water.
4 hours later, third stage and fourth stage.	10 per cent salt water and freshwater.

(e) by retaining the acclimatized fingerlings for a minimum period of 36 hours in the freshwater; and

(f) by either transporting only 25 numbers in each tin carrier with periodical changing of water en route (every 6 hours) or by transporting in oxygen tin carriers.

It has been found that for a transport of 48 hours duration, 25 *Etiopius* of 1 inch to 1½ inches size can stand without mortality in a round tin carrier with changes of water at every 6 hours period.

At the same time 150 *Etiopius suratensis* of 1 inch to 1½ inches size can be transported in 1 oxygen tin without any mortality and without any further oxygenation or change of water.

18. *Miscellaneous items*—JRI *Experiments on the effect of Gammaxene P. 520 on fish life*.—Gammaxene P. 520 is a chemical insecticide used by the State Public Health Department in their anti-malarial operations. Usually a suspension of 1 ounce of the chemical in one gallon of water is prepared and sprayed at the rate of 13.4 gallons of the suspension per acre of water surface.

In the case of ponds, the spraying is usually restricted to the margin only for a width of about 3 feet. The effect of this chemical treatment on fish life in ponds was studied during the year when larvæ of the mosquito, *Anopheles, culicifacies* the local vector type, was found in large numbers in the margins of the fish farm ponds at Bhavanisagar. A series of laboratory experiments were also conducted to find the lethal limits of the chemical for fish life. It would appear from these experiments that Gammaxene P. 520 in the normal dose in which it is used by the Public Health Authorities for the control of mosquito larvæ near the margins of ponds, is not harmful to fish life. However, the insecticide is lethal to fish life in concentrations above 6 p.p.m. and so care should be taken to see that this concentration is not reached especially while treating shallow ponds.

(2) *Experiments on weed controls*.—At the request of the Assistant Director, Madurai, the eradication of the excessive growth of vegetation in the Wilson Fish Farm and Khaleeli channel at Ootacamund was taken up in August 1954. The fish farm ponds had floating vegetation like water hyacinth and lilies and submerged vegetation like *Hydrilla verticillata* and all these died in about three weeks after treatment with 'Dicox' at the rate of 1 ounce per 100 square feet. The Khaleeli channel was silted up considerably and mostly contained land vegetation and monocots only. As they will not be affected by 'Dicox', suggestion were made for their complete removal by manual labour.

The demonstration tanks at Palghat, namely, Blankulam and Manan-ghatkulam, were completely covered by overwhelming growth of the water hyacinth in December 1954. The vegetation was treated with 'Fernoxene' at the rate of 2.5 lb. per acre on 8th December 1954 and by the first week of January 1955 all the treated vegetation had died, proving the usefulness of the weedicide.

Fresh water Biological Research for the year 1955-56.

I. Hydrological Section,

1. *Studies on the Food Value of Fresh Water Fishes*.—(Research Assistant, Hydrology.)

2. *Investigation on the use of fish poisons in the eradication of predatory fishes*.—(Research Assistant, Hydrology.)

3. *Chemical Studies of the Bhavanisagar Reservoir with special reference to possibilities in production and exploitation of fish*.—(Research Assistant, Hydrology.)

4. *Aquatic manuring experiments in Bhavanisagar Fish Farm*.—(Research Assistants, Soil Analysis.)

5. *Analysis of Pond Bottom Muds in relation to their part in Fish Productivity*.—(Research Assistants, Soil Analysis.)

6. *Investigations of Pollutional Effects on Fisheries*.—(Hydrologist.)

7. *Studies on the oxygen requirements of fresh water fishes*.—(Hydrologist.)

II. Biological Section.

1. *Studies on the efficiency of efficient fishing gears in the Bhavanisagar Reservoir and estimation of catch*.—Research Assistant (Fresh Water Biology.)

2. *Experiments on the Segregation of carp fry and reduction of mortality in nurseries and in transport*.—Research Assistant (Fluviatile.)

3. Detailed studies on the riverine fish *Cirrhina cirrhosa*—Research Assistant (Fluviatile).

4. Utility of *Rasbora daniconius* and *Chela clupeoides* in the control of Guina-Worm disease with statistical application to one fish—Public Health Fish Officer, Madras.

5. Studies on fish parasites—Public Health Fish Officer, Madras.

6. Further studies on the culture of the blue-green algae *Microcystis* spp.—Algologist.

7. Effect of *Microcystis* spp. on the survival and growth of *Tilapia mossambica*, *Cyprinus carpio*, *Cirrhina Cirrhos* and *Labeo* spp.—Algologist.

8. Studies on *Tilapia mossambica*.

(a) Methods of cropping—Assistant Director of Fisheries (Fresh Water Biology).

(b) Convertability of *Hydrilla verticellata*—Assistant Director of Fisheries (Fresh Water Biology).

(c) Combined culture with Mirror carp—Assistant Director of Fisheries (Fresh Water Biology).

9. Investigations on the Spawning of Mirror Carp—Assistant Director of Fisheries (Fresh Water Biology).

19. *Extension work*.—The Freshwater Biological Station has advised or helped the following persons and institutions on subjects noted against each :—

(1) Dr. Barooah, Director of Fisheries, Assam—Culture of Gourami, Mirror carp, Etroplus and Tilapia.

(2) Dr. Zargar, Deputy Director of Fisheries, Madhya Pradesh—Culture of Tilapia and spawning of carps.

(3) Sri V. R. Pantulu, Assistant Research Officer, Central Inland Fisheries, Cuttack—Productivity of Ponds and Tanks.

(4) Sri Vartak, Bombay—Pond Fisheries and Reservoir Fisheries.

(5) Sri Baburao Yedke, Bagalgot—Tilapia and Mirror Carp culture.

(6) Sri Jogindra Rai Singh Gill, Amritsar, Punjab—Culture of Mirror Carps and Tilapia and growth of Trout.

(7) *Seed Fruit Products*, Mandi, Himachal Pradesh—Culture of Tilapia, Catla and Rohu at high altitude.

(8) Sri K. C. Chopra and Sons, Amritsar, Punjab—Requirements and details for starting Commercial Pond Fish Culture.

(9) Sri I.B.F. De Sa, Government of India Overseas Communication Service, Madras—Tilapia culture.

(10) Sri M. K. Sur, Mondhapara, Raipur—Tilapia culture.

(11) Miss Sita Kirloskar, Lucknow University—Methodology in the research on "Alimentation of Fishes".

(12) Sri H. R. Srinivasachar, Mysore—Availability and identification of fry of *Barbus*, *Esomus danrica* and *Chela* for studies on their Chondrocrania.

(13) Mr. Edwin, S. Iversen, Fisheries Research Biologist, Fish and Wild Life Service, Honolulu—Determination of the age and growth of Fishes.

(14) Mademoiselle G. Olivereaux, University of Sorbonne, Paris—Methodology in the studies of age and growth rate of fishes.

(15) Dr. Gokhale, Fisheries Department, Saurashtra—Condition factor in fishes and its utility in determination of spawning of fishes.

(16) Assistant Director of Fisheries, Vellore—Reduction of mortality of fingerlings of *Etroplus suratensis*.

(17) Assistant Director of Fisheries, Tanjavoor—Fish seed collection and transport, Tilapia culture in Webster meat and paddy-cum-fish culture.

(18) Assistant Director of Fisheries, Madurai—Seregration carp fry, decline in the Trout Fisheries, spawning of Mirror carp in Ootacamund lake, mortality of fishes in Virudhunagar.

(19) Assistant Director of Fisheries, Mangalore—Brackish water, fish farming.

(20) Assistant Director of Fisheries, Malabar—*Etroplus* transport, spawning of Mirror carps in plains and fish culture in Mangalam Reservoir.

(21) Dr. V. K. John, Madras—Culture of Catla, *Etroplus* and Tilapia in cement cisterns.

(22) Assistant Director of Fisheries, Mettur Dam—Fisheries Research in Mettur Reservoir.

(23) Sri H. K. Punja, Statistical Officer, Madras—Statistical plan for collection of Inland Fisheries Statistics.

(24) Sri Om, Prakash, New Delhi—Aquarium fishes and Aquarium maintenance.

(25) Zamindar of Uthukuli, Uthukuli—Aquarium maintenance and Culture of carps.

(26) Dr. B. Sunder Raj, retired Director of Fisheries, Madras—Sexual dimorphism in *Barbus curmuca*.

(27) Assistant Fisheries Demonstrator, Puthur—Identification of fish fry and aquatic weeds.

(28) J. W. Thomas, Allepey—Fish farming in Tea Estates.

Besides several queries have been answered on the maintenance of aquarium fisheries.

20. *Training*.—Training in Fresh Water Biology and fish culture has been imparted to the following :—

(1) Students of Fisheries Technology of Kalamaserry Polytechnic, Travancore-Cochin State.

(2) All-India Fisheries Trainees of Central Inland Fisheries Training Centre, Calcutta.

(3) Inspector of Fisheries, Visakhapatnam, Andhra State.

(4) Assistant Inspector of Fisheries (Departmental Trainee).

(5) Village Guides of Village Guides Training Centre, Parli.

(6) Village Guides of Village Guides Training Centre, Gandhinagar.

21. *Visitors*.—The following persons visited the Research Station during the year :—

(1) The *ad hoc* Research Committee of Government of India consisting of Dr. B. N. Chopra, Dr. N. K. Panikkar and Dr. W. H. Reich in May 1954.

(2) Dr. Barooah, Director of Fisheries, Assam, in September 1954.

(3) Dr. Zargar, Deputy Director of Veterinary Services and Fisheries, Madhya Pradesh in October 1954.

(4) Sri K. Gopinatha Pillai, Director of Fisheries, Travancore-Cochin State in November 1954.

(5) Members of the States Reorganization Committee constituted by Government of India in August 1954.

(6) Sri K. V. K. Sastry, Lecturer in Statistics, Indian Council of Agriculture Research, Delhi in November 1954.

(7) Sri V. R. Pantulu, Assistant Research Officer, Central Inland Fisheries, Cuttack in December 1954.

(8) Sri Vartak, Fisheries Scholar, Bombay State in March 1955.

C. FISHERIES TECHNOLOGICAL RESEARCH.

1. Fisheries Technological Station.

Sri R. Venkataraman, M.Sc., A.R.I.C., continued as the Superintendent, throughout the year except during a short period from 24th August to 9th November 1954 when he was on earned leave and Sri S. T. Chari, Research Assistant (Biochemical), held full additional charge.

A. *Nutrition studies—Chromatographic studies on the amino acid composition of fish proteins.*—After considerable study on the technique of paper-partition, chromatography of pure amino acids, their movements, the effectiveness of various solvent systems to separate the 'overlapping' amino acids, work was taken up on the amino-acid composition of the fish muscle proteins. During the period under review, the study on the various fishes, viz., (1) White sardine (*Sardinella fimbriata*), (2) Black pomfret (*Stromateus niger*) and (3) Oil Sardines (*Sardinella longiceps*), was taken up. As many as 18 amino-acids which were present in the above fishes were estimated quantitatively. Further work on the proteins of other fishes will be continued during the current year.

B. *Studies on salts and salted products*—(1) *Studies on salts and salted fish.*—This important investigation was vigorously pursued. As many as 30 salt samples were analysed for their chemical composition and bacterial contents and interesting results were obtained. It was found that salts low in total magnesium content harboured very few or no red halophiles while salts having high magnesium contents harboured many red halophiles. The finding is very important in the use of these salts for fish-curing. Apart from the usual defect of cure in high magnesium salts, it was noted that there was also the microbiological instability. Further work on the activity of these chromogenic bacteria continues.

(2) *Experiments on fish-curing salts.*—Generally, powdery salt from Tuticorin is used for curing fish in the West Coast Yards. This contains less than 90 per cent NaCl whereas the standard fixed by the Indian Standards Institute for edible salt is 96 per cent. A much more improved quality of salt, viz., crushed salt was introduced in the yards in order to bring up the quality of salt used in fish curing to the level of the standard fixed. This salt is of fine white crystals and contains 93.96 per cent NaCl. The insolubles in this was less than 0.5 per cent whereas in the powdery salt, this used to be more than 2 per cent. Different samples of crushed and powdery salts received from various fish-curing yards were analysed.

The quality of fish cured with crushed salt was studied. Mettur carps and pomfrets were cured using crushed salt, and powdery salt as control. It was seen that the samples of fish cured with crushed salt presented a clean white appearance and had better keeping quality. The only difficulty experienced in the use of this salt was the highly hygroscopic nature of the salt. Further work is in progress.

(3) *Semi-dried prawns.*—Experiments were conducted to find out the yield of semi-dried prawns according to the species and the size of the raw prawns. The results were very useful to check up frauds and pilferage in commercial processing of the prawns. The moisture contents and the sodium chloride at different stages of processing were worked out for a comparative study of the quality of the finished product. Big sized prawns gave better yield of semi-dried prawns.

(4) "*Gorika Puli*".—This is widely used in South Kanara for curing fish by the "Colombo Method". Chromatographic investigation revealed that the major organic acids of this fruit were citric and tartaric. The amino-acid composition is being worked out.

C. *Canning.*—The help of this station was sought for by a leading firm, namely, the Malabar Fisheries Company, Chaliyam, for canning fish. They canned a large quantity of sardines and mackerels during the year under report and experienced certain difficulties. The problems faced by them were taken up and a detailed investigation of all the stages involved in the canning was undertaken and on timely advice they saved a very large percentage of the canned product from getting spoilt.

Spoilage of canned fish.—Canned fish from Malabar Fisheries Company, Chaliyam, showing 'bulging' were examined. The Mackerels showed extensive "hard swells" due to putrefactive anaerobes of the type *Clostridium sporogenes* while the "soft swells" in sardines were due to the facultatively aerobic *Bacillus* species. The efficiency of various processes in operations is under investigation. In the same factory, pine-apples were canned in the off-season (for fish) and these underwent a different type of spoilage—gaseous swells due to yeasts.

Proposals were submitted to the Government for starting Fish Canning at the Fisheries Technological Station, Kozhikode, on a laboratory scale. Meanwhile, certain experiments in canning were conducted at this Station using a hand seaming machine. Certain experiments were also done at the Malabar Fisheries Company, using the equipments and facilities available there. Spoiled cans of Sardines and Mackerels received from this firm were tested. In most cases, the cans were found to swell with the formation of gas.

D. *Other Bye-products*—(1) *Preparation of pickled fish and fermented fishery products.*—Indonesian Fish Sauce was prepared by mixing salt in the proportion of 1:3 with *Engraulis* (anchovy) and allowing it to ferment. Fish paste was prepared by grinding the fish with pure salt. Lactic bacteria were introduced in both the preparations for starting the fermentation process. The samples were drawn every fortnight and analysed for NaCl, pH value, acidity, total nitrogen, volatile N, and formal Titrable N. The samples fermented within four months and an acidity of 1.5 N/10 was observed in the sauce. But, the flavour of the sauce was found to be not very attractive from the Indian point of view and hence the large scale preparations of these products were not made.

(2) *Fish preparations.*—The Home Economist prepared 18 varieties of new dishes using different types of recipes and most of the preparations tasted well. Demonstration classes were being conducted once in a week to the students of Vellayil Fisheries School and the methods of fish preparations were explained to them. The classes usually started with lectures on the various subjects such as local fishing, cause of spoilage in fish, preservation methods, bye-products, etc., accompanied by a practical demonstration in the cooking of different dishes from fish. Considerable quantities of biscuits were prepared out of fish meal for sale at the exhibitions, with a view to demonstrate to the public the methods of utilizing waste fish to the best advantage.

(3) *Analytical Section.*—As many as 98 samples of bye-products were analysed by the Laboratory Assistant. Out of these, 27 samples were from private parties, who were charged Rs. 10 for one complete analysis. Leading firms and private parties both in Malabar and South Kanara districts availed themselves of this facility and more and more were coming to avail of the same.

This is a very healthy sign as the private sector is anxious to improve the quality of the product and supply the consumer a guaranteed produce. This station by analysing the product not only helps to improve the product but also assures the ryot a guaranteed product. Thus it serves a very useful role and the Fisheries Technological Station has got great scope for expanding its analytical section in the coming years as it is the only institution in the State capable of undertaking this service to the fishing industry.

E. Marine Bacteriology—Investigations in marine bacteriology.—The various bacterial groups in off-shore marine environments especially in the pearl bank area were being studied intensively. There appeared to be continuous microbial activity, resulting in the solubilization and mineralization of inert organic matter. Chitin digesters, agar digesters, algin digesters, cellulose digesters, etc., were present. So also were the urea fermenters, sulphate reducers, denitrifiers and other groups. A detailed study was made during the year. The physiology of denitrifiers was also studied. The studies included the bacteriology of sea water; of sand; of chanks; and of pearl oysters. The last two contained bacteria tolerating 1,000 p.p.m. of Copper Sulphate. Their importance lies in the fact that antifouling compositions with copper may be attacked by these bacteria.

F. Miscellaneous studies—(1) Borewell waters of Tuticorin.—Water samples from five bore wells were analysed for their suitability for ice making in connexion with the installation of ice plant and cold store at Tuticorin. They were all found unfit for the purpose.

(2) Studies on the quality of market fish.—Preliminary studies on the index of spoilage of fish were carried out, using the dye-reduction tests with tetrazolium and comparing with bacterial counts. The results hold out promise of suitable index of spoilage in triphenyl tetrazolium bromide.

(3) Technical enquiries from private parties.—Several technical enquiries were received from private parties and necessary information were furnished to them. This station has been of much assistance to the industry.

(4) Observation on the wastage of salt due to long storage.—In order to determine the percentage of loss in weight of salt due to long storage, six yard officers in Malabar and six in South Kanara districts were asked to keep the salt bags under observation and report the weight every month. During the past nine months, loss ranging up to 10 per cent of the original weight was reported from most of the yard officers. However, this observation will be continued for two years so as to determine the loss permissible in weight of the salt bags stacked in the yards.

General.

1. Visitors.—Many visitors including departmental officers and trainees visited the station during the year and the various activities of the station were explained to them. Mention may be made of the visits of the Minister for Agriculture and Fisheries, Madras, and Members of Sub-Committee on Fisheries Research constituted by the Government of India.

2. Exhibition.—This station took part in the Municipal Exhibition and Guruvavoorappan College Exhibition at Kozhikode and the Congress Exhibition at Teynampet.

3. Indian Science Congress.—Sri A. Sreenivasan, Research Assistant (Bacteriology) was deputed by Government to attend the Indian Science

Congress held at Baroda in 1955 and the following papers were read at the Science Congress Session :—

(1) Amino acid composition of marine fish proteins, by R. Venkataraman and S. T. Chari.

(2) The bacterial flora of shark, by R. Venkataraman and A. Srinivasan.

(3) Spoilage of commercially canned fish, by R. Venkataraman and A. Srinivasan.

(4) Studies on the use of crushed salt for fish curing, by R. Venkataraman and A. G. Vasavan.

(5) Drying of fish with infra-red lamps, by R. Venkataraman, A. G. Vasavan and A. Sreenivasan.

(6) Marine Denitrifying bacteria with a description of new species, by R. Venkataraman and A. Sreenivasan.

(7) Effect of sewage effluents on the coliforms in sea water, by R. Venkataraman and A. Sreenivasan.

(8) Utilisation of various nitrogenous compounds by certain pseudomonas cultures from marine environments, by R. Venkataraman and A. Sreenivasan.

(9) Bacteriology of off-shore marine environments (Pearl banks) off Tuticorin, by R. Venkataraman and A. Sreenivasan.

4. Evaluation of the Technical Programme of the year 1954-55.—Excepting two items, viz., the vitamin content of fishes and the study of shark spoilage, all the other items of the programme were tackled. For want of special chemicals and other difficulties these two items were not tackled. They will be taken up in the ensuing year.

Programme of work for the ensuing year 1955-56.

1. Continuation of the studies on red halophilic bacteria from salts and salted fish.

A purse seine net was fabricated by the expert as he found it the best

3. Estimation of amino acids and vitamins in fish.

4. Canning with special reference to anaerobes.

5. Continuation of chromatographic studies on the amino acid composition of fish proteins.

6. Studies on curing salts, fishery bye-products preparation of recipes will be continued.

7. The nutritive value of cooked fish and fish products.

2. Food and Agricultural Organization Expanded Technical Assistance Programme.

A noteworthy event of the year under review was the arrival of the experts of F.A.O. under the Expanded Technical Assistance Programme of that Organization. This State received the assignment of the services of Mr. Paul B. Zeiner (Norwegian), Naval Architect, and Mr. G. S. Illugason (Icelandic), Fisheries Engineer. The assignment of the former was for a period of about six months and the latter throughout the year with a break of a week when he was away in Andhra State.

(i) Fishing Crafts.

The need for the services of a Naval Architect was keenly felt this year more than ever before to advise and recommend suitable fishing boat designs for motorization as a necessary prelude to the introduction of mechanised fishing on a large scale in the industry. The assignment of Mr. Paul Zeiner in this State thus filled in the gap that existed in the programme of the scheme of development of mechanised fishing. Mr. Zeiner during his tenure of assignment made a general survey of the fishing crafts in vogue in the commercial industry with a view to find out existing fishing boat designs suitable for motorization. The survey conducted revealed the general paucity of existing designs apt to be motorized. The typical Tuticorin fishing canoe stands as the only exception. A detailed study of this design was made and Mr. Zeiner recommended to attempt motorization of this type of craft on an experimental scale.

The second problem tackled by Mr. Zeiner was to evolve a suitable design of a surf landing (beach landing) craft to replace the conventional catamaran and the dug out canoe, the popular fishing crafts in vogue in the East and West Coasts respectively. The designing of a surf-landing craft is a problem of great complexity, comprising evolution of not only the design but also the suitability of the motor and the mode and method of construction of the craft. Several experimental boats will have to be constructed, tried and tested prior to finding out the design and type suitable to be adopted for the industry with advantage. The first in the series of these experimental boats was designed and constructed during the period of assignment of Mr. Zeiner in this State this year. Although the design, as such, was found suitable to some extent for surf landing, it was found necessary to make certain alterations in the design. It is hoped to conduct more trials with the actual design and the Government of India were requested to contribute to one half of the cost of these experiments since the findings of these will be beneficial to several other maritime States in the Indian Union.

Two Danish boats were received during the year from F.A.O. for demonstration and experimental fishing. These boats were greatly appreciated by the local fishermen. A design of Mr. Zeiner, similar to the Danish boats, was adopted and a prototype boat was constructed under his supervision. This prototype boat was named "Pablo" after Mr. Zeiner. The demonstration with this boat had been increasingly encouraging.

(ii) Fishing Gear.

The introduction of improved fishing crafts demands the redesigning of existing tackle in vogue for a corresponding increase in the catches per unit effort. The assignment of Mr. Illugason, F.A.O. Fisheries Engineer, was primarily to study the local fishing tackle and recommend suitable modern fishing gear. He made a preliminary survey of the existing tackle used by the commercial fishermen. Several types of new tackle were demonstrated to the fishermen. Nylon nets were popularised at many centres. Nylon, being superior to cotton yarn in strength, increased the amount of catches at most centres.

The use of small mechanised boats in fishing operations was also demonstrated by Mr. Illugason with the two Danish boats. Groups of fishermen were also being trained in the use of these boats and there was a great demand from fishermen at many centres for similar boats.

A purse seine net was fabricated by the expert as he found it the best tackle suitable for the West Coast shoaling fishes, particularly the mackerels.

There was great awakening at many of the fishing centres for the use of modern tackle demonstrated by Mr. Illugason.

III. SCHEMES INCLUDED IN THE FIRST FIVE-YEAR PLAN.

A. INTENSIVE SEED COLLECTION AND DISTRIBUTION SCHEME.

This scheme aims at large scale collection of spawn, fry and fingerlings of quick growing varieties of fishes and stocking them intensively in inland waters such as reservoirs, lakes, major and minor irrigation tanks, ponds and wells. This is intended to maximise the production of freshwater fish. The innumerable water resources in the State have to be properly surveyed, selected and stocked with quick growing varieties of carps and other suitable fish in the beginning of the season. With proper conservation and growth, exploiting or catching can be commenced after six to eight months. For stocking, a large scale collection of fry and fingerlings have to be made in most of the rivers, channels and estuaries. The scheme provides for adequate staff to collect fish seed and to supply enough equipment like nurseries, tin carriers and motor vans for transporting them from collection centres to the various tanks or farms for stocking.

The target fixed is to collect 5 crores of fingerlings per annum for the composite State. It is expected to bring under culture $2\frac{1}{2}$ lakhs of acres of inland water which will yield about 50,000 tons of fish during the Plan period. The year-wise achievements are given below:—

Year.	Target fixed.	Achieved.
(1)	(2)	(3)
	CRORES.	CRORES.
1951-52	5	1.75
1952-53	5	1.50
1953-54	3	2.97
1954-55	3	6.14

A series of natural calamities like drought which prevailed during the first three years of the Plan period and the devastating cyclone in 1952-53, hampered the progress of the scheme to a considerable extent. However, it was successfully implemented during the year and the target fixed for the year for the residuary State, viz., 3 crores of fish seeds, was exceeded to a very great extent despite the fact that some of the important seed collection centres have been lost to the State on account of the separation of Andhra State. Much progress has been achieved by the location of new seed collection centres and by tapping all the existing centres to the maximum extent and at proper season. Thus the working of the scheme is showing good progress and it is hoped to achieve the target fixed for the Plan period next year.

On the whole, 61,379,525 fish seeds were collected throughout the State during the year. Twenty-five varieties of fish seeds (16 varieties of food

fishes and 9 varieties of larvicidal and other fishes) were collected as detailed below :—

Kind of fish.	Number collected.	Kind of fish.	Number collected.
(1)	(2)	(1)	(2)
1 Labeo	43,658,690	15 Trichogaster	6,265
2 Cirrhina		16 Golden carp	5,697
3 Catla		17 Gambusia	5,000
4 Bhavani carps	9,888,474	18 Striped Barbus	3,380
5 Chanos	4,448,387	19 Micropogon	2,456
6 Mullet	1,025,178	20 Gourami	937
7 Bel	644,765	21 Aplocheilus	225
8 Murrel	566,101	22 Therapon	200
9 Etroplus suratensis (Pearl spot)	491,215	23 Ambassis	175
10 Barbus	438,462	24 Macropodus cuapnus.	75
11 Megalops	102,929	25 Tench	54
12 Mirror carp	47,672		
13 Etroplus maculatus	29,675	Total	61,379,525
14 Glossogobius	13,513		

A statement of intensive seed collection and distribution in the Madras State during 1954-55 and a statement of kind-war (different varieties of fish) seed collection made during 1954-55 are furnished separately (vide Appendices II, III and IV).

B. SALT SUBSIDY SCHEME.

Fish is liable to spoilage within a few hours of its capture unless preserved properly. The fishermen have not only to catch fish but also to convey the catch to the consumer in good time and in fresh condition. Fish has to be processed, if it cannot be sold straightaway in the market. Curing fish with salt is the cheapest and most popular method of preserving fish. In order to encourage fishermen to produce good cured fish under hygienic conditions with sufficient quantity of salt, a large number of fish-curing yards were being maintained both in the West and East Coasts and good quality salt was being supplied to the curers at cheap rates. But when the excise duty on salt was abolished in 1947, salt in the bazaar became much cheaper than salt issued in the fish-curing yards. The fishermen, therefore, were reluctant to bring their catches to the yards for curing. This resulted in the production of low quality cured fish outside the yards. It was therefore necessary to induce the fishermen to purchase pure white powdery salt (special quality) issued at the yards and cure their fish at an economic price below that obtainable at the local bazaar. Hence the sale of salt at the fish-curing yards was being subsidised so as to enable the fishermen to bring in larger quantities of fish for curing and thus produce cured fish of high quality. Thus much spoilage of fish food could be avoided and made available for the consumption of the public. This scheme was being continued.

The target of production fixed and results achieved during the past four years are furnished below :—

Year.	Target fixed in tons.	Achievement in tons.
1951-52	71,400	51,600
1952-53	71,400	74,000
1953-54	50,000	47,070
1954-55	50,000	33,460

The target fixed for the year under report could not be achieved due to the poor fishing season and particularly of the poor mackerel fishery on the West Coast and the increase of issue price of salt at the yards as mentioned in another place in this report itself. No special or personal efforts were possible to attain the target fixed as the issue of salt and saving of fish from spoilage depends upon the availability of fish on the West Coast.

C. DEEP-SEA FISHING OPERATIONS.

This scheme envisages increase of the deep sea fishing operations in the State. The continuance of the scheme for another year was, therefore, sanctioned in G.O. Ms. No. 1858, Agriculture, dated 5th April 1954. Remarkable results were obtained in the working of the scheme despite unfavourable weather conditions and poor fishing season during the year. The use of the Nylon drift nets, made out of the nylon yarn received under the Technical Co-operative Assistance Aid, from the indigenous crafts as well as power vessels, resulted in good catches thereby demonstrating the superiority of nylon nets over the indigenous cotton nets. The use of nylon nets was demonstrated in several centres on both the East and West Coasts. Seeing the efficiency and superiority of nylon nets, many fishermen requested for the supply of nylon nets. As for the quantity of nylon received was small, only a few fishermen could be supplied with nylon nets. Indents were placed for more nylon for distribution to fishermen.

Most of the power vessels in use by the department are very old ones unfit for further use and their replacement by the modern type boats recently received under Technical Co-operative Assistance Aid, would be more economical and remunerative for deep-sea fishing operations. In the light of the experience gained in the use of the Technical Co-operative Assistance Aid vessels and gear, steps are proposed to be taken for expanding the deep-sea fishing operations in the State.

On the whole, 10 centres with 5 power vessels, 7 dug-outs, 3 canoes and 2 catamarans were engaged in the deep-sea fishing operations on both the coasts. A total weight of 449,270 lb. (196,901 lb.) of fish were caught during the year. The results achieved registered an increase of 252,369 lb. over the last year (vide Appendix V).

(i) *Mangalore*.—Four centres (Ullal, Malpe, Hungarcutta and Tarapathi) with 7 boats conducted deep-sea fishing operations in the area on a 'No loss, No profit' basis. Under the system, the boat owners were supplied with the required implements and 50 per cent of the cost of implements was recovered in cash from the owners when the implements were supplied and the balance was recovered by adjustment on supply of shark livers. If the value of shark livers so supplied fell short of the balance due, the boat owners made good the difference in cash at the end of the season. A system of advance supply of fishing implements at 50 per cent cost, was introduced in consultation with the fishermen and the system worked very well during the year.

A total quantity of 143,575 lb. of fish (53,515 lb.) comprising of 121,836 lb. of shark (29,788 lb.) and 21,739 lb. of other fishes (23,727 lb.) was caught during the year. Besides, a total of 4,223 lb. of shark livers (91,938 lb.) was obtained. There was a total receipt of Rs. 1,522-1-6 (Rs. 1,992-5-1) against an expenditure of Rs. 1,498-8-3 this being the cost of fishing implements supplied. The centres worked on a profitable basis and has also stimulated larger supply of shark livers.

Recoveries.—A sum of Rs. 1,311-6-1 was recovered towards the old dues outstanding, leaving a balance of Rs. 4,265-2-10 to be collected at the end of the year. Steps are being taken to effect a complete recovery soon.

(ii) *Malabar.*—The Danish Boat 'Vatsala' and the prototype Motor Boat 'Pablo' operated off this coast at Tellicherry and the imported varieties of fishing gear like Purse Seine, shrimp trawl net, Nylon Bottom net, Cotton Trawl nets were put to use. On the whole, an amount of Rs. 4,870-6-6 was realized as receipts.

East Coast.

(iii) *Vellore.*—One of the two motor fishing vessels, M.F.V. Madras, was surveyed by the Principal Officer, Mercantile Marine Department, who recommended its condemnation and sale in public auction.

The other vessel, M.F.V. Vizianagar, was engaged for 203 days in fishing with long lines with a crew comprising of local and Malabar fishermen. The fishermen were paid Rs. 40 per mensem each plus one-third of the daily sale-proceeds of fish for about four months. This practice while curtailing the huge operational cost, created great stimulus for increased catch by the fishermen crew of the vessel over last year. The total catch amounted to 88,522 lb. of sharks (34,273 lb.) yielding a total of 5,953 lb. of shark liver (2,285 lb.) and a total receipt of Rs. 4,001-2-6 (Rs. 6,892-10-0) was obtained as against a total expenditure of Rs. 8,587-4-9 (Rs. 6,432-14-0).

(iv) *Tanjavoor.*—Two centres at Nagapattinam and Adirampatnam, continued to function. Revolving chain hooks at Nagapattinam and the newly imported Nylon Drift Nets at Adirampatnam were operated. The results achieved were remarkable in that the crafts using the improved type of fishing gear, obtained excellent results. The notable feature was the capture of a big saw fish (*Pristis*) weighing 900 lb. and realizing Rs. 105 by the Nylon drift net at Adirampatnam. Nylon net was proved superior to cotton nets and the fishermen are keen on switching over to Nylon nets. Nylon yarn received under Technical Co-operative Assistance Aid was supplied to the centre and arrangements were made to make more Nylon drift nets and to issue them to the fishermen societies or to individual fisherman on a share basis to begin with. Nagapattinam centre proved to be a potential shark fishing ground.

On the whole, 45,673 lb. of fish (22,040 lb.) comprising of 35,824 lb. of sharks (22,040 lb.) were caught fetching a total receipt of Rs. 5,026-8-0 (Rs. 1,565-7-6) against an expenditure of Rs. 4,894-15-0 (Rs. 1,184-14-6). Besides, this yielded a quantity of 6,846 lb. of shark livers (4,350 lb.) to the department.

(v) *Madurai.*—The deep-sea fishing operations in this area were conducted in Palk Bay from April to November and in Gulf of Mannar from November to March. This year there was unusually squally weather resulting in poor fishing season. Besides, the power vessels stationed at Pamban, M.F.V. Calicut, broke down due to engine trouble and old age. Hence two indigenous canoes were used which could not work satisfactorily against the squally weather. So the results were poor during the year in this area. However, fishing in Palk Bay contributed to the major quantity of the catches made in the area. The total catches amounted to 19,417 lb. (58,223 lb.) consisting of 6,809 lb. of sharks (21,108 lb.) and 12,608 lb. of other fishes (37,115 lb.), besides yielding 215 lb. of shark liver (350 lb.). The total receipts came to Rs. 1,881-0-9 (Rs. 5,991-14-0) against an expenditure of Rs. 6,661-5-2 (Rs. 16,974-9-9).

(vi) *Tuticorin.*—The Deep-Sea Fishing unit in the area comprised of Motor Fishing Vessels Gouher Khaleeli and Tuticorin and a Tuticorin canoe. All these vessels operated off Tuticorin.

Vessel.	Gear used.	No. of trips.	Weight of fish caught. LB.
M.F.V. Gouher Khaleeli, Tuticorin.	R.C. Hooks	.. 86	11,387
Do.	Long lines	.. 130	33,343
Tuticorin canoe	Nylon drift nets.	170	60,394
Total			105,124

Thus a total quantity of 105,124 lb. of fish (29,339 lb.) valued at rupees 6,458-8-9 was landed during the year. Besides, 3,657 lb. of shark livers (2,995 lb.) were also obtained. The results achieved during the year were noteworthy especially due to the usage of Nylon drift nets from the Tuticorin canoe which alone caught 60,394 lb. or more than half of the total catch. The power vessels could not be worked for more number of days as they were engaged in towing the chank fishing canoes and in pearl bank inspection and pearl fishery. Otherwise the results would have been still better.

Though the total receipt from the deep-sea fishing operations were much less than the expenditure incurred, the continuance of the scheme is justifiable since it has resulted in the production of 449,270 lb. of fish at a cost of approximately two annas per lb. while carrying on demonstrational fishing with new types of fishing gear. The cost incurred by the State in producing the above quantity of valuable food cannot be considered very high.

At the instance of Government, a conference of departmental officers and F.A.O. Expert, was convened in Madras on 1st March 1955 to formulate a scheme for the successful implementation of the deep-sea fishing project. After careful consideration of the two schemes in operation under the Marine Fishery Development in this State, namely, deep-sea fishing operations and improvement of indigenous craft and tackle, it was decided that these schemes should be considered conjointly and the future programme of work should be formulated accordingly. The decisions arrived at are embodied in the following recommendations submitted to Government for final orders:—

- (1) Five of the motor fishing vessels and Lady Nicholson may be condemned and disposed off.
- (2) Boats of the motor lugger type need not be made in future.
- (3) The boats to be made in future should be of the "Pablo" type.
- (4) A few vessels necessary for experimental fishing, demonstration and survey alone need be maintained.
- (5) The mechanised crafts and modern fishing tackle should be given to fishermen on liberal terms.
- (6) A few officers of the department should be given training in marine engines.
- (7) The Government of India may be addressed to exempt fishing vessels from payment of port dues and observance of port formalities.

D. SCHEME FOR IMPROVEMENT OF INDIGENOUS CRAFT AND TACKLE.

The fishing craft used locally, catamaran on the East Coast and the dug-out canoe on the West Coast are primitive and inefficient. There is no room in the catamaran or canoe for free movement to facilitate effective use

of the nets. Besides lot of energy is expended by fishermen in taking the craft to the fishing grounds and they are almost tired out by the time they reach there. Thus considerable time and energy are wasted.

Small mechanised sea-going fishing boats will enable fishermen to reach the fishing grounds quickly without much expenditure of energy. The aim of the scheme, as originally sanctioned in G.O. Ms. No. 118, Food and Agriculture (Food Production), dated 7th September 1950, was to construct six small mechanised boats and to demonstrate their usefulness. These boats were to be used to intensify the production of sea fish as it increased effectively the area of operation of fishing. Fishermen could go out 20 to 30 miles in the sea in these boats with confidence. Government later sanctioned the construction of five more boats in G.O. No. 419, Food and Agriculture (Food Production), dated 15th September 1951, in 1951-52. Accordingly, 11 boats were constructed each costing about Rs. 6,000. These boats have an average speed of 7-8 knots and a mileage of 20 per gallon of fuel oil. No further boat was constructed afterwards. Out of the 11 boats, one was transferred to Andhra State and two boats were transferred to Mettur Dam for transporting fish catches quickly from the catching centres. Therefore, only eight boats were used for fishing during the year. Due to unfavourable weather conditions, poor fishing season and lack of proper facilities at fishing centres for attending to breakdown of some of these vessels, it was not possible to achieve the target of fish production fixed for these boats at 14 tons per boat. However, it is gratifying to note that it was possible to land 104.3 tons of fish by using these boats during the year as against 76.6 tons caught during the previous year. It is also worth mentioning that in one centre, viz., Porto Novo, the results were so good that the fishermen co-operative society of the place has asked for the loan of one or two boats.

(i) *Madurai*.—One of the Motor Lugger, M.L. Victoria, constructed under the above scheme, was in operation in this area assisted by a local canoe. It was under repairs till July 1954 and hence could make only 220 trips during the year. The lugger and the canoe operated long lines, R.C. hooks and Dunlop nets, both in the Palk Bay and in the Gulf of Mannar. On the whole, 17,857 lb. of fish (14,722 lb.) consisting of 12,052 lb. of shark (10,195 lb.) and 5,805 lb. of other fishes (4,527 lb.) valued at Rs. 1,814-2-0 (Rs. 1,466-5-6) were caught. This yielded 949 lb. of shark livers (632). The total expenditure came to Rs. 1,917 (Rs. 3,695-11-6) which enabled the scheme to be worked on a self-supporting basis.

The motor luggers M.B. Ajit and M.L. 3 which were transferred from Porto Novo in November 1954 continued to be in disrepairs.

(ii) *Tanjavoor*.—With a view to exploit the rich fishing grounds opposite the Vellar estuary off Porto Novo, two luggers (M.L. Kumaraswamy and M.L. 3 from Madras) were transferred to Porto Novo. M.B. Ajit which was the first lugger to be constructed, was in disrepairs and it was repaired at a cost of Rs. 530 as ordered in G.O. Ms. No. 4067, Development, dated 7th September 1953, and sent to Pamban on 15th October 1954. Due to frequent breakdowns, M.L. 3, after working for some time, was transferred to Pamban in November 1954. M.L. Kumaraswamy was set right and started working from January 1955. Meanwhile the newly constructed "surf or beach-landing boat" was transferred from Madras. All these vessels could be worked only for 60 days during the year. A total quantity of 20,567 lb. of

fish was caught by them and 2,192 lb. of shark livers were obtained. The total receipts came to Rs. 2,226-0-6.

Boat.	Gear.	Fish caught.	Weight of livers.		Receipts.		
			LB.	LB.	RS.	A.	P.
M.L. 3	33 Long lines ..	2,622	380		254	11	0
M.L. Kumara-swamy.	6 R.C. Hooks ..	7,108	343		765	3	6
Surf boat ..	29 R.C. Hooks ..	10,837	1,469		1,206	2	6
Total ..		20,567	2,192		2,226	0	6

The surf boat, which operated R.C. Hooks for only 29 days, was able to land two-thirds of the total catch at this centre, the majority of the catch being sharks.

(iii) *Tellicherry*.—The following five luggers and the newly built "Pablo" which were stationed at Tellicherry worked for seven months in the year from September 1954 to March 1955 and a total quantity of 175,368 lb. of fish was caught :—

	LB.						
M.L. Nandana	...	...	...	...	...	...	29,876
M.L. Madhu	...	...	...	...	...	...	31,866
M.L. Durga	...	...	...	...	...	...	30,470
M.L. Devika	...	...	...	...	...	...	38,423
M.L. Saraswathi	...	...	...	...	...	...	18,500
Pablo	...	...	...	...	...	...	26,233
Total ..	...	...	...	...	...	...	175,368

The targets of production and the results achieved are given below :—

Year.	Target fixed.		Target achieved.	
	TONS.	TONS.	TONS.	TONS.
1951-52	85.5	13.5		
1952-53	200.0	54.0		
1953-54	112.0	76.6		
1954-55	112.0	104.3		

E. SCHEME FOR THE PROVISION OF QUICK TRANSPORT FACILITIES.

The fishing hamlets, as a rule, are situated far away from large cities or towns. They do not have proper roads connecting them to the important highways. Consequently quicker means of transport could not be employed and the fish caught are taken by the old conventional methods like headload, slings, cycle, hand-carts and jutkas. This results in delay and as our country is in the tropical zone, the spoilage of fish is accelerated due to severe heat. Hence provision of facilities for transport of the catches quickly to many of the important cities and towns is contemplated under the scheme. Large and small fish transport vans with special facilities for seating the fishermen and keeping their fish as well are put in operation on different routes and the fish is transported quickly and made available to the public in wholesome conditions. Thus the fish food problem can be solved to a very great extent by this scheme.

The scheme was originally sanctioned in G.O. Ms. No. 117, Food and Agriculture (Food Production), dated 7th September 1950. Under the scheme, ten fish transport vans were purchased and were provided with special facilities in each for seating about 24 persons and keeping about 80 baskets of fish. The quantity of fish that could be saved from spoilage by a single van is estimated at 150 tons a year. In G.O. Ms. No. 251, Food and Agriculture (Food Production), dated 25th June 1952, the Government ordered the transfer of four vans out of the ten purchased to the scheme for Intensive Seed Collection and Distribution. So there were six vans working under this scheme. The six vans were distributed to Mangalore, Tuticorin, Mettur Dam and Madras where these were being used for transport of fish. The targets of production and achievements are given below :—

Year.			Target.	Achievement.
			TONS.	TONS.
1951-52	--	--	2,500	898
1952-53	..	--	3,000	1,350
1953-54	..	..	900	505
1954-55	..	..	900	464.73

Fishermen, due to their backwardness, are slow to take advantage of the vans. Only a few fishermen co-operative societies were able to take advantage of the scheme and that too intermittently. Most of the fishermen co-operative societies are not able to pay the mileage of Re. 0-12-0 and Re. 0-8-0 for the big and medium size vans. Due to the above practical difficulty experienced, the revenue realized so far was poor. Steps are being taken to improve the revenue by diverting the vans to work in places of heavy catches and in places where they are needed most. The proposal to concentrate these vans in any of the National Extension Areas is also being examined (vide Appendix VI).

F. FISH PRESERVATION AND TRANSPORT—PROVISION OF ICE-PLANT AND COLD STORAGE.

The construction of buildings and erection of the two plants, sanctioned as a Post-war Reconstruction Scheme in 1946, one at West Hill in Malabar district and the other at Mangalore in the South Kanara district, were completed during the year. Each plant has a capacity of producing 5 tons of ice, quick-freezing about 5 tons of fish per day and has cold storage accommodation for 30 tons of chilled fish, 40 tons of frozen fish and 15 tons of ice. The estimated cost of the scheme was about Rs. 14 lakhs for both the plants and the amount so far spent has come to Rs. 13 lakhs. This is one of the schemes under the First Five-Year Plan and it is gratifying to report that the scheme has been successfully launched and put to operation within the fourth year of the plan.

(i) The West Hill plant went under trial production from 15th October 1954, as sanctioned in G.O. Ms. No. 3120, Agriculture, dated 18th October 1954. It was inaugurated by the Minister for Agriculture and Fisheries, Sri M. Bhaktavatsalam, on 7th January 1955. Actual demonstrations of the modern methods of preserving the fish without spoilage, i.e., quick freezing and storing in frozen state, were given to the local fishermen and consequently the plant has become very popular among them. Ice produced in the plant was also made available to the fishermen at Rs. 40 per ton which compares very favourably with local rates of about Rs. 80 per ton.

Encouraged by the results achieved, some leading merchants in the field of refrigeration came forward to take up the lease of the plant. The Government in G.O. Ms. No. 3712, Agriculture, dated 31st December 1954, accepted the proposal of the Director for leasing out the plant and the terms and conditions under which such lease should be granted. Accordingly public tenders were invited for the lease of the plant by advertising in prominent dailies all over India and the highest tender of Rs. 42,000 per annum offered by the Bombay Ammonia and Refrigeration Co., Ltd., No. 298, Bazaar Gate street, Bombay-1, was accepted and the lease of the plant was granted to the company for a period of three years from 1st July 1955, as ordered in G.O. Ms. No. 1107, Agriculture, dated 18th April 1955. The annual rental value of the lease thus works out to about 6.01 per cent of the total cost of the plant which can be considered a very fair return for the successful implementation of the scheme. As the Company feared some local prejudices against an outside company, the directors of the company decided to form a branch company named the Malabar Ice and Cold Storage Company with headquarters at Kozhikode to run the plant. It was registered and the approval of the Government to transfer the lease to the new company is under consideration.

In G.O. Ms. No. 2187, Agriculture, dated 10th September 1955, it was ordered to collect the following rates from the fishermen and fish merchants making use of the cold store and fish freezing plant :—

Service.	Rates.
1 Storage of fresh fish ..	Rs. 10 per American ton (2,000 lb.) per day.
2 Storage of frozen fish ..	Rs. 400 per 1,000 c.ft. per mensem.
3 Freezing of fish ..	Rs. 187-8-0 per American ton (2,000 lb.) per day.
4 Sale of Ice ..	Rs. 40 per ton.

(ii) *Mangalore Plant*.—This plant was also completely erected by February 1955. Trial run was sanctioned in G.O. Ms. No. 1380, Agriculture, dated 20th May 1955. But since the fishing season commenced only in September 1955, trial run started on 27th September 1955 and the results have been satisfactory. The plant was inaugurated by the Minister for Agriculture on 18th October 1955.

IV. DEVELOPMENT AND EXPLOITATION.

A. MARINE FISHERIES.

1. Pearl and Chank Fisheries.

(i) *Pearl Fisheries—Tuticorin Pearl Fishery*.—The prospect of a pearl fishery in 1955, which was forecast as a result of the detailed inspection of the pearl banks conducted during the March-April 1954, was followed up by regular patrolling of the pearl banks and prohibition of fishing on the banks under orders of Government in G.O. Ms. No. 334, Agriculture, dated 7th February 1955. Two police constables and two sub-inspectors were added on to the patrolling staff as sanctioned in G.O. Ms. No. 3466, Agriculture, dated 1st December 1954. Due to unfavourable conditions of weather and sea the inspection of the pearl banks for collecting samples of oysters for test valuation of pearls could be undertaken only late in January-February 1954. Soon after, proposals were submitted for declaring a pearl fishery from the middle of March 1955 which was approved by Government in G.O. Ms. No. 856, Agriculture, dated 26th March 1955. As the time was short, the elaborate arrangements necessary for the conduct of a pearl fishery had to be made with the

greatest speed. A regular pearl fishery "Town" with temporary quarters for divers, sheds for officers, stores, kottus and pearl bazaar, fresh water bore wells and electric lighting, was organized in the time-honoured site for pearl fishery at Silvathurai about 2 miles north of Tuticorin. Regular public motor service was provided from the town to the camp. Other amenities such as canteen, supply of protected drinking water, public health and medical facilities, fire protection and police bandobust were adequately provided.

When the fishery was about to commence, the divers put forth certain unreasonable demands which could not be acceded to. As a result they struck work on the first day. The public of the town as well as the leaders of the district lost all sympathy for the divers as they continued to stick to their very unreasonable demands. Therefore, with the kind help and co-operation of the local gentry the departmental officers succeeded in breaking the strike and divers began to participate in large numbers very soon. The fishery continued up to 14th May 1955 when it had to be closed due to unfavourable weather conditions. Thirty-five lakhs eight thousand nine hundred and sixty-seven oysters were fished, out of which two-thirds formed the Government share. The total receipts of the fishery amounted to about Rs. 1,46,000 and expenditure Rs. 48,000. The Director of Industries and Commerce, Sri T. K. Palaniappan, and the Additional Director of Industries and Commerce, Sri S. Aruldoss, supervised the preliminary arrangements and Messrs. V. John, Deputy Director of Fisheries (Marine), P. I. Chacko, Assistant Director of Fisheries (Marine Biology), and N. V. Choodamani, Assistant Director of Fisheries, Tuticorin, were in charge of the day-to-day operations throughout the period of the fishery.

1. Tirunelveli Chank Fishery.

(ii) *Chank Fisheries*—(a) *Fishery of 1953-54*.—The chank fishery which was continued beyond the financial year 1953-54 was closed on 26th May 1954. The details of the fishery for the complete season from 26th November 1953 to 26th May 1954 were as follows :—

Chanks fished—

Full sized	..	..	..	..	900,452
Under sized	..	..	..	..	83,885
Wormed	..	..	..	..	61,174
Immature (returned to sea)	..	..	..	..	17,419
No. of chank beds fished	..	..	..	..	22

(b) *Fishery of 1954-55*.—The second fishery commenced on 23rd December 1954. It had to be closed on 19th March 1955 to make all the divers take part in the pearl fishery.

Divers.—The maximum number of divers who participated in the fishery during the year was 665 with 60 canoes, as against 644 divers with 54 canoes in the previous season. Of these 218 were from Tuticorin, 375 from Ramanathapuram and 72 from Travancore State. All the divers were given accommodation in the office compound and facilities for drinking water and entertainment through a community radio set were provided for them.

Advances.—No advance was given for any previous advance was pending recovery during the year.

Loans.—No loans were issued.

Rate of chank.—Full-sized chanks were paid at the rate of six annas per chank out of which five annas were paid immediately and the balance of one anna was withheld and paid at the close of the fishery as a measure of 'small savings campaign' among the divers.

Bonus.—A sum of Rs. 2,237-12-9 on the account of 304 divers lapsed to Government since they did not claim them.

Savings.—The savings scheme for the divers started as per G.O. Ms. No. 2927, Development, dated 23rd June 1951, was continued during the year. Besides the current year's savings, undisbursed savings of 1952-53 and 1953-54 were also disbursed during the year.

Catches.—Three hundred and forty-six thousand six hundred and eighty full-sized chanks, 28,305 under-sized chanks and 9,987 wormed chanks were fished during the season. This year's chank fishery had to be closed during the period of pearl fishery and that was responsible for the fall in the collection of chanks during the year under report.

Chank beds fished.—Twenty-one chank beds were exploited during the year against 22 in the previous year. Melanbattu Par yielded the maximum number of chanks, i.e., 101,787 and Athombathu Par yielded the minimum number of chanks, i.e., 1,396. All the chank canoes were towed to the beds by the departmental vessels, M.F.V. Tuticorin and M.F.V. Gouher Khaleeli, during the year.

Live chanks.—Two thousand nine hundred and thirty-two undersized chanks were released back into the sea as against 17,410 during the last year.

Accidents.—Government have sanctioned the payment of a compensation of Rs. 3,000 each to the dependents of the two divers who met with death by accidents during the 1953-54 season. During the 1954-55 season one diver who went for chank fishing returned with a complaint of severe pain in his chest and abdomen. He was admitted into the Government Hospital where he died after four days and his case was diagnosed as chronic peptic ulcer. His dependents claimed compensation which is under examination.

Poaching.—A poaching case was detected in Vadaithundan Par on 24th January 1954 and five persons were arrested and charge-sheeted before the Sub-Magistrate, Tuticorin. All the five were convicted and sentenced to pay a fine of Rs. 50 each. But all of them appealed against the orders before the Subdivisional Magistrate, Tuticorin, who set aside the sentence on the ground that there was no clinching evidence about the exact location of the place of occurrence of the case. Government did not consider it advisable to appeal to the High Court against the acquittal and passed orders accordingly in G.O. R. No. 920, Home, dated 16th March 1955.

Sale of chanks.—Half of the total quantity of chanks fished during the 1953-54 season were sold to Sri K. T. M. T. S. Omer Abdul Quadir & Co., Kilakarai, at the rate of Rs. 1,327 per 1,000 full-sized chanks, Rs. 111 per 1,000 under-sized and wormed chanks. The other half was sold to the Department of Cottage and Small Scales Industries of the West Bengal Government on a Government to Government basis at the same rate mentioned above as ordered in G.O. Ms. No. 1606, Agriculture, dated 20th June 1955.

2. Ramanathapuram Chank Fishery.

During this year also the chank fisheries continued to be leased out to Messrs. A.M.S.S.V.M. & Co., of Kilakarai, for Rs. 42,000. The number of chanks fished by the lessee during the year was as follows :—

Full-sized	...	...	...	...	...	...	325,505
Under-sized	...	...	...	...	...	...	21,819
Wormed	...	...	...	...	...	...	26,678
Immature (returned alive to sea)	...	...	...	...	...	...	7,063

A special staff of an Inspector of Fisheries stationed at Kilakarai and the Chank Fishery Overseer stationed at Karangadu exercised supervision over the fishery to prevent the collection of immature shells and for obtaining data regarding chank fishery operations in this area.

3. Sivaganga Chank Fishery.

In this area, chanks were collected and paid for departmentally at the rate of annas 2 per chank. The following collections were made during the year :—

Full-sized	...	...	...	...	...	...	...	3,824
Under-sized	...	...	...	...	...	...	...	374
Wormed	...	...	...	...	...	...	...	330

The chanks of 1951-52, 1952-53, 1953-54 and 1954-55 were sold to Messrs. K. T. M. T. S. Omar Abdul Quadir & Co., of Kilakarai, at the rate of Rs. 821 per 1,000 full-sized chanks and Rs. 101 per 1,000 under-sized and wormed chanks during the year.

4. Tanjavor Chank Fishery.

During this year also, the departmental exploitation of chank fishery extending from Puthukuda to Point Calimere was continued and the collections made were as follows :—

Full-sized	...	...	...	...	...	...	...	11,832
Under-sized	...	...	...	...	...	...	...	4,677
Wormed	...	...	...	...	...	...	...	651

The chanks of 1953-54 season were sold for Rs. 9,829-3-0 at the rate of Rs. 601 per 1,000 full-sized chanks and Rs. 101 per 1,000 under-sized and wormed chanks to Sri A.M.S.S.V.M. & Co., of Kilakarai.

The lease of the chank fishery of the Tanjavor coast excepting the area from Puthukuda to Point Calimere and the coast of French India Territory of Pondicherry and Karaikal, was granted to Messrs. A.M.S.S.V.M. & Co., Kilakarai, for a period of three years from 1st July 1954 to 30th June 1957 at an annual rental of Rs. 15,875.

5. South Arcot Chank Fishery.

The lease of the chank fishery in this area was also granted to Messrs. A.M.S.S.V.M. & Co., Kilakarai, for a period of three years from 1st July 1954 to 30th June 1957 at an annual rental of Rs. 13,406 per annum.

6. Chingleput Chank Fishery.

The chank fishery in this district was leased out to Sri K. T. M. T. M. Abdul Kayum Sahib Hussein Sahib of Kilakarai at Rs. 4,711 per annum for a period of three years from 1st July 1954 to 30th June 1957.

2. Fish-curing Yards.

(West Coast.)

(i) *Chief Coastal fisheries.*—The fishing season in general on the West Coast was very poor. Shoaling fishes like Mackerel (*Rastrelliger kanagurta*) in particular and Goggler (*Caranx crumenophthalmus*), Ribbon-fish (*Trichiurus*), White-bait (*Stolephorus*), Malabar Sole (*Cynoglossus*), etc., in general

were caught in poor quantities. But for the fairly good catches of oil-sardine (*Sardinella longiceps*) and Silver-bellies (*Leiognathus*) in Malabar district, the fall in transactions from last year's would have been still greater.

(East Coast.)

The fishing season on the East Coast was also poor. Ribbon-fish, White-bait, Sharks, Sardines and Mackerels formed the chief catches on the East Coast.

(ii) *Yards.*—The same number of yards continued to exist except that the private yard at Padu Thonse in South Kanara district, was closed at the request of the owner, this having worked from 1st November 1954 to 16th December 1954 only. (Vide Appendix VII—List of fish-curing yards.)

The opening of a public yard at Padu Thonse is still under consideration for want of a proper site. Opening of a public yard at Shashinithlu in South Kanara district under the assistance of the Community Project Development Programme was mooted out but was later given up due to the general enhancement of the issue price of salt. All the yards on the East Coast worked on temporary basis and their continuance was sanctioned up to 28th January 1955 in G.O. Ms. No. 3398, Agriculture, dated 23rd January 1954, and up to 29th February 1956 in G.O. Ms. No. 766, Agriculture, dated 19th March 1955.

(iii) *Yard staff.*—Of the 72 yards, 17 yards were under the charge of Sub-inspectors, 53 yards under Petty Yard Officers and two yards under peons as ordered in G.O. Ms. No. 613, Agriculture, dated 4th March 1955. Due to the poor consumption of salt, Blangad yard was put under the charge of a petty Yard Officer instead of a Sub-Inspector from 1st March 1955 as ordered in G.O. Ms. No. 614, Agriculture, dated 4th March 1955. Similarly Idinthakarai yard was also put in charge of a Petty Yard Officer instead of a Sub-Inspector from 16th October 1954.

(iv) *Yard transactions.*—During the year a total quantity of 1,106,616 maunds 24 seers of fish were brought to the yards for curing, 774,985 maunds 16 seers of cured fish were let out and 178,240 maunds 16 seers of salt were issued for curing in the yards against 1,434,539 maunds and 25 seers. 928,456 maunds 18 seers and 212,898 maunds 16 seers respectively during the previous year (Vide Appendix VIII—Statement of yard transactions during the year 1954-55).

There was general decrease in transactions except in Tanjavor and Tuticorin regions. The decrease was due mainly to the poor fishery of the shoaling fishes detailed in the preceding paragraph. The mackerel fishery which is the most important from the viewpoint of curing, was very poor during the year. Malpe yard in South Kanara district, which used to consume about 10,000 bags (20,000 maunds) of salt in peak years, consumed only 1,022 bags during the year. Another factor for the low consumption of salt at the yards is reported to be the private curing resorted to by some curers who in their eagerness to effect economy cure fish in a very unhygienic conditions. Thirdly the recent increase in the issue price of salt is also standing in the way of the curers resorting to the yards especially on the East Coast, where salt is reported to be available outside at a much cheaper rate. Hence the question

of lowering the issue price of salt has to be seriously considered so that greater interest is created among fishermen to resort to yards for hygienic curing of fish.

(v) *Supply of salt*.—The stock of salt at the beginning of the year was 198,241 maunds 28 seers. A total quantity of 190,684 maunds 2 seers was supplied during the year to the yards. Out of this 66 maunds were supplied to the Fisheries Technological Station (Fishery Demonstration Units) during the year. The balance stock of salt in the yards was 205,005 maunds 25 seers.

(vi) *Salt transport*.—From the Tuticorin Salt Factories, 177,674 maunds of salt were purchased and supplied to west coast yards. Of these, 125,276 maunds were despatched to Malabar district and 50,308 maunds 12 seers to South Kanara district by sea and 2,700 maunds by rail to South Kanara district. There was an excess of 24 maunds of salt in Boat No. 61 unloaded at Ponnani and a total of 19 maunds 16 seers were collected as sweepings from the boats unloaded in Malabar district during the year.

As the Salt Department during the year has fixed a sodium chloride content of not less than 94 per cent for standard salt for human consumption, the production of salt declined at the Tuticorin factories and a corresponding increase in the cost of salt by Re. 0-0-6 to Re. 0-1-6 per maund for the various grades of salt was registered. Hence there was difficulty in getting the salt required for departmental use. However, with the help of the Salt Department, the entire quantity required was procured at rates noted below :—

Grade of salt.				Quantity purchased.	Rate per maund.		
				MDS.	RS.	A.	P.
1	Powdery salt	..	..	55,582	0	7	6
2	Crystal salt (medium sized)	..	..	95,232	0	7	0
3	Do.	..	..	6,860	0	6	6
4	Crushed salt	..	..	20,000	0	11	0
Total				177,674			

Separate rates for removal and transport of salt bags from Tuticorin to West Coast were fixed as in last year. The rates of transport for 100 bags ranged from Rs. 62-8-0 to Rs. 131-4-0 and thus were much lower than those of last year. Besides, 6,400 maunds of salt were purchased for the Tuticorin Division yards and 1,340 maunds for the Madurai yards at Re. 0-7-6 per maund from the Tuticorin factories and supplied during the year.

(vii) *Issue price of salt*.—The issue price of salt at the yards continued to be the same as last year, i.e., Rs. 1-7-4 per maund on the West Coast and Re. 1-4-0 per maund on the East Coast.

(viii) *Wastage of salt*.—A wastage of 58 maunds 9 seers of salt occurred during the year. Out of this, a total of 32 maunds 14 seers were ordered to be written off the accounts. Hence a balance of 25 maunds 35 seers found short at Gangoli yard in South Kanara district on account of re-weighment of 51 bags of salt transferred from the closed Kirimanjeshwar yard, is to be written off the accounts. This wastage was due to long storage.

(ix) *Standard curing sheds*.—The following are the details of the sheds in existence :—

Kind of sheds.				Number at the beginning of the year.	Number at the end of the year.
Kutchha	..	..	..	284	255
Semi-pucca	..	..	..	445	441
Pucca	..	..	..	535	537
				1,264	1,233

The above figure excludes the six sheds in Malpe II and Kidiyur private yards which were closed down during the year. During this year, 9 pucca sheds and 1 semi-pucca shed were constructed by the curers and there was appreciable decrease in the number of kutchha sheds.

(x) *Damage to yards*.—The sea erosion at Hungarcutta continued during the year also. Hence the salt bags and stores were removed to a site half a mile south of the original site and curing was continued to be done at the old site pending provision of a new site. The District Collector was requested to make available a safe poramboke site free from encumbrances for shifting the yard. Similarly the western side of Bekal yard was also subject to sea erosion. The Kumbla yard, which is situated in the land strip between sea and the Kumbla river bar, was also threatened by erosion. The Public Works Department authorities were requested to inspect the site and suggest suitable preventive measures. The Mangalore yard was also being subject to gradual encroachment by the river. The Port Officer, Mangalore, was requested to reinforce the adjoining shore by sand and silt dump to prevent further erosion. In all the cases action was taken to ensure the safety of salt bags and other articles.

(xi) *Curing system*.—The local curing system was employed in all the yards except in some of the yards north of Mangalore where Colombo and Ratnagiri methods were adopted to cure fish for export, and 3,503 maunds 12 seers and 96 maunds, respectively, were cured under the above systems.

(xii) *Oil and guano factories*.—On the whole, 100 factories (91 in South Kanara and 9 in Malabar district) functioned and 99 tons of oil and 434 tons of guano were produced during the year against 2,230 tons of oil and 9,717 tons of guano produced during the last year.

3. Shark Liver Oil Extraction.

There was remarkable improvement in the total production of shark liver oil during the year when compared to the previous years. The procurement of livers showed an increase of 72 per cent while the yield of oil showed an increase of 78 per cent over that of last year. The average percentage of yield of oil worked out to 44.6 per cent or 45 per cent which is a noteworthy feature. This was due to the landing of some monster sharks and saw-fish at Ullal, Kizhur Adakathabail, Gangoli and Bekal in the South Kanara district, and Kadapuram and Tellicherry in the Malabar district. The departmental deep-sea fishing operations all over the State and the special efforts made by the yard staff to collect all the available liver were responsible for this marked increase in output. The Ullal centre topped the list with a procurement of

16,250 lb., i.e., nearly 10 per cent of the total procurement. It may also be mentioned that the distribution of good quality hooks to the fishermen by the department contributed to the increased production of shark liver. Continuance of such efforts with greater vigour will be undertaken during the coming year.

A total quantity of 172,981 lb. of liver was procured against 104,960 lb. during the last year. Of this 29,091 lb. were supplied by the deep-sea fishing section of the department. 172,835 lb. of liver were treated and 77,154 lb. of oil were extracted. Thirty-eight centres were engaged in the extraction of oil and 27 centres procured and despatched livers to the Government Oil Factory, Kozhikode, during the year (vide Appendix V—Statement of shark liver oil centres) and production in the State during the year 1954–55 (vide Appendices IX and X).

4. Technical Co-operation Assistance Programme.

Under the Technical Co-operation Assistance programme, the following articles were received during the year under review :—

Fish hooks (white tinned)	398,000
Insulated motor vans and miscellaneous auto parts..	2
Marine diesel Engines	10
Cotton long lines with glass floats and bamboo floats.	67 units of 100 fathoms each.
Long-line howler	1 unit.
Lampara nets with spare twine	2 sets.
Nylon twine	2,000 lb.
Music wire	100 tubes.
Flat-trawl nets	2 sets.
Otter boards	4

5. Fisheries Demonstration Factories.

Six demonstration factories continued to function in the State as last year each in charge of an Operative. A total of 55,954 lb. of fish manure, 12,167 lb. of fish meal, 3,546½ lb. of fish oil, 1,499 lb. of shark liver oil and 7,359 lb. of brine salt and manure were produced against 60,093 lb., 17,097 lb., 3,756 lb., 1,409 lb., and 16,320 lb., respectively, produced during last year. The slight decrease in production in some of the products was due to the poor fishing season and failure of mackerel fishery during the year.

A statement showing the production, disposal and balance stock of these products during 1954–55 is given below :—

Products.	Stock on 1st April 1954.	Produced during 1954–55.	Sold during 1954–55.	Balance on 31st March 1955.
	LB.	LB.	LB.	LB.
1 Fish manure	64,275½	55,954	79,086½	41,143
2 Fish meal	4,292	12,167	13,988½	2,470½
3 Fish oil	2,832	3,546½	3,078½	3,300
4 Shark liver oil	1,035	1,499	1,600	934
5 Brine salt manure	8,405	7,359	11,049	4,715
6 Semi-dried prawns	13	6,956½	6,119½	850

6. Manufacture of semi-dried prawns.

The scheme for the manufacture of semi-dried prawns was being worked at Tanur and other demonstration factories after the partition of the State. A total quantity of 6,957 lb. of semi-dried prawns was manufactured during the year as against 3,787 lb. during last year.

Centre—	1954–55. LB.	1953–54. LB.
Kozhikode	3,969½	300
Tanur	2,724½	3,468
Ennore	186½	19
Malpe	76	Nil.
Total	6,956½	3,787

During the year under report the production was almost doubled, and it yielded a net profit of Rs. 3,313–15–6. Thus the scheme was working satisfactorily.

B. INLAND FISHERIES.

1. Fishing Licences.

1. Backwaters (stake-net fishing).

(i) Licences for fishing with stake-nets in Cheruvatur river are continued to be issued. Seventy-nine licences at Rs. 4 per stake were issued and Rs. 316 collected during the year.

Orkulam	29
Padinhare orkulam	5
Kavanchira	22
Chemoarakad	10
Kodathawala	2
Kaithakad	7
Total	75

There was an increase of 7 licences issued over that of last year.

(ii) *Malabar*.—In accordance with the instructions contained in G.O. Ms. No. 288, Agriculture, dated 8th December 1953, stake-net licences in the following rivers were issued in this district :—

Chethuvayi river (Ponnani taluk).—This river was included in the notified waters under the Indian Fisheries Act of 1867 (Madras Amendment Act of 1929) for purpose of issue of licences for stake-net fishing. The maximum number of licences to be issued had been fixed as 131. As per conditions laid down in the Government order quoted above, only 68 licences could be issued during the year to the members of the Chethuvayi Stake-net Fisheries Co-operative Societies which is an association of bona fide stake-net fishermen.

The remaining 63 licences could not be issued on account of disputes in respect of the sites to be allotted for fishing with stakes. Arrangements were made for a detailed survey and demarcation of sites and only on completion of this work further issue of licences can be undertaken.

Taliparamba and Baliapatam rivers.—Out of 512 licences to be issued in these waters, 498 licences were issued strictly in accordance with the Government order mentioned above.

Korapuzha river.—The total number of licences to be issued in this river is 90. Out of these, 89 were issued during the year. The remaining one licence could not be issued as the income of the licensee, Sri Azhikkal Thekkevalappil Velu was reported to be above Rs. 900. He preferred an appeal to the Collector which was finally disposed of only after 31st March 1955 and as the period of licence also expired by that date, the licence was not issued.

2. Inshore waters (fishing by trees).

Ramanathapuram district.—Fishing by trees is one of the methods followed in the inshore waters off Ramanathapuram district in Palk's Bay (Tondi area). Littoral fishes take shelter under the trees fixed and the fishermen use encircling nets and catch the fishes from their shelter. Despite much reluctance on the part of fishermen, the number of licences issued during the year was increased to 45 against 15 issued last year. This was achieved by effective propaganda to educate the fishermen about the object of licensing, namely, to prevent destruction of breeders and young fishes.

(iii) *Vellore : Adyar Backwaters (Madras City).*—A total number of 2,950 licences (2,489) were issued and a receipt of Rs. 1,247-12-0 (Rs. 915-12-0) was obtained during the year. The Adyar backwater licensing system was continued under G.O. No. 3277, Agriculture, dated 5th November 1954. Apart from conserving the fishery, licensing system ensured a steady livelihood for the poor fishermen of the only inland society in the Madras City.

Poondi Reservoir (Chingleput district).—The system of licensing was continued during the year as sanctioned in G.O. Ms. No. 2645, Agriculture, dated 17th August 1954. One thousand eight hundred and seventy-four licences (1,554) were issued for Rs. 4,276 (Rs. 3,218) during the year. There was an increase in the number of licences taken as the fishermen have realized the remunerative yield obtained by them in licensed fishing.

One hundred and eighty-nine cases (138) of poaching were detected by the local staff, out of which 24 cases (22) were charge-sheeted before the Sub-Magistrate, Tiruvallur.

Kolaroy lake (Chingleput district).—The lake retained water throughout the year, and hence more fishermen took out licence for fishing. A total number of 440 licences (150) were issued and an amount of Rs. 601-4-0 (Rs. 191-8-0) were collected during the year. The licence system was continued as sanctioned in G.O. Ms. No. 1659, Agriculture, dated 25th June 1955.

Vellore Fort moat.—Due to growth of weeds in large quantities fishing was found difficult and hence the number of licences taken in the moat was less during the year. Only 69 licences amounting Rs. 95 were issued during the year as against 145 licences for Rs. 176-8-0 obtained last year. Rod and line fishing was stopped from the beginning of the year with a view to conserve the natural Murrel fishery of the moat. This step of conservancy assisted the department in collection of Murrel seed for stocking wells in Block Development areas in Tiruvallur, Polur and Tiruvannamalai. Since

the fishery from revenue and private tanks presented better prospects owing to seasonal rains, the fishermen were not keen on taking licences for moat fishing except during certain periods. There were no cases of poaching.

(iv) *Tanjavoor.*—It is a well-known maxim that development of Inland Fisheries is a problem of conservation while that of marine fisheries is one of exploitation. The Cauvery system is a seasonal one in many places. The data that have been collected since the days of Henry Charles Wilson have shown that a systematic check against dynamiting and poisoning in the upper reaches, preventing fishing of breeders and adults in congregations and eradication of fixed engines, have immensely enriched the Fisheries. During the year under review, Fishery legislation were enforced at Veeranam, the big lake at the tail-end of the Cauvery system which supplies the bulk of the breeders for the lower reaches at Vadavar and Ullar and at Vellar.

Veeranam lake.—This is the tenth year since the Veeranam tank was closed for indiscriminate fishing by successful bidders and a systematic exploitation by licensing was adopted. The conditions in the licence include the release of cultivable fishes below a certain size so that they can be given a chance to breed, release of all new varieties of fishes and an adherence to the size of the mesh of nets to be used. The staff employed carried out the task of rescuing all fishes caught in the irrigation channels due to closure and put them back in the Veeranam lake. During the year under review, 1,095 licences were issued for fishing as against 853 the previous year. The receipts from licences also showed an increase from Rs. 6,150 to Rs. 7,537. The Assistant Inspector and his staff carried out an intensive drive around the lake against illicit fishing and this accounted for the increase in revenue. Sixty-two cases of alleged violation of the Fisheries Act were detected during the year. Sixteen of them were recommended for being prosecuted and the rest were issued licences with severe warning.

Vadavar.—The conserving and licensing of this river connecting Coleeroon and Veeranam is a part of the Veeranam scheme, but separate conservancy staff was first sanctioned in 1951-53 and is being continued under G.O. No. 3469, Development, dated 27th July 1953. A total number of 341 licences were issued and an amount of Rs. 1,509 was realized during the previous year. In this area, 47 cases of poaching were detected.

Vellar.—A temporary scheme of conservancy and licensing was brought into force in the Vellar estuary from 1952-53. The scheme aims at preventing the massacre of the quick growing fry and fingerlings of chanos, mullets, and prawns that enter the estuary and allow them a chance to grow before they are caught by the bigger-sized meshes permitted to be used under the G.O. Ms. No. 1207, Agriculture, dated 12th April 1954; this scheme is being continued. Here 1,103 licences were issued and Rs. 1,444 was realized against the 846 licences and Rs. 1,263 realized during the previous year. The fishermen of the area represented to Government to issue licences to various kinds of nets which are at present not allowed under the scheme and also for the reduction of the licence fees. After careful consideration, several kinds of nets are being permitted now, but subject to mesh regulations as otherwise it will defeat the very object of the scheme. At the end of the year, the Government in G.O. No. 711, Agriculture, dated 12th March 1955, have also been pleased to reduce the rates of licence fee by 50 per cent which it is hoped will go a long way in redressing the grievance of the fishermen of Porto Novo area.

The Ullar by-pass at Grand Anicut which serves as the scouring sluice and emergency outlet, has the potentialities of a huge congregation of fishes that abound in both Cauvery and Coleroon. Government have stopped the savage destruction during the breeding months of June and October by completely prohibiting any type of fishing during these months. A special staff of one maistry and two watchers were appointed as usual this year also to enforce this order. Consequent on the delay in the disposal of the lease of this fishery, the patrolling staff were retained throughout the period from June to October.

Special efforts were taken this year to check the increasing menace to migration of fish from paddy fields and small channels to the main river caused by the various types of saars put on irrigation channel. A number of these were confiscated during various raids carried out. In these places where the leases were authorized to put saars, special care was taken to collect all fingerlings of major carps and release them in cultivable waters. It is proposed to call for a complete list and exercise greater check in the coming year.

(v) *Madurai—Kodaikanal lake*.—The control of the Kodaikanal lake was taken over by the department on 1st April 1952 for a period of ten years for scientific development and exploitation of fishery in the lake. Since then, 62,833 mirror carps, Golden carps and Tench have been stocked in the lake. The Golden carp have bred prolifically. During the year, 83 licences for angling were issued realizing a value of Rs. 183-8-0 against 51 licences valued at Rs. 153 during last year.

(vi) *Tuticorin—Hope lake*.—Seventy-two licences were issued (74) for fishing in the lake and a sum of Rs. 128-8-0 (Rs. 130) was realized during the year. Besides departmental fishing was also conducted. The system of licensing was introduced in this lake as sanctioned in G.O. Ms. No. 117, Development, dated 16th January 1949. The rates of licence are Rs. 2 per month or Re. 0-8-0 per day for rod and line fishing.

Kadamba tank.—The number of licences issued in this tank was 341 for an amount of Rs. 1,740-8-0. The rates of licence fee charged are Rs. 7-8-0 per month for cast net and Nachu valai at each Re. 1 for Ootha, Rs. 7-8-0 for Madavalai and Rs. 5 for weed collection. The licensing system was introduced as sanctioned in G.O. Ms. No. 4441, Development, dated 21st August 1947. Besides departmental fishing was also conducted in the tank.

Fishing in the Hope lake and the Kadamba tank is controlled by rules framed under section 6 of the Indian Fisheries Act of 1894 and the Madras (Amendment) Act, 1949. This control is introduced to prevent the fishing of immature fishes and breeders so that the fisheries of the lakes are not depleted. Fishing is therefore permitted only under licence issued by the departmental officers in charge. Regular patrolling staff check illicit fishing and also see that the licensees observe conditions prescribed for fishing. Thus judicious exploitation of the fisheries is allowed to make the fisheries continuous.

Similarly in G.O. Ms. No. 1787, Agriculture, dated 31st May 1954, fishing of immature fry and fingerlings was prohibited in backwaters and channels at Idinthakarai, Kulasekharapattinam, Tiruchendur, Punnakayal, Tuticorin and Veppalodai.

(vii) *Mettur Reservoir*.—During the year, 111 licences for fishing with coracles, and nets at Rs. 100 each, 20 licences for fishing with country rod and line at Rs. 2 each and 11 licences for game-fishing at Rs. 1-8-0 each,

were issued during the year against 200, 7 and 8 licences issued respectively during last year. The decrease is due to the withdrawal of the permission to remit licence fees in instalments granted to the fishermen in previous years. As the fishermen are poor, the continuance of the system of payment in instalments requires to be considered. One hundred and forty-four cases of poaching were detected of which 82 cases resulted in conviction.

(viii) *Yercaud lake*.—In this lake, an amount of Rs. 17 was collected as fishing permits during the year as against Rs. 35-15-0 during last year besides an amount of Rs. 70 (Rs. 66) towards boating charges, and Rs. 174 (Rs. 295-1-6) towards the sale-proceeds of departmental catches of 348 lb. (589½) of fish.

2. Provincialized Waters.

(i) *South Kanara*.—In all there are 24 tanks in this region. During the year two tanks in Puttur and one in Karkal were provincialized. Ninety-four thousand nine hundred and ninety fish seeds were stocked in the various provincialized waters. Fishing in none of the provincialized waters was leased during the year. A total quantity of 331 lb. was caught and sold for Rs. 132-8-6. With a view to establish Catla, Labeo, Cirrhina and Gourami in the rivers of this area, a consignment of 1,900 carps and 12 Gourami were released in the upper reaches of river Netravatti and periodical fishing was conducted to find out whether fish introduced have bred.

(ii) *Malabar*.—The only provincialized water in the district is the Vyam lake in Ponnani taluk. The provincialization of the Malampuzha reservoir is under correspondence. Both these waters were stocked with 569,538 fish seeds. The fishery right in the Vyam lake was leased for Rs. 532 during the year.

(iii) *Vellore*.—The various provincialized waters in this region received fairly normal supply of water during the period under review. These were stocked with 1,154,349 fish seeds during the year. The total fishery rental realized for these tanks during the year came to Rs. 11,123. Eight inland fishermen co-operative societies were granted the lease rights of the nine provincialized tanks as per instructions contained in G.O. No. 200, Development, dated 16th January 1950.

(iv) *Tanjavoor*.—The fishing rights in all the provincialized waters, i.e., rivers, channels and tanks in Tanjavoor, Tiruchirappalli and South Arcot districts, were leased out to the local fishermen co-operative societies according to the rules laid down in G.O. Ms. No. 200, Development, dated 16th January 1950, as follows:—

		1954-55.	1953-54.
		RS.	RS.
Rivers and channel fisheries	..	1,11,357	96,304
Tank fisheries		7,038	5,133
Total	..	1,18,395	1,01,437

Besides an amount of Rs. 3,580 was also collected towards the costs of stocking fish seeds to develop the fisheries. A further amount of Rs. 1,960 was also received towards stocking of non-provincialized waters in this region which were also leased to the local fishermen co-operative societies.

During the year, the tanks in Nannilam taluk were provincialized as ordered in G.O. Ms. No. 2266, Agriculture, dated 6th July 1954, while the provincialization of tanks in other taluks was deferred. The Willington Reservoir in South Arcot district was departmentally fished during the year, as the highest bid obtained was found meagre. The Department, however, was able to realize Rs. 1,192 being the cost of 12,724 lb. of fish caught which demonstrated the potentialities of this water. The number of provincialized waters in this region are so numerous that some waters escape the departmental attention. During the year, one such source, Ellis Choultry tank, was detected and brought to public auction by the department. Besides, some more waters like North Rajan Channel, Ullar and Tiruchirappalli major items were also brought to public auction as the local fishermen co-operative societies offered very low rentals. After much persuasion, they accepted rentals approximating to the rentals of the previous year. In the case of tank fisheries it was found that the procedure of leasing for a calendar year inconvenienced the programme of stocking and developing the fisheries and hence the District Collectors was requested to change the lease period from the calendar year to fasli year. With his concurrence, the lease of the tank fisheries was given to the local fishermen co-operative societies for 1½ years, i.e., from 1st January 1955 to 30th June 1956 to enable the conversion of lease period easily after the date. It is hoped, from next year onwards, the lease of fisheries will not interfere with the stocking programme.

(v) *Madurai*.—There are ten provincialized waters having an acreage of 3,509.59. Of these, 7 waters were stocked with 350,000 seeds of fish. A total lease rental of Rs. 8,899 was obtained as against Rs. 3,181-8-0 during last year. The rental fetched is much greater than the average of the previous five years' rental, viz., Rs. 7,931. The annual compensation payable, however, came to Rs. 7,005-11-0. Thus there was a clear profit of Rs. 1,894 to this department. Four inland fishermen societies took up lease of fishing rights in the provincialized waters for a total of Rs. 13,401-6-2 during the year.

(vi) *Tuticorin*.—There are only two provincialized waters in this region. These were stocked with 2,984,868 fish seeds during the year. Departmental fishing was conducted in both the tanks and a total quantity of 5,428 lb. of fish worth Rs. 1,369-12-0 were caught. Besides, a system of licensing of fishing was also adopted as in last year and an amount of Rs. 1,869 was obtained as licence fee. Thus there was a total receipt of Rs. 3,238-12-0 for both the waters. No compensation is, however, payable for these waters.

(vii) *Mettur Dam*.—There are 19 provincialized waters in this region. All these were leased for a total amount of Rs. 986-4-0 during the year.

(viii) *Bhavanisagar*.—There are about 60 provincialized waters in this district. Of these, 3 waters in Avanashi taluk were submerged to form part of the Bhavanisagar Reservoir. Of rest 40 waters were leased for a total rental of Rs. 8,255 during the year.

A list of provincialized waters is enclosed (vide Appendix XI).

3. Departmental waters.

(i) *South Kanara*.—There are 11 departmental waters in this area. A total number of 351,114 fish seeds (154,851) of the following varieties was stocked in these waters :—

Fish.	Number.
Etroplus	124,476
Mullet	138,662
Megalops	415
Chanos	1,204
Gourami	4
Barbus	2,785
Labeo	71,174
Eels	12,500
Tilapia	268
Total	351,114

Three thousand seven hundred and fifty-one pounds (3,965) of fish were caught from the various waters and marketed for Rs. 1,584-9-9 (Rupees 1,488-6-1).

(ii) *Malabar*.—There were 113 departmental waters in this region. During the year, two more waters in Palghat taluk were taken over, namely, Mangat-kulam under G.O. Ms. No. 488, Agriculture, dated 4th March 1954 and Aro-nurkulam under G.O. Ms. No. 181, Agriculture, dated 21st January 1954. Hence there are 15 tanks altogether. Besides the newly constructed Malam-puzha Reservoir is taken up for departmental development and exploitation provisionally.

A total of 700,700 fish seeds (107,600) as detailed below are stocked in the departmental waters including Malampuzha Reservoir.

Fish.	Number.
Carp	560,588
Catla	14
Gourami	197
Cirrhina	2,667
Labeo	834
Etroplus	16,114
Mirror carp	2,810
Murrol	2,805
Megalops	28,783
Mullet	7,786
Barbus	43,761
Tilapia	1,497
Micropogon	1,749
Chanos	30,165
Total	700,770

Departmental fishing was conducted in these waters excluding Malampuzha which yielded an aggregate of 5,245 lb. of fish (1,495) valued at rupees 1,385-10-6 (Rs. 547-9-6) during the year. The yield has shown much progress during the year.

(iii) *Vellore*.—Details relating to the quantities of fish landed from the various departmental fish farms are furnished below :—

	LB.	OZ.	RS.	A.	P.
1 Vellore Moat ..	12,807	6	3,287	4	9
2 Poondi reservoir ..	8,519	6	2,820	10	3
3 Poondi fish farm ..					
4 Adayar fish farm ..	177	..	42	10	3
5 Sathiavedu fish farm ..	102	10	51	5	0
6 Chingleput Fort Moat.	888	6	370	4	0
7 Thanthipandal fish farm.	4	..	2	0	0

Vellore moat.—The Vellore moat (Sections A, B and C) retained good quantity of water in all the sections. Generally Section A, the deepest of all the sections, used to be stocked with Catla seeds besides Labeo and Chanos. But this year, it was stocked with Labeo and Chanos and received from Tanjavor and Pamban respectively. Tilapia breeders received from Tanjavor and Mirror carp fingerlings brought from Ootacamund were also stocked in A section. Tilapia bred well in the Vellore moat and Mirror carps also have grown very well.

The Vellore moat was stocked with the following varieties of fish seeds :—

Carps	23,531	
Chanos	12,500	
Mirror carps	800	
Tilapia	72	
Eels	2,000	(brought from Srivaikuntam)
Total ..	38,903	

The moat fishery could not be exploited in full as fishermen were fully engaged in fishing other waters due to seasonal rains and hence fewer numbers took licences. The decrease in receipts is due to the lack of catla stocking which accounts for major yield.

Poondi reservoir and fish farm.—The Poondi reservoir retained water throughout the year and thus afforded good chances for the successful growth of Mrigal (*Cirrhina mrigala*) and Rohu (*Labeo rohita*) received from Cuttack. One thousand four hundred L rohita, C. mrigala and Catla received from Cuttack during the year were stocked in the reservoir after sufficient growth in fish farm. Establishment of these species is being watched with interest. Fingerlings and mrigal have been collected below the reservoir but till now no Rohu fingerlings have been noticed.

A total quantity of 8,357½ lb. of fish was caught from the deep pools below the reservoir and sold for Rs. 2,732-4-9 as against a total quantity of 3,585 lb. of fish sold for Rs. 2,317-12-9 during 1953-54.

The following fish seeds were stocked in the Poondi reservoir during 1954-55 :—

Chanos	283
Tanjavor fry	160,000
Catla	136
Labeo and inchrina	2,500
Mrigal, Catla and Rohu	1,400
Mullet	10,000
Total ..	74,319

Poondi fish farm.—The ponds were stocked with 1,482 Chanos and a total quantity of 162 lb. was caught and sold for Rs. 75-5-8. The lease of grass in the farm fetched Rs. 13. The ponds continued to be useful for stocking the fry received from other stations and their subsequent release in the reservoir after they attained stock-size.

Thanthipandal fish farm.—Owing to the uncertainty regarding the future of Thanthipandal fish farm as it is located in the border area adjoining the Andhra State, no development was undertaken. The fish farm was stocked with a consignment of 1,300 Murrel (*O. striatus*). Owing to heavy rains in the year, the farm ponds were all flooded and fish escaped into the channels. Four pounds of fish were caught and sold for Rs. 2. The carps and chanos stocked in the previous years have also not grown and several could not be accounted for. The growth of fish is also very poor due to paucity of plankton life. The question of reducing the staff was under consideration towards the close of the year under report.

Sathiavedu tank.—This is mainly used for breeding Gourami and *Eetroplus suratensis*. A total quantity of 102 lb. of fish was caught and sold for Rs. 51-5-0. Seven hundred and twenty-nine fingerlings of Gourami were collected from Thanthipandal and Sathiavedu and supplied to regional Assistant Directors.

Chingleput moat farm.—During the year the moat was stocked with the following fish seeds :—

Chanos	10,000
Labeo	5,681
O. Striatus	5,877
Total ..	21,558

Departmental fishing was conducted and a total quantity of 888½ lb. of fish was landed and sold for Rs. 370-4-0.

The moat is gradually silting up and the successful rearing of fish is retarded. Steps have to be taken for desilting the moat.

Adayar backwater served as the collection ground for seed of estuarine species. A total number of 425,634 seeds were collected from this backwater during the year and stocked in provincialized waters, demonstration tanks, etc. A total quantity of 177 lb. of fish was caught from the attached fish farms and sold for Rs. 42-10-3.

On the whole, 144,261 fish seeds were stocked in departmental waters as detailed below :—

	Number stocked.
Carp fry	83,531
Catla	136
Labeo fimbriatus	8,181
Chanos	22,783
Murrel	7,177
Cirrhina	8,181
Rohu Mrigal	1,400
Mullet	10,000
Eel	2,000
Tilapia	72
Mirror carp	800
Total ..	144,261

(iv) *Tanjavoor*.—The following tanks which were under the control of the department either under Rural Fishery Demonstration Scheme or Gourami Popularization Scheme, yielded a total quantity of 23,158 lb. of fish which realized an amount of Rs. 5,799-2-3. The details of the results obtained from each tank are furnished against each :—

Name of tank.		Results in 1954-55.		
		Lb. of fish. Caught.	Value.	
			RS.	A. P.
1 Aynankulam, Tanjavoor	2	430	132	15 0
2 West Moat, Tanjavoor	2	1,400	436	6 6
3 Webster Moat, Tanjavoor	3	604	192	0 6
4 Pookulam, Tanjavoor	10 cents	120	37	0 6
5 Pattankulam, Tanjavoor	10 cents	70	22	10 6
6 Ayikulam, Kumbakonam	1	575	109	11 6
7 Anayadikulam, Kumbakonam	1	774	154	7 6
8 Pidari Tank, Kumbakonam	2	1,710	288	8 0
9 Pattaraikulam, Muthupet	6	3,061	1,035	0 0
10 Thachankulam, Tiruthuraiyandi	1½	1,863	208	1 0
11 Pillaikulam, Adirampatnam	2	602	94	2 0
12 Aladikulam, Adirampatnam	2	160	31	4 0
13 Durga Tank, Nagapattinam	2	800	146	11 6
14 Pachamuthunattar tank	½	191	68	9 0
15 Pillaikulam, Nagapattinam	1½	56	10	2 0
16 Chatram Kulam, Nagapattinam	½	..	..	..
17 Sengulam, Mannargudi	2	3,091	741	9 0
18 Eachankulam, Nagapattinam	2	838	156	10 0
19 Kacherykulam, Nagapattinam	½	..	..	..
20 Uppukulam, Nagapattinam	½	..	..	..
21 Perumalkulam and Padikulam	2 & 4 approximate	2,000	400	0 0
22 Ramatheertham, Tiruvanaikoil	2	620	118	3 0
23 Keelanaiar, Pudukkottai	2	825	302	3 0
24 Tirukulam, Pudukkottai	4	126	47	7 0
25 Sivankoil, Pushkarani	½	71	26	14 6
26 Kumudankulam, Pudukkottai	1-70	1,091	..	..
27 Palaniandi Urani, Pudukkottai	1-77	..	..	..
28 Vairanachi Urani, Pudukkottai	1-42	..	..	..
29 Servarayanikulam, Pudukkottai	2-85	..	..	..
30 Sivayam tank, Kulittalai	..	..	..	..
31 Theerthakulam, Tindivanam	3	309	106	15 0
32 Anaikulam, Gingee	30 cents	53	12	6 0
33 Chakkarakulam, Gingee	50 cents	122	30	2 3
34 Venkateswarankulam	20 cents	14½	3	6 0
35 Chettikulam, Gingee	2-90	373½	86	4 0
36 Cuddalore, O.T. tank	3	867½	232	1 9

Name of tank.	Average.	Result in 1954-55.		
		Fish caught.	Value.	
		LB.	RS.	A. P.
37 Bhuvanagiri tank, Chidambaram	25 cents	..	..	..
38 P.W.D. tank, Chidambaram	10 cents	39	14	8 0
39 Sevamandir ponds, Porto Novo	1-55 cents	Gourami Nursery		
40 Ghouse, Palli tank, Port Novo	1-25 cents	..	..	..
41 Appapalli tank, Port Novo	1-50 cents	25	5	14 0
42 Pudupalli tank, Port Novo	1-25	58	14	5 0
43 Mahdoo Appapillai tank	1-50	203	50	13 0
44 Kitherngbi tank	1-25	85	21	10 0
45 Vaithapalli tank	1-25	30	7	9 0
Total ..	68-20	23,158	5,799	2 3

Total area of the tank exploited	68-20 acres.
Average production per acre	340-50 lb.
Maximum production per acre	1,545-5 lb.
Minimum production per acre	16-77 lb.

Of these items 10, 16, 19, 20, 37, 38 and 40 to 45 were handed over to the owners as they were found to be uneconomical to maintain. The results obtained from other tanks are generally satisfactory as many of them were either stocked at a later stage or were not operated fully. In 1955-56 it is hoped every tank will not only be maintained on a self-supporting basis but also with considerable margin of profit. The tank at Muthupet had a fieldman and a watchman-cum-fisherman but with a view to economize expenditure on the maintenance of tanks, the post of fieldman has been retrenched with effect from 1st September 1954. The tank at Kulithalai was taken over only in March 1954 in anticipation of Government sanction and the tank was stocked in this year though the removal of silt, construction of inlet and outlets have not been attended to for want of sanction. The tanks (items 27 to 29) were taken over on 1st October 1954 from the Pudukkottai Municipality on a 50 per cent profit-sharing basis and they have been stocked during this season. The growth of Catla and other species introduced in the tanks at Kumbakonam has been reported to be poor as also in the Ramatheertham in Tiruvanaikoil while in the Webster moat, the growth of Catla and Tilapia was surprisingly good. Fishing in Webster moat during the four weeks of the year have yielded 3,745 lb. fish with a revenue of Rs. 935-14-0 up to 23rd May 1955. The Mirror carps introduced in this moat have grown to more than 3 lb. in about three months. The Hydrologist has already taken up the analysis of the water of this tank and the results are awaited.

The Tilapia introduced in the Webster moat has not only grown well but has also bred prolifically. Since it was found unsafe to leave the entire Tilapia in the tank, arrangements were made to fish out grown-up Tilapia for sales. The Sivankoil pushkarani in Thirumayam (Pudukkottai) was stocked with 18 breeders and 100 seedlings of Tilapia. This water is not connected with any river system. Following are the details of supplies made to other divisions from the Webster moat :—

Tilapia:	Assistant Director, Mangalore.	Assistant Director, Bhavanisagar.	Assistant Director, Vellore.	Curator, Madras.	Assistant Fisheries Demonstrator, Pudukkottai.
(1)	(2)	(3)	(4)	(5)	(6)
Breeders	72	205	65	40	18
Fingerlings	1,550	57	22	..	100
Total ..	1,622	262	87	40	118

(v) *Madurai*.—Twenty-four lakhs, nine thousand eight hundred and nine fish seeds were stocked in all the Departmental waters in this Division which contributed substantially to augment the fish food production.

At the beginning of the year in the Division the following were the Departmental waters and fish farms :—

- (1) Mariamman Teppam, Madurai.
- (2) Valaiveesi Teppam, Madurai.
- (3) Thirumakulam, Madurai.
- (4) Race Course pond, Madurai.
- (5) Kaluvankulam, Tirumangalam.
- (6) Kallukatti Teppam, Karaikudi.
- (7) Chettinad Raja's tank.
- (8) Quarry pools (3 numbers) at Virudhunagar.
- (9) Kodaikanal fish farm.
- (10) Kodaikanal lake.
- (11) Mankatti Teppam, Melur.
- (12) Salakarayan tank, Melur.
- (13) Peria Urani, Melur.
- (14) Vadugapatti, Nilakottai.
- (15) Peria Theppam, Kallupatti.
- (16) Kamman Urani, Tirumangalam.
- (17) Agneeswarar Teppam, Tirumangalam.

Of the above Nos. 1 to 7 are under the Inspector of Fisheries, Madurai, No. 8 is under Sub-Inspector of Fisheries, Virudhunagar, Nos. 9 and 10 are under the Assistant Fishery Demonstrator, Kodaikanal, Nos. 11 to 14 are sanctioned under Community Project Scheme and Nos. 15 to 17 are demonstration tanks in the National Extension Service area which are under the Sub-Inspector, Virudhunagar. During this year, Kaluvankulam one of the Demonstration tank was returned and two tanks (Shenbakavinayagar tank at Sivakasi and a private quarry pool at Virudhunagar) have been acquired for fish cultural purposes. Kodai fish farm was constructed with three small ponds during the year. It was declared open by the Director of Industries. These ponds were stocked with 500 Mirror carp from Ooty and 1,000 golden carp from the Kodaikanal lake. Sanction for the construction of three more ponds were received at the close of the year and this work will be executed during the ensuing year.

(vi) *Tuticorin*.—The demonstration ponds at Kadayanallur were fished departmentally. A total quantity of 833 lb. of fish was caught and sold for Rs. 156-13-6. (Vide Appendix XII—List of departmental waters in the State.)

4. Rural Fishery Demonstration Units.

(i) *South Kanara*.—There are in all eleven demonstration tanks in this division.

Taluk.	Number of tanks.
Mangalore taluk	3
Kasaragod taluk	1
Karkal taluk	2
Puthur taluk	4
Coondapur taluk	1
	11

A total number of 351,114 seeds were stocked in these tanks, the varieties being Etroplus collected from Nileshwar, Labeo and Catla from Tanjavoor, Tilapia from Madras and Tanjavoor and Elvers from Srivaikuntam. The seeds from Tanjavoor started coming only from December and hence stocking could not be done in all tanks. With a view to establish catla, labeo Cirrhina and Gourami in the rivers of this division, a consignment of 1,900 carps and 12 Gourami were released in the upper reaches of river Nethravathi. Periodical fishing is conducted to find out whether fish introduced is breeding.

A total quantity of 3,751½ lb. of fish was caught and marketed from the various demonstration tanks in the division during the year and a revenue of Rs. 1,584-9-9 obtained. Revenue obtained during 1954-55 from the demonstration tanks were twice that of 1953-54.

(ii) *Malabar*.—There are three units at Palghat, Kozhikode and Thariods is in the district. The first two units are under the charge of Assistant Fishery Demonstrators and the last under the charge of a Fieldman. There were 13 demonstration tanks, during the year two more tanks in Palghat, namely, Mangat kulam and Aranur kulam were taken over and hence 15 demonstration tanks existed at the end of the year. A total number of 140,180 fry and fingerlings were stocked in the demonstration tanks. Fishing in these tanks were conducted and a total quantity of 5,345 lb. of fish was caught and sold for Rs. 1,385-10-6 as against 1,495 lb. of fish and Rs. 547-9-6 during the last year. There was an increase of catches in the demonstration tanks during the year showing much progress in the development of these tanks.

(iii) *Vellore*.—Of the 39 tanks, the control of four waters at Chingleput and Uthiramerur were handed over to the respective local boards as the tanks were not productive. Nine tanks belonging to the Revenue Department in Tiruvallur taluk were taken over during the year. Hence there were 44 demonstration tanks at the end of the year. A total quantity of 7,085 lb. of fish was caught from the demonstration tanks and an amount of Rs. 2,995 was realized as sale-proceeds.

(iv) *Tanjavoor*.—There are six units, two in Tanjavoor district, two in Tiruchirappalli district and two in South Arcot district, in this region. These units were continued as sanctioned in the following Government Orders :—

- (1) G.O. No. 135, Agriculture, dated 6th March 1954.
- (2) G.O. No. 3772, Development, dated 17th August 1953.
- (3) G.O. No. 3121, Agriculture, dated 18th October 1954.
- (4) G.O. No. 275, Agriculture, dated 7th December 1953.
- (5) G.O. No. 3290, Agriculture, dated 8th November 1954.

These units attended to survey of waters, supply of fish seeds to private parties and propagation of fish culture among the public. The total area of tank exploited was 68.20 acres which yielded a total quantity of 23,158 lb. of fish realizing an amount of Rs. 5,799. The average production per acre came to 340.5 lb. whereas the maximum and minimum production per acre were 1,545.5 lb. and 16.8 lb., respectively.

Some of the tanks were found non-remunerative and hence were handed over to the owners. Some new tanks in Kelithalai and Pudukkottai were taken over during the year. As soke of the waters were not yielding good results, action was taken to conduct the analysis of the waters with the help of

the departmental hydrologist so that remedial measures can be taken to make them productive. It is hoped to maintain all the tanks on a self-supporting basis during the next year.

The Webster moat in Tanjavoor proved to be the most productive one during the year. Catla and Tilapia introduced have grown very well. Especially the Tilapia bred prolifically in the moat. Besides the mirror carp which was also introduced in this moat, have grown to more than 3 lb. in about three months. The Sivankoil pushkarani in Tirumayam at Pudukkottai which is not connected with river system was stocked with 16 breeders and 100 seeds of Tilapia during the year. Two thousand one hundred and twenty-nine Tilapia (400 breeders and 1,720 fingerlings) were supplied to the departmental officers at Mangalore, Bhavanisagar, Vellore, Pudukkottai and Madras. Besides, grown-up Tilapias were also sold.

(v) *Madurai*.—There are three units in this region, at Madurai, Kodaikanal and Virudhunagar. An Assistant Inspector was newly sanctioned in G.O. Ms. No. 2385, Agriculture, dated 15th March 1954, at Madurai. The following are the demonstration tanks under this unit :—

- (1) Race Course Pond.
- (2) Thirumakkulam.
- (3) Kaluvangulam.
- (4) Mariamman Theppam.
- (5) Valaiveesu Theppam.
- (6) Kallukatti Theppam.

Besides, some tanks in Vadugappatti, Melur and Navinipatti under Community Project area and a tank at Nattarmangalam under National Extension Scheme are stocked and exploited by these units. These served as demonstration tanks and fish seeds were supplied to the public from these tanks.

Kodaikanal.—This unit is under the charge of an Assistant Fishery Demonstrator at Kodaikanal. The Kodaikanal lake and the newly constructed Kodaikanal Fish Farm besides the waters in Dindigul, Palni and Periakulam taluks are under his control. The newly constructed fish farms were stocked with mirror carp and golden carp during the year.

Virudhunagar.—This unit is in charge of a Sub-Inspector at Virudhunagar. There were three perennial quarry pools having an area of two acres at Virudhunagar. These were stocked with Labeo, Catla, Chanos, Etroplus, and exploited departmentally. Besides, three demonstration tanks at Kallipatti, and a tank at Sivakasi taken over during the year and National Extension Scheme are also under his control. One more private quarry pool was taken over during the year. Proposals are under consideration to take over a tank at Sathur and another two tanks at Srivilliputtur.

5. Inter-Regional Fish Seed Supply.

During the year, the seed collection programme was taken up on an elaborate scale and all the existing sources and the new sources found out during the year were tapped to a great extent. However, the needs of fish seeds in each region with regard to the varieties of fish, could not be fully met with from local resources. Hence an exchange of fish seeds was effected

from sources of abundance to places of requirements. On the whole, 11,072,396 fish seeds of different varieties were supplied and 7,202,648 were received by the departmental officers as against 3,855,986 and 891,450 seeds respectively during the last year.

(i) *South Kanara district—Receipts*.—A total number of 144,770 fish seeds was received during the year as detailed below against 70,754 seeds received in the previous year :—

From Tanjavoor—Labeo, Cirrhina	121,027
From Srivaikuntam—Elvers	19,925
From Madras—Tilapia	2,218
From Malabar—Megalops	600
From Ootacamund—Mirror Carps	1,000
Total	144,770

Supply.—Out of the total collection of 559,576 fish seeds during the year, 135,836 fish seeds were supplied to the other departmental officers against 169,700 supplied during last year.

Malabar, Madurai and Mettur Dam—

Etroplus	135,800
Gourami	36
Total	135,836

(ii) *Malabar district—Receipts*.—A total quantity of 808,101 seeds and fingerlings were received during the year as detailed below against 149,948 seeds received last year :—

Carps	761,614
Ooty—Mirror carp	4,090
Madurai—Chanos	30,680
Madurai—Etroplus	9,680
Malabar—Gourami	540
Madras—Tilapia	1,497
Total	808,101

Supply.—From this region, 230,890 fish seeds were despatched to other departmental officers during the year :—

Therapon	—200
Madurai—Murrel	—182,382
Mangalore—Megalops	41,308
Mangalore—Etroplus	7,000
Total	230,890

(iii) *Vellore—Receipts*.—One lakh, forty-six thousands, eight hundred and thirty-nine fish seeds were received from other departmental offices during the year against 282,070 fish seeds received last year :—

Ootacamund—Mirror Carp	..	..	..	800
Pamban—Chanos	..	..	..	46,000
Tanjavoor—Labeo cirrhina	..	..	..	96,324
Srivaikuntam—Eels	..	..	..	2,000
Cuttack—				
Mrigal	..	..	..	1,715
Rohu	..	..	..	
Catla	..	..	..	

Total .. 146,839

Supply.—Seven hundred and twenty-nine Gourami fingerlings only were supplied to the departmental officers and other State offices during the year :—

Tanjavoor	..	..	..	208
Malabar	..	..	..	230
Bhavanisagar	..	..	..	6
Tuticorin	..	..	..	24
For exhibition	..	..	..	159
Director of Fisheries, Assam	..	..	..	90
Inspector of Fisheries, Coorg	..	..	..	12

Total .. 729

(iv) *Tanjavoor—Receipts*.—Fourteen thousand, three hundred and eighty-three fish seeds were received from other regions during the year.

Supply.—Seventy-four lakhs, seven thousand, two hundred and eighty fry and fingerlings of Labeo, Cirrhina and Catla were supplied during the year to the other departmental offices noted below against 3,574,902 fish seeds supplied last year :—

	Fry.	Fingerlings.	Total.
Vellore	415,000	169,713	584,713
Mettur Dam	..	9,304	6,304
Tuticorin	..	184,125	184,125
Madurai	422,250	175,600	597,850
Malabar	5,780,000	82,364	5,862,364
Mangalore	..	168,924	1,68,924
Total	6,617,250	790,030	7,407,280

(v) *Madurai*.—The following varieties of fish seeds totalling 1,020,959 were received for stocking during the year against 223,351 fish seeds received last year :—

Tanjavoor—Labeo	..	..	..	592,850
Bhavani—Carps	..	..	..	357,508
Nileshwar—Etroplus	..	..	..	25,043
Madras—Etroplus	..	..	..	900
Ooty—Mirror carps	..	..	..	20,000
Ooty—Gambusia	..	..	..	4,800
Palghat—Murrel	..	..	..	17,138
Srivaikuntam—Elver	..	..	..	1,820

Total .. 1,020,959

Supply.—Seventy-eight thousands and five hundred fish seeds of chanos were supplied to other department officers against 77,554 fish seeds supplied during the previous year :—

Chanos—Mettur	..	..	..	17,500
Chanos—Vellore	..	..	..	10,000
Chanos—Malabar	..	..	..	51,000
Total	..	..	..	78,500

(vi) *Tuticorin—Receipts*.—One lakh, eighty-two thousands, nine hundred and fifty-three fish seeds of Labeo, Cirrhina and catla were received from Tanjavoor against 146,862 fish seeds received last year.

Supply.—Nineteen thousands eels were supplied to Mangalore region against 32,490 fish seeds of chanos and Etroplus supplied to the departmental officers from this region.

(vii) *Bhavanisagar—Receipts*.—Forty-eight lakhs, fifty-two thousands, four hundred and eighty-four fish seeds were received from other departmental offices during the year as detailed below :—

Carp fry	..	..	..	4,734,800
Murrel	..	..	..	22,587
Etroplus	..	..	..	86,591
Malabar—Megalops	..	..	..	8,506

Total .. 4,852,484

Supply.—Fifty-two lakhs, one hundred and sixty-one fish seeds were supplied from this region to other departmental offices during the year :—

Bhavani carp fry	..	..	..	5,167,550
Murrel	..	..	..	3,079
Mirror carp	..	..	..	29,212
Stripped Barbus	..	..	..	180
Etroplus maculeatus	..	..	..	140

Total .. 5,200,161

(viii) *Mettur Dam—Receipts*.—Thirty-two thousands and one hundred and fifty-nine fish seeds were received from other departmental offices during the year.

Supply.—Nil.

6. Survey of waters and supply to private parties.

(i) *South Kanara*.—Sixty-one tanks with an extent of 75.86 acres in Puthur, Udipi, Karkal and Coondapoor taluks, were surveyed against 13 tanks and 3 wells extending over 41 acres last year. Of these, 22 tanks were brought under pisciculture. Besides the tanks in Puthur taluk were also

surveyed and brought under pisciculture. A total of 11,613 seeds of food fish costing Rs. 71-9-2 were supplied on the whole.

Etroplus	6,860
Megalops	339
Gourami	22
Murrel	36
Labeo	4,356
Total ..	11,613

Besides, the local rivers were also surveyed to expose fish seed collection centres and Shiradygadi centre was found to abound in *Barbus tor*.

(ii) *Malabar*.—A total number of 56 tanks covering an area of 72.30 acres were surveyed and 16 tanks were brought under culture and 7,250 fish seeds (7,202 seeds of food fish and 48 seeds of Public Health fish) costing Rs. 581-8-6 were supplied during the year.

Food fish.				Public health fish.			
Etroplus	461	Trichegaster	30				
Megalops	12	Barbus	6				
Gourami	529	Macropodus	12				
Murrel	148						
Labeo	2,790	Total ..	48				
Cirrhine	2,223						
Mirror carp	1,039						
Total ..	7,202						

(iii) *Vellore*.—Forty waters extending over an area of 523.56 acres were surveyed in Chingleput and North Arcot districts during the year. Sixty-four thousand, two hundred and eight fish seeds (44,126 fish food seeds and 20,082 public health fish seeds) were supplied to private parties for stocking some of the water surveyed.

Food fish.				Public health fish.			
Etroplus	12,812	Gambusia	300				
Gourami	8	Orange Chromide	19,782				
Murrel	25,306						
Labeo	6,000	Total ..	20,082				
Total ..	44,126						

(iv) *Tanjavoor*.—About 104 waters resources covering an area of 6,754.5 acres were surveyed. A total number of 161,224 fish seeds including Public Health fish were supplied for stocking many of these centres. An amount of Rs. 4,505-10-6 was realized on account of the seed supply. There was a heavy demand for seeds of Gourami and Catla from the public and it is hoped to comply with these demands in the coming year.

(v) *Madurai*.—There was very great demand for supply of fish seeds from the public consequent on the various efforts taken to popularise fish culture for stocking the various private waters in this region as detailed below :—

Labeo	2,044	Mirror carp	145
Gourami	10	Golden carp	158
Chanos	3,745	Eel	1,820
Etroplus	6,253		
Bhavani carps	6,508	Total ..	35,221
Murrel	14,538		

7. Mettur Reservoir Fisheries.

Cauvery is one of three biggest rivers in South India. The fisheries and irrigation potentialities of the river have been exploited from very ancient times. This was yielding a fishery revenue of a lakh of rupees till the construction of the Mettur Dam. The immediate effect of this construction was the formation of a vast reservoir extending over 60 square miles and impounding a volume of 94 million cubic feet of water. The huge lake submerged many villages and jungles. The huge dam became an effective obstruction for migratory fishes. The annual floods which used to sweep through the sand bar of the Coleroon provided a passage for vast shoals of Hilsa which used to swim up the river through the Ullar by-pass. The construction of the dam and the formation of the reservoir stopped effectively these annual floods. These caused a sudden diminution of the fisheries of the river below and it reflected immediately in the rentals which fell from a lakh of rupees to forty thousand annually.

The Fisheries Department took up the problem of resuscitating the fisheries. The dam has converted the upper reaches into a big lake, leaving the tail reaches in its erstwhile riverine condition. The first step taken towards resuscitation was the imposition of conservancy regulations. The four mile stretch below Hoganikkal and three miles below the Dam have been declared as sanctuaries. The only obstacle before the Dam existed preventing the movement of fishes was the Hoganikkal falls. Later, the Dam became an insurmountable barrier. The introduction of fish pass at an enormous cost was considered unnecessary. Regular steps are taken to rescue the fish stranded at the foot of the dam in large numbers and transporting them to the reservoir whenever the sluices were closed suddenly. The Ellis surplus which functions for more than 100 days in a year naturally brings down with its fish and fingerlings which repopulate the lower reaches. The reservoir and the river were intensively stocked with Catla; the quickest and largest grown India Carps, the Gourami, Etroplus and the Bengal carps, Rohu and Mrigal. Fishing of immature fish was prohibited. A fish farm was constructed at Mettur. Fingerlings of important species were grown in the farm and released in the reservoir. A hatchery has been erected. As a result of these systematic activities, the fisheries in the reservoir developed rapidly. A series of experiments have shown that large quantities fish can be taken out annually from the reservoir without in any way depleting the fisheries. Big fishes like Catla, *Pangassius*, *Cirrhina cirrhosa*, *Barbus dubius*, *Macrones aor* are daily landed in large numbers.

After developing the fisheries, attention was directed to the exploitation aspect. Usually, fisheries in tanks and lakes are auctioned annually and given to the highest bidder. But it was difficult to find an organization or individual to exploit an area of this size, viz., 62.5 square miles. The ordinary Indian Inland fisherman is not used to fishing in such deep waters or on a

bottom of rocks and forests. The cast net of the Inland fishermen is suitable only for shallow waters. The "Rangoon net" a drift net which hangs vertically in water with the aid of floats on the top was introduced in Mettur reservoir from Rajahmundry which is now in Andhra State. The local fishermen adapted it rapidly. The net has a dimension of 100 feet by 20 feet with $2\frac{1}{2}$ inches mesh. There are no weights on the lower margin of the net. In water the net is not quite visible to the fish which swim straight in and get entangled at the region of the gills. This method automatically prevents the capture of immature fish which swim away unharmed through the large meshes. The indigenous "uduvalai" which has got weights at the bottom, is also quite effective. For catching the bottom dwelling fishes, hooks and lines also yield some results. The local fishermen are given licences on payment of a moderate fee to fish in the reservoir. More than 140 fishermen are fishing every day and landing a good quantity daily. A pilot fishing scheme was introduced by the department and a small portion of the reservoir was exploited. On an average, about 1,500 lb. of fish were landed daily. These fishes were sent to various stations for consumption in fresh condition. Encouraged by the results achieved, a regular scheme was introduced for the development, exploitation and marketing of the Mettur fish as sanctioned in G.O. Ms. No. 140, Food and Agriculture (Food Production), dated 16th April 1951. This was continued during the previous years and this year as well as sanctioned in G.O. Ms. No. 216, Agriculture (Food Production), dated 6th July 1954.

Water-level.—The water-level in the reservoir was 78.30 feet on 1st April 1954. The highest level was noticed in August 1954 when it was 120 feet. Gradually the water receded to 69.80 feet on 31st March 1955.

Offtake.—At the beginning of the year twelve departmental units (2 fishermen each) were engaged in departmental fishing. As it was decided to stop the departmental procurement exploitation and marketing gradually, 3 of the 12 units were retrenched on 13th February 1955. Seven more units also have been recommended to be closed as a measure of economy. Keeping only two units for experimental purpose only. However, 9 units with 18 fishermen continued to work till the end of the year. Three additional units with 6 fishermen attached to the two motor fishing luggers were also conducting fishing. At the beginning of the year, there were not enough fishing tackles for supply of these fishermen but arrangements were made by the Director for the supply of 200 lb. of Nylon yarn received in connection with the Technical Co-operation Aid Schemes as no yarn of that kind was available for purchase in the open market. The supply was received at a time when the fishing implements were badly required for the departmental fishing.

A total quantity of 79,367 lb. of fish was landed by departmental units including the catches by the three units attached to the motor fishing luggers as against 77,200 lb. landed during last year, thus showing an increase 2,167 lb. of fish landed by the departmental units during 1954-55.

Fish of the carp varieties was purchased from the licensees at $2\frac{1}{2}$ annas per lb. and other fish at 3 annas per lb. as in the previous years. During the year, 327,985 lb. of fish were purchased from the licensees as against 373,046 lb. procured last year. The total quantity of fish procured from licensees and the departmental catches amounted to 497,352 lb. which may roughly be taken to represent two-thirds of the catches from the reservoir and it may be assumed that one-third of the catches might have been disposed of by the

fishermen for local consumption and for despatch to outstations through merchants. During the early part of the year, the catches of fish were not very satisfactory but gradually the catches improved when the water-level went down.

In connection with proposals for the continuance of the scheme during 1955-56, it was ordered that the procurement of fish from the licensees should be stopped with effect from 13th March 1955. The transactions are not confined to the departmental catches and the same are utilized to meet the demands from Government institutions and that fish need not be supplied to private merchants by purchasing from the licensees.

In obedience to those orders, procurement of fish from the licensees were stopped with effect from 13th March 1955.

There was no change in the selling price of fish as the same schedule of rates of last year was in force during the this year also as shown below :—

Price per lb. f.o.r. destination.

Particulars.	Within 50 miles.		Over 50 miles and up to 250.		Over 250 miles.	
	(2)		(3)		(4)	
	RS.	A. P.	RS.	A. P.	RS.	A. P.
1 Fish ungutted consisting of varieties ..	0	5 3	0	5 9	..	..
2 Fish gutted	0	5 6	0	6 0	0	7 0
3 Fish excluding carps gutted	..	..	0	5 0	0	6 0

N.B.—An increased rate of one anna per lb. over the above for fish with heads, tail and fins removed was collected.

A fish transport van No. MZS 1550 was used for transporting fish for marketing purposes at the station. The transport charges arrived at, on account of its use, was Rs. 1,387-12-0.

There are 70 private merchants on roll. Among them, 47 are being supplied with fish regularly and 23 occasionally according to their indents. Forty-six Government institutions and departmental officers were supplied with fish originally from this station. Since the stoppage of procurement of fish from licensees, only the indents from Government institutions are complied with from the departmental catches. Fish supply to private parties by procuring fish from the licensees was stopped with effect from 13th March 1955.

A gist of the transactions during the year of the Marketing Section is given below :—

	LB.	OZ.
Total quantity of iced fish sent to outstations ..	342,378	7
Total quantity of cured fish sent to outstations ..	428	0
Total quantity of fish cured	10,871	8
Quantity of dry fish obtained	3,534	0
Fresh fish sold locally	21,953	0
Iced fish sold locally	360	4
Cured fish sold locally	489	12

8. *Gourami Popularization Scheme.*

The continuance of the scheme was sanctioned in G.O. Ms. No. 3290, Agriculture, dated 8th November 1954.

The following are the fingerlings obtained from the tanks noted below :—

Name of tank.	Number of fingerlings.
(1)	(2)
Koilvenni tanks	135
Sevamandir pond, Porto Novo	174
Tiruchirappalli tanks	75
Total ...	384

Besides 208 seeds were obtained from Vellore Division and 60 from the Superintendent of the Sevamandir pond at Porto Novo to replenish the stock). Of the total thus procured, some were stocked in tanks as detailed below and 360 were supplied to private parties :—

Name of tank.	Number stocked.	Name of tank.	Number stocked.
(1)	(2)	(1)	(2)
1 West moat	72	9 Pillaikulam	42
2 Ayyankulam	25	10 Assistant Director (Fresh	
3 Pookulam	12	water Research), Bhavani-	
4 Thattankulam	25	sagar	24
5 Eachankulam	25		
6 Sengulap	25	Total ..	302
7 Koilvenni	25		
8 Pattaraikulam	27		

When the Thachankulam at Tiruthuraipundi was handed over to the Panchayat Board, 69 Gourami breeders and fingerlings were obtained and these have been stocked in Pillaikulam at Adirampatnam and Muthupet. There was heavy demand for Gourami and also for Catla seeds from the public which could not be met with fully due to non-availability of seeds to the extent of demand. However as all the tanks mentioned above have been re-stocked and the Koilvenni tanks, Sevamandir ponds and the circular and rectangular cistern and A.I.R. tank, Tiruchirappalli, have got good number of breeders and fingerlings, it is expected that the demand in the next year can be met fully if they breed well in those tanks.

9. *Paddy-cum-Fish Culture.*

Government sanctioned in G.O. No. 1547, Agriculture dated 8th May 1954, a scheme for the culture of fish in paddy fields comprising of 3 plots of 100 acres each for a period of 8 months. Each plot was to be in charge of one Assistant Inspector specially sanctioned for the scheme.

Three hundred acres of paddy farms selected were in the following places :—

	ACS.
Tanjavoor—Pandithar Thottam	25
Aduthurai—Pappa's farm	65
Kumbakonam—Kalithular, Mandai	107

	ACS.
Mayuram—Arupathi odai	40
Mahadanapuram	
Kadalangudi	64
Vandahirajapuram	
Research plots—Randomization of species in 10 plots at Mahadana-	
puram.	
Triplicated system—20 plots in Kalithular.	

The scheme was inaugurated by the then Director of Industries, Sri E. P. Royappa, I.A.S., on 10th November 1954. This was the first time in South India that the scheme was taken up on a field scale. Excepting for establishing that Labeo and Catla can be grown nothing else could be achieved by way of results except at Arupathi odai where deep water paddy was grown. The reasons for the failure of the scheme in general was attributed to the following reasons :—

(1) The maximum period for keeping water in any paddy field did not exceed three months at a time. Though double-crop paddy fields were selected there was a gap of two months when seedlings were planted and ploughing, manuring, etc., was resorted. It was planned to drive the fish to the feeding channels but this did not work.

(2) The minimum level of 4 inches of water could not be maintained due to constant closure and change in water-supply rate of the irrigation channels. On many occasions the paddy fields had no water at all.

(3) There were two spells of heavy rains which completely flooded the fields and the adjoining channels and all the fishes escaped into the river system.

It was estimated that each acre should yield 150 lb. The planning results obtained and the rate of growth showed that this rate could be achieved provided the above handicaps could be overcome. However good results were achieved in the 40 acres plot of Arupathi odai. Here a special variety of deep water paddy PTB. 15 was cultivated. So far we have taken out 230 lb. of fish and the one-third share of Government has fetched Rs. 16-12-0 per acre. The exploitation is still going on. Catla grew to 2 to 3 lb. in each case. There are 4,000 acres of this type of paddy and it may be advantageous to pursue this further.

10. *Fish culture in backyard wells.*

(i) *Mettur Dam (Salem district).*—During the year under report, the Well Stocking Scheme was first inaugurated in Salem district. The aim was to stock as many irrigation wells as possible with fingerlings of *Etrophus suratensis* and Murrel. The scheme was formally inaugurated at Gundakalur village by the Collector of Salem on 15th July 1954. On the same day a fish show was also organized. The following fish fingerlings were stocked in wells during the year. Seven hundred and seven wells were stocked with 4,473 fish seeds during the year.

Name of fish.	Number.
Murrels	2,859
<i>Etrophus</i>	1,473
Catla	41
Labeo	100
Total ...	4,473

(ii) *Vellore (Chingleput and North Arcot districts).*—A total number of 2,368 wells were stocked with fingerlings of *Etrophus* and Murrel collected from centres in this division as against a target of 2,000 wells fixed for the division for 1954-55. They were stocked with a number of fish seeds. This is the first year of the working of the scheme and there was satisfactory response from the public. The transport of fingerlings to remote villages at the expense of the private party retards the enthusiasm of the public in the purchase and stocking of the seeds. Hence the supply of fish seeds should be made at cost price exclusive of transport charges to the enthusiastic villagers.

V. FISH MARKETING AND INFORMATION UNIT.

1. MARKETING.

Marketing is an item of great important in fisheries trade especially because fish is a commodity that is likely to get spoilt quickly and consequently prices are liable to great fluctuations. The prices also fluctuate considerably when there is a glut in fishery and later when it becomes scarce. There are also many varieties of fish and people of each locality have a special preference to certain types of fish. Taking advantage of these factors, middlemen make enormous profits at times. In Madras State, there are a number of middlemen who invest first a little and make a good profit later on. The fishermen get only a fraction of the price paid by the consumer. There are a very few big businessmen engaged in fish trade in Madras State. In contrast to this, the fish business is very well organized in other countries.

In Madras we have got enormous resources. Nearly 2 lakhs of fishermen are operating in the State. The main production of fish is from the sea. The inland waters contribute a good share but form a very little percentage. More than 40 per cent of the total landings are salted on account of the difficulties experienced first in transport of fish to nearby markets and secondly lack of knowledge of the scientific and economical methods of marketing.

To solve the first problem, the department have taken steps to provide proper transport facilities from the landing centres to the City markets. This has helped the fishermen to market their catches more profitably. During the year, eight fish transport vans were hired out to Fishermen Co-operative Societies for transporting the fishes. A total quantity of 308.5 tons or 690,895 lb. was transported to Madras City markets by these vans and a total hire charges of Rs. 14,172-12-0 was obtained for these vans against Rs. 12,377-10-0 obtained during the last year.

Van.	Route.	Fish transported in tons.	Hire charges.
(1)	(2)	(3)	(4)
1 MZS 1262	Ennore to Madras	19.70	770 14 0
2 MZS 1335	Do.	26.00	82 0 0
3 MZS 1540	Do.	53.32	2,375 8 0
4 MZS 3351	Do.	128.54	5,656 12 0
5 MZS 2968	Ennore to Tiruvottiyur and Madras.	27.70	2,326 10 0
6 MZS 3102	Do.	32.21	1,538 4 0
7 MZS 3158	Arambakkam to Madras	14.81	88 0 0
8 MZY 0291	Do.	6.20	1,419 12 0
	Total	308.48	14,172 12 0

Thus transport of fish from Pulicat Lake and Ennore backwaters to the City markets was facilitated by the Department during the year.

As there is a good demand for fresh fish, arrangements were made to transport fish from Mettur reservoir for sale to the public in Madras City. It was remarkable that all the fish received were sold immediately on arrival. On the whole, 102,174 lb. or 42½ tons of fish were sold for Rs. 30,521-4-0 as against 14,059 lb. during the last year. Besides 768 lb. of semi-dried prawns were also sold in the City by the marketing unit as against 485 lb. during last year. The figures of sale shown above indicate the great demand for fish and fish products in the City.

Regarding the improvement of marketing facilities, an officer of the department (Sri V. D. Spurgeon) was deputed to undergo training in the organization, methods employed and technique of fish marketing of the International Training Centre held at Hongkong from 12th July 1954 to 21st August 1954 under the auspices of the F.T.A.P. of F.A.O. The Officer has reported that designs of fish stalls found in Hongkong are well-planned and fish sold at these stalls are kept absolutely fresh on raised platform with blood, slime and water draining off from below. The cost of fish is fixed and displayed on plastic index cards. The whole stall is kept fly-proof and free from any odour. These stalls serve as models to be copied by other Nations. He also suggested that the best way to improve the appalling conditions in Madras State is to give practical demonstration by putting up a model Fish Stall undertake departmental marketing in these stalls to begin with in some of the selected towns. Each Fish Stall will be of 15 feet by 8 inches size with cement floorings, rounded corners drainage connection, raised and sloping platform for cutting and display of fish fly-proof enclosure, dial-scale for weighing and plastic price index cards. The stalls can be cheaply designed and the municipalities can be asked to construct such stalls in important towns and lease them to the fishermen. It is essential that even the fish retailers should be clean. Separate fish markets do not exist in this State. Further fish vending is allotted only a small portion of the markets without much convenience. As most of the markets in this State are owned by the Municipalities, Local Boards or private individuals or trusts, it is essential that necessary legislation is to be enacted to make the owners of the markets to construct fish stalls on model designs with necessary hygienic conditions under expert advice of the Officer trained.

2. INFORMATION AND PROPAGANDA.

1. *Library.*—The Central Fisheries Library continued to cater to the needs of departmental officers, trainees, students, research workers of the various Universities and the public. During the year under report, 1,378 additions were made to the library and 400 books were issued for reference and return.

2. *Museum.*—The Fisheries Museum was very popular and was visited by many persons and served as an effective medium of propaganda for the various activities of the department. The exhibits were rearranged and the following exhibits were newly added :—

- (1) Model of Chinese Dip net used in Cochin backwaters.
- (2) Thoori-net used in the Madras Coast.
- (3) Uduvalai used in Mettur Reservoir.

- (4) Draf net.
- (5) Cast net—stringed; stringless.
- (6) Model of Danish Fishing boat.
- (7) Model of Surf boat.
- (8) Crab and chank show cases.

Besides several specimens were made available to the departmental officers for participating in the different exhibitions held within their jurisdiction. A set of illustrated, propaganda posters were supplied to the regional Assistant Directors from the Central Museum.

3. *Aquarium*.—The departmental aquarium continued to draw a large number of visitors on the Marina beach. In order to make the aquarium more attractive, the Curator was deputed to Ceylon. About 1,500 fingerlings and breeders of the following varieties of exotic aquarium fishes were imported for display in the Aquarium as sanctioned in G.O. Ms. No. 3648, Agriculture, dated 24th December 1954 :—

- (1) Siamese Fighters (*Betta splendens*).
- (2) Jewel fish (*Hemichromis bimaculatus*).
- (3) Agens (*Pterophyllum scalare*).
- (4) Pearl Gourami (*Trichogaster leeri*).
- (5) Blue Gourami (*Trichogaster trichopterus*).
- (6) Firemouth (*Cinchlasoma meeki*).
- (7) Jack Dempsey (*Cinchlasoma biocellatum*).
- (8) Blue Acara (*Aequidens latifrons*).
- (9) Brown Acara (*Aequidens portalegrensis*).
- (10) Australian Rainbow (*Melanotaenia nigrans*).
- (11) Cardinal fish or white-cloud Mountain Minnow (*Tanichthys albonubes*).
- (12) X-Ray fish (*Pristella riddlei*).
- (13) Harlequin (*Rasbora heteromorphs*).
- (14) Neon Tet (*Hyphessobrycon innesi*).
- (15) Widow Tet (*Gymnocorymbus ternetzi*).
- (16) Black-line Tet (*Hyphessobrycon scholzei*).
- (17) Silver Tet (*Ctenobrycon spilurus*).
- (18) Buenosaires Tet (*Hemigrammus caudo-vittatus*).
- (19) Glow-light (*Hyphessobrycon flammeus*).
- (20) Flame Tet (*Hyphessobrycon serpae*).
- (21) Serpae Tet (*Hyphessobrycon serpae*).
- (22) Red Tet (*Hyphessobrycon rosaceus*).
- (23) Head and tail light (*Hemigrammus ocellifer*).
- (24) Golden Barb (*Barbus semi fasciolatus*).
- (25) Sumatra Barb (*Barbus sumatranus*).
- (26) Rosy Barb (*Barbus conchoni*).
- (27) Niger Barb (*Barbus nigro-fasciatus*).
- (28) Cumming Barb (*Barbus Commingi*).

- (29) Cherry Barb (*Barbus titteya*).
- (30) Nanaostomus.
- (31) Bumblebee (*Brachygnathus xanthozonus*).
- (32) Mollie (all varieties) (*Mollienisia sphenops*).
- (33) Sail-fin mollie (*Mollienisia latipinna*).
- (34) Platy (all colours) (*Xiphophorus maculatus*).
- (35) Sword-tail (all colours) (*Xiphophorus hellerii*).
- (36) Lace-tail guppies (*Lebistes reticulatus*).
- (37) Gold-fish, Calice (*Carassius auratus*).

These fishes were added on to the Aquarium tanks during the year under report.

4. *Exhibitions*.—During the year under report the department participated in several exhibitions held at various towns in the State and popularized the fisheries activities. The notable exhibition was the one conducted at Teynampet Congress Grounds, Madras, in connexion with the Sixtieth Session of the Indian National Congress at Avadi near Madras. This department participated in the exhibition on a grand scale. Special exhibits like fish-farm models, models of the modern ice-cum-cold-storage plant and fish-meal plant erected on the West coast for processing fish, models of the indigenous and modern fishing crafts and tackles, a miniature demonstration of live fishes of economic, larvicidal and ornamental values and practical demonstrations of paddy-cum-fish culture, were arranged and displayed to the public. Besides, sale of fish products like semi-dried prawns, fish-meal, fish biscuits, shell-grit, etc., was also conducted. To popularize fish food, sale of fish cutlets, etc., was arranged at the stall and it became popular among the public. A list of exhibitions in which the department participated is given below :—

(i) *Assistant Director of Fisheries, Vellore.*

- 1 Tamilnad Co-operative Exhibition, Vellore.
- 2 Annual Rural Development Exhibition, Katpadi.
- 3 Swadesi Khadi Agriculture Exhibition, Tiruvannamalai.
- 4 Rural Pongal Week Exhibition, Kalavai.
- 5 Rural Pongal Week Exhibition, Velanandal.
- 6 Rural Pongal Week Exhibition, Santhavasal.
- 7 Rural Pongal Week Exhibition, Kuzhivanandal (Polur).
- 8 Rural Pongal Week Exhibition, Tiruvannamalai.

(ii) *Assistant Director of Fisheries, Tanjavor.*

- 9 Tanjavor Art Gallery Exhibition.
- 10 Mayuram Cattle Show.
- 11 Kumbakonam Mahamakam Exhibition.
- 12 Tiruthuraiundi Cattle Show.
- 13 Kulithalai Cattle Show.
- 14 Mannargudi Exhibition.
- 15 Educational Conference Exhibition.
- 16 Kumbakonam College Centenary Celebrations.
- 17 Annamalai University Silver Jubilee Exhibition.

(iii) *Assistant Director of Fisheries, Madurai.*

18 Community Project Exhibition at Kalimangalam opened by the Chief Minister.

19. **Tamilnad grama Sevak Vidyalaya Exhibition, Kallupatti.**

20 S.P.C.A. Exhibition at Virudhunagar.

21 Industrial Exhibition at Virudhunagar.

22 Pattiveeranpatti High School Exhibition.

23 Kodaikanal Fish Farm Inauguration Exhibition.

24 American College Science Exhibition at Madurai.

25 Alagarkoil Exhibition.

26 Railway Centenary Exhibition at Madurai.

(iv) *Assistant Director of Fisheries, Tuticorin.*

27 Fifth National Exhibition and Health Festival, Tirunelveli.

28 Eighteenth Industrial Exhibition at Tuticorin.

(v) *Assistant Director of Fisheries, Mettur Dam.*

29 Municipal Exhibition, Salem.

30 State Exhibition sponsored by the State Conference of Social Work at Salem in which the Chief Minister and the Minister for Fisheries participated.

5. *Technical information.*—In order to educate the local fishermen in the various fisheries activities undertaken by the department, propaganda unit of the department took up to printing of following articles on fisheries in Tamil in the form of pamphlets and to supply them to the interested fishermen free of cost :—

1. Fish preservation and by-products.
2. Inland Fisheries Research and Statistics.
3. Marine Fisheries Research and Statistics.
4. Indigenous Craft and Tackle and mechanisation of fishing.

The Government accepted the proposal and the articles were sent for printing during the year.

Pamphlets in Tamil on the following subjects were printed and distributed to the interested public :—

(1) Paddy-cum-fish culture.

(2) Fish from backyard well.

Besides a pamphlet in English on the Recipes for semi-dried prawns was cyclo-styled and distributed to the public along with the sale of prawns.

Proposals were submitted for obtaining a cine-projector (16 m.m.) under the T.C.A. aid, so that the fishermen can be educated by showing different films of fishery importance.

6. *Enquiries.*—The Propaganda Unit continued to furnish information to several public institutions and private individuals regarding the methods of fish culture, manufacture of fish products, information on larvicidal and ornamental fishes, their culture and breeding, etc. Several pamphlets and literature on fisheries matters were also supplied to many persons. Fisheries publications were also sold to many research institutions and fisheries trainees.

Periodical information on the fisheries activities in the State were furnished to the Director of Information and Publicity, Madras, and the Editor of the *Ind-Com Journal* for publication in the official journals published by them. Film shows also were arranged for the benefit of the fishermen.

VI. SOCIO-ECONOMIC WORK.

1. FISHERMEN CO-OPERATIVE SOCIETIES.

General.—The fishermen co-operative societies continued to play an important role in the improvement of the economic condition of the fishermen. They issued small loans to the fishermen members during the off-season, and recovered them during the season. They inculcated a habit of thrift among the fishermen. Some of them arranged the sale of fish to the best advantage of the members. In the East Coast, the inland societies were prominent, as a number of them took almost all big public water-sources on lease and the members were much benefited. Attempts were made to revive the dormant societies of the sea-fishermen in the East Coast by non-credit activities, as these societies did not enjoy credit facilities. Such non-credit activities included the distribution of yarn, running of transport vans, marketing of fish, etc. The question of giving assistance to these societies by way of Government loans for long terms to be recovered in easy instalments for the purchase of fishing craft and tackle and by introducing the use of mechanized boats which should be supplied by the department on hire-purchase system was actively under the consideration of the Government. The new type of mechanized boat known as "Pablo prototype" is popular among the fishermen of this Coast. The societies can take them when they are constructed more in number.

The following particulars show the position of societies at the end of the co-operative year 1954-55 :—

	NUMBER.
Number of Societies	238
West Coast	115
East Coast	123
Number of members	34,429
	RS.
Paid-up share capital	5,85,947
Reserve Fund	1,53,477
Loans issued during the year	3,38,363
Loans outstanding at the end of the year	10,94,238
Loans obtained from the central banks	4,10,315
Value of lease of inland fisheries taken by societies.	1,93,269
Amount remitted to the Government towards the lease amount.	1,66,868
Value of foodstuffs and other accessories distributed.	1,21,188
Value of yarn and other fishing tackle sold	51,511
Amount of subsidy towards clerical assistance granted to societies.	1,935
Savings on account of thrift scheme	..

In addition, there are 4 cottage industry societies for net-making consisting of fisherwomen. (Vide Appendix No. XIII.)

The societies represented the local grievances of the fishermen to the department and all of them were looked into.

The department continued to have the staff of the Co-operative department for organization and supervision of societies. The West Coast is having the intensive supervision of the societies since the year 1945. The need for such supervision of societies in the East Coast is keenly felt. The Government sanctioned a post of a Senior Inspector of Co-operative Societies for Ramanathapuram district in G.O. Ms. No. 1120, Agriculture, dated 7th April 1954. The Senior Inspector of Co-operative Societies joined duty on 2nd August 1954. The Government further sanctioned a post of a Junior Inspector of Co-operative Societies in G.O. Ms. No. 201, Agriculture, dated 25th January 1955, for looking after the marine societies in Tanjavoor district. The Inspector joined duty during the current year.

In the West Coast, there was a set-back in the development of credit activities, as the fishing season failed. Fish of economic importance like meckerels, sardines, etc., did not appear in abundance as usual. The societies defaulted to pay the dues to the banks and further credit during the ensuing monsoon was seriously affected. It is increasingly felt that the fishermen should be assisted by long-term and medium-term loans also to improve their economic position.

A brief survey of the salient features of the progress is given below :—

West Coast.

South Kanara district.—At the beginning of the year, there were 50 fishermen societies in this district. During the year, a Fish marketing society was started on work with area of operation extending the whole of the district. The fishermen co-operative credit societies covered all the important fishing lamlets.

(a) **Membership and share capital.**—At the beginning of the year 1954-55, there were 7,964 members on roll with a paid-up share capital of Rs. 2,53,711. During the year, 103 members were admitted. There were 7,971 members with a paid-up share capital of Rs. 2,71,149 at the end of the year.

(b) **Loans to members.**—At the beginning of the year 1954-55, the loans outstanding against the members amounted to Rs. 7,40,694. During the year, loans to the tune of Rs. 2,23,740 were issued and Rs. 3,05,292 were collected leaving a balance of Rs. 6,59,142. There was a reduction in the amount of loans outstanding but the overdues rose from Rs. 2,75,439 to Rs. 3,28,483. The failure of the fishing season accounts for the large overdues of loans.

(c) **Borrowings.**—During the period 24 societies borrowed Rs. 1,66,950 from the bank and 38 societies repaid Rs. 2,25,680 leaving a balance of Rs. 3,28,483. The borrowings from the bank showed a decrease to an extent of Rs. 58,730 since a majority of the societies failed to repay the loans in time and applied for extension of due date till the next fishing season. In view of the unprecedented distress among the fishermen the bank granted extension of time in deserving cases.

(d) **Thrift.**—During the year 1954-55, thrift deposit of value Rs. 3,215 was collected and Rs. 8,257 refunded leaving a balance of Rs. 32,202 as against Rs. 37,244 at the end of the previous year. There was a fall in the thrift deposits.

Misappropriation.—The President and the two clerks responsible for the misappropriation of Rs. 12,450 of Mangalore Society were tried in the Sessions Court and found guilty. They were sentenced to 5 years and 3 years of imprisonment respectively.

During the year, two more cases of fraud in Gangolli and Tarapalli societies have been detected and investigation was taken up.

Regional Conferences.—Representatives of the societies held conferences in important fishing centres like Gangolli, Malpe, Mangalore and Kasargode to review the progress of their societies and to work out common measures. The departmental staff attended the conferences and gave necessary advice.

Joint purchase and sale of members' requirements.—(1) Six societies maintained their fair price shops and sold foodgrains to the extent of Rs. 1,61,263. Two societies sold mill cloth valued Rs. 1,608. Five societies distributed fishing implements worth Rs. 1,985. Five societies supplied cotton yarn worth Rs. 1,229.

(2) **Joint sale of fish of members.**—Two societies (Ajanar and Kasargode) pooled the catches of their members and sold them jointly. The sale proceeds amounted to Rs. 19,303 during the year as against Rs. 17,210 in the previous year and by these transactions the fishermen and the society earned a decent profit.

(3) The District Fish Marketing Society started functioning on 11th April 1954. Forty-two societies and 58 fishermen were admitted as members and a share capital of Rs. 10,360 was collected. It has a paid Secretary and a clerk to carry on the day-to-day administration. It sold fish worth Rs. 2,412 on commission basis and purchased and distributed fishing implements worth Rs. 9,491-11-0 to its members. An amount of Rs. 14,000 was borrowed from the Central Co-operative Bank and issued as loans to the members on pledge of their produce.

Malabar.—The number of societies continued to be 65 as in the last year.

There were 9,563 members with a paid-up share capital of Rs. 2,05,189 at the end of the year as against 9,477 members and a paid-up share capital of Rs. 1,93,638.

There was an increase in the overdues during the year :—

Year	Loans issued. Rs.	Loan collected. Rs.	Loan overdue. Rs.
1954-55	76,471	49,717	3,24,414
1953-54	1,95,020	1,41,146	2,71,233
1952-53	2,23,965	..	1,80,992

The Malabar District Co-operative Central Bank was reluctant to finance the societies owing to the overdues. The outstanding amount against the Central Bank borrowings is Rs. 88,469 as against Rs. 96,495 in the last year.

Thrift.—Thrift scheme was encouraged among the fishermen by introduction of hundi boxes and levy of cess on salt issued to ticket-holders in the Fish-Curing Yards. An amount of Rs. 1,609 was collected through hundi boxes and Rs. 8,631 by way of cess collections.

Non-credit activities—Joint purchase and sale of members' requirements.—Seventeen societies were running Ration shops through which foodgrains were distributed. Since the complete decontrol of foodgrains, all ration shops attached to societies were closed and societies had to face a new situation. During the year foodgrains worth Rs. 54,247 were purchased and sold for Rs. 69,042 as against Rs. 9,29,672 and Rs. 10,07,110 in the previous year.

There are 4 net-makers' societies consisting of fishermen. Since the decontrol of yarn and stoppage of subsidy on yarn, the net-making business is seriously affected. The Government were pleased to grant a subsidy to one of the societies, viz., Kozhikode Women Fishing Net-Makers' Society for the purchase of a Singer Sewing Foot machine. The Assistant Women Welfare Officer, Kozhikode is giving training in sewing to the members of the Society to provide a subsidiary occupation for their living.

Ex-officio.—Out of 65 societies, in 37 societies the Yard Officers or school teachers of the Department served either as Ex-officio President or as Secretary and they assisted the working of the Fishermen Co-operative Societies.

East Coast.

Vellore—Number of societies.—There are 36 societies as against 54 at the end of the previous year. Two new societies at Wallajapet and Vengalathur in North Arcot district were formed during the year. The Societies at Kadakkam and Poondi which remained dormant at the commencement of the year were revived.

Members.—There were 4,393 members on rolls with a paid-up share capital of Rs. 34,603-14-0. There was an increase of 124 members during the year.

Loan transactions.—A sum of Rs. 861-12-0 was advanced to members, Rs. 1,099 was collected and a sum of Rs. 4,805-12-0 was outstanding from members as against Rs. 356, Rs. 700 and Rs. 4,943 respectively in the previous year.

Non-credit activities—Joint purchase and sale.—Cloth worth Rs. 3,530 was purchased and sold by the Rayapuram Fishermen Co-operative Society. The Kasimedu Fishermen Co-operative Society purchased yarn worth of Rs. 880 and sold to its members.

Sale of fish.—The South Madras Fishermen Co-operative Society and Kasimedu Fishermen Co-operative Society pooled 2,189 lb. and 972 lb. of fish and sold to the public for a sum of Rs. 1,094 and Rs. 486 respectively.

Quick transport facilities.—Three societies at Ennore, Vallambedu and Kasimedu hired fish vans from the department and transported the catches from the landing centres to the City Markets. They paid a total hire charge of Rs. 10,739.

Fishing leases.—Eight Inland societies took the lease rights of 20 water-courses during the year on reasonable rentals as stipulated in G.O. Ms. No. 200, Development, dated 16th January 1950, for a total rental of Rs. 11,123.

Tanjavoor Region.—There are 49 societies in this region. The following societies were organized in South Arcot district:—

- (1) Villupuram Fishermen Co-operative Society.
- (2) Sangilikuppam Fishermen Co-operative Society.
- (3) Agaram Fishermen Co-operative Society.
- (4) Serumathurai Fishermen Co-operative Society.

Membership.—There are 4,401 members in Tanjavoor district, 1,736 members in Tiruchirappalli district and 2,468 in South Arcot district.

Paid-up share capital.—The total paid-up share capital amounted to Rs. 37,409 as against Rs. 36,358 at the end of the last year thus showing an increase during this year.

Non-credit activities.—Fourteen inland societies got lease rights of the river and tank fisheries in the three districts on a total rental of Rs. 1,23,058. The lease rights were equitably distributed among the members of the societies in consultation with the department and co-operative staff. A Fishery Development Officer was appointed by the Parvatharajakula Fishermen Co-operative Society, Tanjavoor, to take up the lease and development and exploitation of all revenue tanks in the district.

The Sonamkuppam Society got the lease of the two fish markets at Cuddalore for a total amount of Rs. 8,725. The Uppalavadi Fishermen Co-operative Society conducted its own fish market. It has proposed to purchase house-sites for its members. The Porto Novo Fishermen Co-operative Society did marketing of dry fish of its members.

Many of the societies renewed the yarn licences for the year and did a small business in the distribution of yarn. The Chandrapadi and Tranquebar Sea Fishermen Society did business in coir ropes and coir yarn obtained from Malabar.

Two marine societies, viz., the Chandrapadi and Eripurakarai societies undertook extraction of shark liver oil as agent of the Oil Chemist, Kozhikode. These societies were supplied with necessary utensils for the purpose from the Government Oil Factory, Kozhikode.

The working of the Papanasam Fishermen Co-operative Society during the year was found unsatisfactory; hence an enquiry under section 38 of the Madras Co-operative Societies Act was conducted and during the enquiry the affairs of the society were set right.

Thrift deposits were collected from members in the majority of societies in South Arcot district to teach the fishermen to save.

A conference of all the fishermen co-operative societies in Tanjavoor district was convened by the Assistant Director of Fisheries, Tanjavoor, to consider the question of organization of a district federation of fishermen co-operative societies and discuss common problems.

Madurai Region.—There were 23 societies in the beginning of the year in Madurai and Ramanathapuram districts and two new societies at Watrap and Tirupuvanam in Ramanathapuram district were started during the year. One society at Maudrai was organized. The two societies in Coimbatore district were transferred to the control of the Assistant Director of Fisheries (Freshwater Biology), Bhavanisagar, with the jurisdiction of District Fisheries.

Membership.—There are 1,316 members with a paid-up share capital of Rs. 19,144.

Borrowing from banks.—Loans of value of Rs. 4,280 were taken from the Raminad District Co-operative Bank by two of the Inland Societies for remitting lease amounts of fisheries in some of the inland waters.

Non-credit activities—Fishing lease.—Four Inland Societies took the lease of fisheries in Inland waters for a total amount of Rs. 13,401-6-2.

Thrift scheme.—One Inland Society (Palni) is adopting the thrift scheme to encourage saving among its members. Necessary instructions were given to collect thrift deposits from the members in all the societies.

Two coastal societies (Kilakarai and Irumeni) are purchasing yarn and selling them to their members.

District federation.—A district federation of Fishermen Societies of Ramanathapuram district was organized during the year and is pending registration with the Co-operative Department.

Staff.—From 3rd August 1954, one Senior Inspector of Co-operative Societies was appointed to supervise and improve the societies in the region.

Tuticorin.—There were eleven societies in this region at the beginning of the year. Two societies at Sernthamangalam and Melapavoor were registered and started during the year.

The Tenkasi Society has taken over the lease of fishing rights of 20 tanks in Tenkasi taluk.

The Tuticorin Society purchased yarn from the Madura mill authorities at ex-mill rates on the recommendation of the department and supplied it to its members at cheap rates. The transactions in this amounted to Rs. 37,669 during the year.

Mettur Dam.—The only society in this area remained dormant during this year also. An enquiry into its affairs is pending with the Co-operative Department.

2. Fisheries Education.

During the year under report, the number of fisheries schools run by this department increased to 69 comprising of three high schools, one middle school, thirteen higher elementary schools and fifty-two lower elementary schools (vide Appendix XIV). The increase was due to the conversion of the middle school into a high school, one higher elementary school into a middle school with the consequent opening of the primary classes and opening of three new elementary schools. The schools had a total strength of 12,282 pupils as against 12,002 pupils during last year. The teaching staff consisted of 471 teachers as against 422 teachers during last year. Four adult night schools were run during the year. Out of this, two were closed down in the middle of the year for want of teachers.

West Coast.

(i) *South Kanara.*—There were 30 schools in this district at the beginning of the year. Two new schools, one at Padukarakuppam and the other at Yermal South were opened in June 1954, as sanctioned in G.O. Ms. No. 1154, Agriculture, dated 8th April 1954, and G.O. Ms. No. 1316, Agriculture, dated 21st April 1954, respectively. Thus at the end of the year there were 32 schools as detailed below :—

	At the beginning of the year.	At the end of the year.
High schools	1	2
Middle schools	1	..
Higher Elementary schools	6	6
Lower Elementary schools	22	24
	30	32

New classes were opened in the following schools during the year :—

Bekal school	IV Form opened	G.O. Ms. No. 1712, Agriculture, dated 21st May 1954.
Kizhur school	VII Standard opened	G.O. Ms. No. 1152, Agriculture, dated 8th April 1954.
Malpe school	VI Form opened	G.O. Ms. No. 1153, Agriculture, dated 8th April 1954.
Cheruvathur school	VIII Standard opened	G.O. Ms. No. 1156, Agriculture, dated 8th April 1954.
Moolur school	V Standard opened	G.O. Ms. No. 1153, Agriculture, dated 8th April 1954.

Proposals for raising the higher elementary schools at Navunda and Hej madikodi into high schools submitted during the year were turned down pending the approval of the introduction of the revised syllabus for the fisheries schools.

Strength.—There were 4,903 pupils comprising of 2,987 boys and 1,916 girls. Of these, 3,612 were fisher-children and the rest non-fisher children. The strength registered an increase by 583 pupils (305 boys and 278 girls) during the year.

The Elementary School-Leaving Certificate examination results during the year were as follows :—

School.	Number appeared.	Number passed.	Per centage of pass.
Hejmadikodi	20	19	95
Kanhangad	14	5	36
Podippu	17	9	53
Navunda	18	16	89
Total	69	49	71

Teachers.—There were 199 teachers in all the 32 schools. Of these, 5 were graduate-trained, 1 graduate untrained, 48 secondary-grade trained (14 fisheries trained and 34 ordinary trained), 147 higher grade trained (23 fisheries trained and 119 ordinary trained), 2 basic trained and 2 untrained.

Government owned buildings.—Of the 32 schools, 7 were housed in Government buildings. Construction of additional buildings for the Bekal High School with a well and sanitary conveniences and the replacement of the roof with asbestos sheets were being considered by the department. The increased expenditure on the construction of the Tarapathi school building was sanctioned in G.O. Ms. No. 151, Agriculture, dated 18th January 1955, and the work has been entrusted to the Public Works Department for execution.

Donated buildings.—Additional building with about 170 school places for the Bekal High School was under construction on the site acquired by the Government at a cost of Rs. 5,825-5-2 in G.O. Ms. No. 18, Agriculture, dated 4th November 1953. The cost of construction was borne by the local High School Committee.

Damage to buildings.—In June 1954, a heavy cyclone caused damages to the roof of the buildings of the Bekal High School and destruction to the Bekal Elementary School building to the extent of Rs. 1,162-5-4. The same was temporarily repaired at a cost of Rs. 114-4-0. As stated in the preceding paragraph, the replacement of the roof by asbestos sheeting is under consideration.

Conductress.—Conductress is continued to be employed at the Kumbala school to bring the children daily and regularly to the school.

Free supply of books, slates and games materials.—Free supply of books and slates to poor pupils was continued during the year. Besides, games materials were also supplied. A grant-in-aid of one-third cost towards the Games Fund was given to the high schools.

Free supply of mid-day meals.—The proposal for supply of rice-gruel (kanji) and shark liver oil to the pupils was negatived. However, the Indian Red Cross Society kindly arranged the supply of 2,250 lb. of skimmed-milk powder and 10,000 vitamin B tablets for feeding 375 pupils under 12 years for three months, 6 schools where malnutrition was rampant were selected for the purpose of feeding.

Handicrafts.—Net-making, coir work (spinning and weaving), hemp twisting, mat weaving, clay-modelling, needle and thread work were some of the handicrafts taught in these schools during the year.

Schools in Compulsory Education Zone.—Nine schools were brought under the zone during the year and steps were taken to bring one more school (Kodi school) under the zone.

(ii) *Malabar.*—There were 31 schools at the beginning and 33 schools at the end of the year in this district as detailed below :—

	At the beginning of the year.	At the end of the year.
High school	1	1
Middle schools	1	1
Higher elementary schools	7	7
Lower elementary schools	22	24
Total	31	33

No new schools or classes were opened during the year except that the primary classes in the Madapalli High School were separated and formed into a new lower elementary school. Similarly the South Nattika Higher Elementary School was bifurcated and the primary classes were formed into a new lower elementary school while the remaining higher elementary classes were continued as a middle school during the year.

Strength.—The number of pupils on rolls in the various schools were as follows :—

Boys-Girls.	Fisher.	Non-fisher.	Total
High school	430	220	550
Middle school	58	24	82
Elementary school	5,310	1,137	6,447
Total	5,798	1,281	7,079

There was an increase of 174 pupils (an increase of 375 fisher-children and a decrease of 201 non-fisher children) over that of the previous year on the whole.

Teachers.—Two hundred and sixty-four teachers were employed in all the schools in the district during the year. Of these, 10 were graduate-trained, 56 secondary trained, 193 higher grade trained and 5 lower grade trained.

Deputation of teachers.—Four teachers trained in fisheries science were on deputation during the year.

Conductress.—Ten schools continued to have conductresses this year also.

Free supply of midday meals.—Out of the grant received from the UNICEF, the Collector of Malabar, allotted sufficient quantity of rice for the supply of midday meals to a limited number of deserving pupils of the schools in the district for a period of four months. After that period the supply was continued by the department.

Location of schools.—The long-pending acquisition of site for playground and school building for the Madapalli High School ended and the site was taken over by the department in January 1955. A pucca building to house the Nattika Middle School was being constructed during the year by the High School Committee with 50 per cent grant from the District Development Fund sanctioned by the Collector.

Scheme of studies.—The proposals for the revision of the existing syllabus for elementary schools were approved by the Government. The proposal for the introduction of the bifurcated course of studies in the Fisheries High School according to the Reorganized Scheme of Education of 1948, is pending approval of the Government.

Extra-curricular activities.—The Madapalli High School partook and fared well in the D.S.A.A. tournaments. Educational excursions were conducted for the final year students. A scout troop was formed during the year. Proposals were submitted to start National Cadet Corps training in the school.

East Coast.

(iii) *Vellore.*—The two schools at Sathankuppam and Pinnamalaicheri started during the previous year continued to function during the year. Another school at Alambaraikuppam was also opened during the year as ordered in G.O. Ms. No. 1160, Agriculture dated 8th April 1954.

The adult night school at Ennore (Thalamkuppam) was closed down for want of a teacher in the fishing village. But the night school at Sathan-kuppam with the departmental teacher was working satisfactorily. Another new night school was opened at Doomingkuppam but it was closed down after three months for want of an interested local teacher.

(iv) *Tanjavoor.*—The only school at Kaveripatnam was continued during the year with two teachers only. The proposal for opening a new school at Vanagiri was deferred by the Government.

3. WELFARE SCHEMES.

(i) Communication of weather warnings to fishermen.

The Bay of Bengal and Arabian sea are areas subject to the turbulence of cyclonic weather. The effects of cyclonic weather, at times, are disastrous and much damage to property, crop and human lives are caused on the coastal area often times. Such damages are more seriously felt at sea and the fishermen residing on both the coasts of Madras State have often felt the pangs of the cyclone when fishing at sea. In order to alleviate their sufferings, the Fisheries Department in consultation with other departmental authorities like the Port Department, Meteorological Department and Naval authorities have taken precautionary measures for avoiding such danger to fishermen's lives. The Director of Regional Meteorological Centre, Madras, has agreed to the despatch of telegraphic weather warnings to the officers of the Fisheries Department so as to enable them to pass on the warning messages immediately to the headmen of the fishing villages for notifying the warnings to the fishermen. It was also agreed by the Director of Industries and Commerce that the telegraphic charges incurred on the above arrangement will be borne by the Fisheries Department. The Government, in G.O. Ms. No. 2988, Agriculture, dated 1st October 1954, approved the arrangements made by the Director. Subsequently, the Director of Regional Meteorological Centre has reported that the Fisheries Department need only bear the cost of telegrams in respect of the copies of the warnings sent to the Director of Industries and Commerce and the Assistant Director of Fisheries, Tanjavoor and Madurai, for administrative purposes and that the telegraphic expenses for direct warnings sent to various Fisheries officers for taking precautions would be borne by the Meteorological Department itself. The Government, in their Memorandum No. 131191-C. II/54-3, Agriculture,

dated 24th January 1953, approved also the modified arrangement. Thus the Fisheries Department has taken a right step to prevent the loss of lives of fishermen due to cyclonic weather by forewarning to them the information regarding the impending danger. This arrangement has been put into effect during the year and no untoward incidence has been so far reported. The weather warnings are received by the Fisheries departmental officers and communicated to the fishermen in the neighbourhood.

(ii) *Relief and rehabilitation of fishermen.*

Relief work—(i) *South Kanara*.—(1) During the year, there was a sea flood in the West Coast from Coondapoor to Mangalore and considerable damage was caused to the coastal fishermen as the fishing boats and nets kept on the sea-shore were washed away. The details of loss sustained were gathered and submitted to the Government who were pleased to sanction Rs. 5,208 as a grant for relief to the affected fishermen in G.O. Ms. No. 2469, Agriculture, dated 27th July 1954, as detailed below :—

(1) Free grant of yarn for making nets to the four fishermen affected at a total cost of Rs. 2,808.

(2) A cash grant of Rs. 100 each to the affected fishermen. The above relief was made available through the Revenue department.

(2) In G.O. Ms. No. 1161, Revenue, dated 23rd April 1953, Government ordered that sufficient extent of private lands in the coastal areas may be acquired for the present and future needs of the fishermen for building houses. This was an action in the right direction and the department took active steps with the help of the Revenue Department to acquire lands for building houses wherever necessary. But still much has to be done to provide the fishermen with enough accommodation.

(3) Many requests were received from fishermen and fishermen's societies for constructing roads, connecting the fishing villages to important highways. Steps were taken by the department in consultation with the President, District Board, and the Divisional Engineer (Highways), for the construction of feeder roads for the fishing villages wherever found necessary and feasible.

(ii) *Vellore*.—The question of rehabilitating the fishermen north of Madras Harbour affected by sea erosion was taken up during the year. The sites affected and the sites proposed to be allotted to the fishermen were inspected by the Chief Minister and the Minister for Agriculture and Fisheries, along with the Director of Industries and Commerce, Collector of Madras, Commissioner of Corporation and the Chief Engineer, Public Works Department. They have selected the necessary sites to house the fishermen affected and sanctioned the allocation in G.O. Ms. No. 1007, Revenue, dated 8th April 1953. Arrangements are being made to distribute the site among the fishermen.

(iii) *Tuticorin*.—*Provision of drinking water facilities*.—The dire need to provide adequate drinking water facility to the fishermen at Idindakarai was keenly felt for a very long time. The only bore-well in the outskirts of the fishing hamlet fell into disuse. The department took up the matter with the Industries (Engineering) Department and the Revenue Department for a satisfactory solution of the problem. As a result, a pipe-line was laid from an overhead tank to which water is pumped from a deep well and a number of street taps were provided in the village and water was supplied to the fishermen in plenty. This was greatly appreciated by the fisherfolk.

(iii) *Community Development Project Scheme.*

(a) *Community Project Scheme.*

(i) *South Kanara*.—Nine villages in the three taluks of Mangalore, Karkal and Coondapoor in this district were brought under the Community Project Scheme. The staff of the following institutions of the department co-operated with the Project Officer for developing the area and the fisheries activities in particular. The results achieved are mentioned below :—

Fish-curing yards.—Seven yards (Ullal, Mangalore, Bockapatnam, Thannerbhavi, Baikanpadi, Hosabettu and Moolky) are situated in the area. The fishing transactions in these yards are given below :—

	MDS.
Fresh fish brought for curing	59,396
Cured fish obtained	37,195
Salt issued for curing	9,037

Besides, a large quantity of fish were consumed in fresh condition.

Fisheries schools.—Three fisheries schools (Hejmadi-kodi Moolky) Sandspit and Sri Gnanakodaya (Mangalore) are located in this area. These schools helped in the education of fisherfolk and other caste pupils in their neighbourhood.

Deep-sea fishing operation.—Two centres (Ullal and Mangalore) come under the Project area. These centres are engaged in increasing the deep-sea catches in this area and a total quantity of 137,843 lb. of fish (117,869 lb. sharks and 19,977 lb.) were landed. Besides, 4,057 lb. of shark livers were procured for extraction of oil. The local fishermen were supplied with fishing implements to the value of Rs. 1,189-3-6 during the year.

	Number of seeds.
Etroplus	10,077
Labeo and Cirrhina	39,978
Tilapia	168
Eels	5,000
Chanos	98
Mullet	3,247
Total	58,566

The departmental fishing conducted fetched a total of Rs. 494-7-0 being the cost of 1,000 lb. fished. As stocking of these waters was done on a large scale during this year, very good results are expected next year.

Besides, 8 Gourami seeds and 1,462 seeds of Labeo and Cirrhina were supplied to private parties for an amount of Rs. 27-14-6 in this area.

(ii) *Malabar*.—Palghat taluk in Malabar district comes under the Community Project Development Scheme. There is only one demonstration unit under an Assistant Fisheries Demonstrator at Palghat who looks after all the inland fisheries work. He is assisting the Project authorities to develop the fisheries activities in the selected villages.

Forty private tank owners in the Project area were supplied with 7,250 fish seeds costing Rs. 361 out of Rs. 500 sanctioned for the purpose by the Government in their G.O. No. 622, Public (Rural Development), dated 5th March 1954. The supplies were made at 50 per cent of cost on recommendation of the Project Officer as ordered by the Government.

(iii) *Madurai*.—Yeoman work was done during the year to popularize fish culture and intensify the departmental stocking in the area. The departmental officers took every effort in consultation with the Project Officers to ascertain and supply the required number of fish seeds for fish culture by private individuals—

(1) *Melur Block*.—Three tanks at Melur and Navinippatti were departmentally stocked with fish seeds. At the end of the year, the Government sanctioned Rs. 3,505 for fish farming in the above tanks intensively in G.O. Ms. No. 512, Public (Rural Development), dated 21st February 1955. The departmental efforts had a salient effect over the people of the area to take to fish culture.

(2) *Madurai Block*.—Twelve wells were stocked with 312 *Etrophus suratensis* fish seeds through the Project staff. Proposals were sent to the Assistant Project Officer for stocking Periyar-fed tanks which belong to the villagers by subsidizing 50 per cent of the cost of the fish seeds from the Project funds.

(3) *Nilakottai Block*.—One hundred and twenty-one wells at Gandhigram in this block were surveyed and stocked with 4,655 fish seeds of Pearl Spot, Labeo, and Murrel during the year. Fresh indents were also collected for supply of more fish seeds especially chanos during the ensuing season. Besides the departmental tanks at Vadugapatti were intensively stocked with fish-seeds. On the request of the Assistant Project Officer, Mannadimangalam tank was inspected and remedies were suggested for the eradication of the water weed, water hyacinth, from the tank with the help of the staff of the Fresh-water Research Station.

(b) National Extension Service Schemes.

(i) *South Kanara*.—There are three blocks in this area. They are Sullia, Manjeshwar and Byndoor blocks.

The following are the fisheries institutions in these blocks and these participated fully in the development work under its jurisdiction :—

Fish-curing yards.—Six yards, Thaikadapuram, Manjeshwar, Kumbala, Gangolli, Marawanthe, and Tarapathi are located in these blocks. The yard transactions are given below :—

	MDS.
Fresh fish let in for fishing	90,653
Cured fish let out	53,199
Salt issued for curing	13,729

Besides, 15,304 lb. of shark livers were obtained and 3,482 lb. of oil were obtained.

Fisheries schools.—Eight schools (Cheruvathoor, Udinoor, Kadapuram, Kumbala, Navunda, Kesargodi and Hadavinakone) exist in these block areas. The staff of these schools took active part in the educational programme in the block area.

Deep-sea fishing operations.—A centre was opened at Tarapathi by the end of this year. The local fishermen were encouraged to go for Deep-Sea Fishing on "No-loss no-profit basis" and they were supplied with fishing implements on payment of 50 per cent of cost to begin with, the rest of the cost being recovered in instalments or by adjustment of cost of livers supplied for extracting oil. Efforts are being taken to open another centre at Gangolli.

Inland Fisheries.—Nileshwar fish farm comes under this area. Intensive collection of fish seeds were undertaken and 303,281 *Etrophus* fish seeds (300,481 at Nileshwar and 2,800 at Cheruvathur river) were collected. This was a record collection in this area. The departmental staff took strenuous efforts to achieve this record. Thirty-one thousand four hundred and seventy-five seeds in provincialised waters and 102,768 seeds in departmental waters were stocked and the rest were distributed to the departmental officers.

(ii) *Malabar*.—Tellicherry in Kurumbranad taluk is the only block under the National Extension Service Scheme in this district. The Inspector of Fisheries (Tellicherry) attends to the development of the fishery activities in this block. Besides there are two fish-curing yards (Tellicherry and Thalayi) some fisheries schools and a deep-sea fishing unit under the exclusive charge of an Inspector of Fisheries. Some of the mechanised boats (Motor Fishing Luggers) constructed under the scheme for improvement of Indigenous Craft and Tackle and motor boat (Pablo) designed by F.A.O. Expert, Mr. Zeiner and motor-boat received under T.C.A. Aid like Danish Boat are all concentrated at this place to improve the deep-sea fishing activities.

(iii) *Vellore—Chingleput or Thirukalikundram Block*.—On the advice of the department, the Government sanctioned a loan of Rs. 18,000 for the purchase of catamaran logs to the Mahabalipuram Fishermen Co-operative Societies as a step to augment the production of more marine fish from this Coast.

Numerous drinking water wells invested with "cyclops" (Guinea worm carriers) in Polur, Kalasapakkam and Tiruvannamalai block areas, were surveyed and stocked with 9,535 public health fish seeds like *Cyclopoical fish*, *Etrophus maculatus*.

(iv) *Madurai—Thirumangalam Block*.—Fifty-eight wells of private parties were surveyed and through the Block Officers 1,500 fish seeds of *Etrophus* and Murrel were supplied for stocking these wells.

Kallupatti Block.—Five thousand six hundred and thirty fish seeds of Murrel, Chanos, *Etrophus* and Mirror Carp were stocked in private waters through the agency of Block Officers. Besides the three demonstration tanks at Kallupatti were intensively stocked and exploited fully thus demonstrating the advantages of fish culture to the local population.

Usilampatti Block.—Proposals for departmental fish farming at Nattarmangalam village was recently sanctioned by the Government on the term that the villagers are given 50 per cent of the net profit thereon. The execution of the scheme is kept in abeyance as a conflict arose over the ownership of the fishery of the tank and the Revenue Department have been requested to settle the dispute soon. Indents for supply of fish seeds to private parties were collected and will be supplied shortly.

(v) *Ramanathapuram district*.—Due to active propaganda among the villagers indents were procured and 4,487 fish seeds were supplied during the year.

Rajapalayam Block.—One thousand nine hundred and sixty-six fish seeds were supplied for stocking the waters owned by private parties. There is one fishermen co-operative society in this block. Inland Fishery leases were obtained for this society and fish seeds were supplied to them for stocking and developing the fishery in the tanks.

Srivilliputtur Block.—Six thousand one hundred and fifty three fish seeds of Chanos, Etroplus and Eel varieties were supplied to private parties. A new fishermen co-operative society at Watrap was registered and started during the year in this Block.

Sivakasi Block.—Six thousand three hundred and sixty-eight fish seeds of Chanos, Murrel and Etroplus were supplied to private parties in this block. A private tank, Shenbagavinayagar tank was taken over for departmental fish farming and demonstration to the public. This tank was stocked with 2,000 golden carps.

(iv) *Tuticorin—Tirunelveli district*—(1) *Cheranmahadevi Block*.—Four tanks in Gopalamudram were taken over for departmental operations. These were stocked with 9,502 fish seeds (Labeo 6,870 and Eels 2,532).

Proposals have been submitted to provincialise some of the tanks and channels connected with Tambaraparani river system to establish some fish nurseries in this block area for supplying fish seeds to interested pisciculturist.

(2) *Kuruvikulam Block*.—Five thousand four hundred and seventy-two fish seeds (Etroplus 450 and 5,022 Eels) were distributed to private parties in the area.

(3) *Koilpatti Block*.—Five hundred fish seeds were supplied to private parties in the area.

On the whole 43 private parties were supplied with 14,487 fish seeds in the above blocks.

(vii) *Mettur Dam—Salem district*.—Fourteen thousand five hundred and eighty-five fish seeds of the following varieties were stocked in the district:—

Murrel	...	...	...	...	...	7,755
Etroplus	...	...	...	...	...	338
Labeo	...	...	...	...	...	6,500
Total						14,585

(i) *Athur Block*.—Two thousand one hundred and thirty-eight fish seeds (1,808 Murrel and 330 Etroplus) were supplied for stocking irrigation wells through the Block Development Officer.

(ii) *Krishnagiri Block*.—Six thousand and five hundred Labeo seeds were stocked in Badethalab Reservoir and arrangements were made to supply a large number of fingerlings to private parties in the ensuing season.

(iii) *Hosur (Key Village Scheme Area)*.—One thousand one hundred and seventy-six Etroplus fingerlings were supplied to the Superintendent, Livestock Research Station, Hosur, for stocking the irrigation wells in the village covered by the scheme.

Extensive survey of waters in the area covered by the above blocks were undertaken by the departmental staff. Private parties were supplied fish seeds for stocking the irrigation wells through the staff of the Block Development Scheme. The Collector of Salem was kind enough to meet half the cost of the fish seeds supplied to private parties in the block area as an incentive to take to pisciculture and to get adequate supply from the Department out of the Block Development funds.

(viii) *Tanjavoor*.—A scheme for the development of Inland Fisheries in Chidambaram taluk under the aid of National Extension Scheme Grant was submitted to Government and their sanction is awaited. Special emphasis has been laid in the stocking and collection of seeds in the areas covered by the National Extension and Block Development Scheme.

The Kurunjipadi Fishermen Co-operative Society received a sum of Rs. 60 under the Block Development Scheme for the improvement of Fisheries in Perumal tank.

There are a number of waters rentable for fish culture in this district. Most of these are Provincialized and some have yet to be provincialized. All these waters were leased out to the members of the fishermen co-operative societies. These waters were stocked systematically with quick-growing fish seeds so that the fish food can be made available to a great extent in these areas. The following number of fish seeds were stocked in the tanks lying in the Development Blocks of this district:—

	FISH SEEDS.
Kumbakonam	372,800
Mayuram	225,000
Papanasam	814,150
Tiruturaipundi	233,313
Total	1,647,263

These are expected to give a great yield and contribute largely to the food resources of the area and to the economic livelihood of the local fishermen in general.

(ix) *Tiruchirappalli district*.—The following number of fish seeds were stocked in the Development Block areas of this district:—

	FISH SEEDS.
Karur	2,600
Perambalur	1,600
Musiri	1,000
Total	5,200

(x) *South Arcot district*—(1) *Chidambaram Block*.—Seven thousand fish seeds were stocked in the area. A scheme for the development of tanks in this area was submitted and sanction is awaited.

(2) *Panruti Block*.—Twenty-nine thousand, two hundred and ninety public health fishes were distributed in this area for bringing down the incidence of Guinea worm. Reports have been received regarding the beneficial effects of previous stocking of Etroplus fish seeds in waters infected with Guinea-worm.

VII. GENERAL.

1. BIOLOGICAL SUPPLY STATION.

(i) *Supply of biological specimens.*—Forty-five educational institutions, 27 private firms and individuals and 6 departmental units were supplied with various biological specimens. The revenue realized amounted to Rs. 8,791-8-0 as against Rs. 10,878-14-6 realized during the last year.

(ii) *Supply of edible oysters.*—During the year, 37,760 oysters were supplied to hotels, clubs and private individuals fetching an income of Rs. 1,181-10-0 as against 48,326 oysters sold for Rs. 1,245-10-0 during the last year.

(iii) *Supply of shell grit.*—Twenty-six parties including livestock and veterinary institutions in Madras and Andhra States were supplied with 2,840 lb. of shell grit against 2,298 lb. sold last year. The revenue realized was Rs. 223 against Rs. 197-2-0 realized during the last year.

2. BIOLOGICAL SURVEY OF THE LACCADIVE ISLANDS.

A survey of the fisheries resources of these islands situated in the Arabian Sea about 250 miles from the West Coast was conducted from the middle of December to the end of January by the Research Assistants deputed to the Islands along with the inspection party. It was ascertained that the waters around the island abound in commercial fishes of pelagic and bottom dwelling habits, such as the tunnies, sharks and rays, horse-mackerels, perches and rock cods. The exploitation of this fishery wealth is limited to the day-to-day requirements of the population. Excepting preserving tunnies on a small scale, the rich fishery beds are not harvested for export of fish to the mainland and other places. The potentialities are great and the development of the fishing industry will not only ameliorate the poor economic condition of the islanders but also increase the fish supply of the mainland. The islanders have to be supplied with materials required for making the fishing gears. New and better methods of fishing and use of power vessels have to be demonstrated to them. For preservation of fish, Model curing yards have to be opened with facilities for extraction of shark liver oil. Co-operative societies have to be organized for effecting large-scale marketing. There is also scope for developing subsidiary fisheries of shell-fishes, sea-cucumbers and turtles systematically. Surveys and researches on the spawning, growth and seasonal periodicity of the fishes have also to be organized.

3. STRANDING OF A WHALE IN TANJAVOOR DISTRICT.

One of the biggest whales stranded in recent times was salvaged on 28th February 1955 about four miles north of Tranquebar. It was identified as *Balenoptera indica*, the whale-bone whale. It measured 92 feet in length. Its baleen plates were removed and 25 gallons of oil were extracted from its blubber. The entire skeleton of the animal was taken out and it was given as gift from the Fisheries Department to the Art Gallery at Tanjavor as ordered by Government in G.O. Ms. No. 2122, Agriculture, dated 1st September 1955, on condition that it should be properly mounted and displayed in a prominent place in consultation with the department, and that it should not be sold in any event but should be returned to the department, if, for any reason the Art Gallery were to be closed down. A placard was also to be displayed near the exhibit stating that the whale skeleton was a gift to the Art Gallery from the Fisheries Department.

4. SCHEME FOR THE IMPROVEMENT OF THE METHODS OF COLLECTION OF FISHERY STATISTICS.

A scheme for the collection of Marine Fisheries Statistics, sponsored and financed by the Indian Council of Agricultural Research, was started during the year as per sanction accorded in G.O. Ms. No. 365, Agriculture, dated 9th February 1955. The collection of statistics is done by the yard officers and by the special staff called 'Statistical Enumerators' posted wherever there are no fish-curing yards.

5. DEPUTATIONS.

Sri V. D. Spurgeon, Assistant Director of Fisheries, Madurai, underwent a course of training during the year at the International Training Centre, Hongkong, on fish marketing and distribution. The training was for a period of six weeks from 12th July to 21st August 1954. This course of training conducted by the F.A.O. was intended to train suitable fisheries workers of the member countries of the Indo-Pacific Fisheries Council of the Food and Agricultural Organization in the organization methods, and techniques employed in fish marketing at Hongkong with special reference to regulation and supervision, financing and accounting practice, handling and selling techniques, fishermen's welfare and co-operative activities.

After the training was over, Sri Spurgeon was allowed to visit and study general fisheries in Bangkok (Thailand) and Rangoon (Burma) enroute to India.

Two other officers of this department, Sri G. Laxminarayana Rao and Mr. M. Mukundan Unni, who were awarded the Murphy Scholarship, were deputed by the Government to study deep-sea fishing methods followed in United Kingdom. They left for United Kingdom in December 1954 and were undergoing the training during the year.

6. PUBLICATIONS.

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9. "Spawning habits of the milk-fish, *Chanos chanos* (Forsk.) in the coastal waters of Madras State, India", by P. I. Chacko, *Proc. 42nd Indian Sci. Cong.* 3, 307 1955.

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13. "The 1953-54 bumper fishery of the oil sardine (*Sardinella longiceps*) of the West Coast of Madras State," by P. I. Chacko, *ibid*, 3, 307-308, 1955.

14. "A review of the 1953-54 fishery of the mackerel, *Rastrelliger kanagurta*, of the West Coast of Madras State," by P. I. Chacko, *ibid*, 3, 308, 1955.

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7. "Studies on the use of crushed salt for fish curing," by R. Venkataraman and A. Sreenivasan.

8. "Drying of fish with infra-red lamps," by R. Venkataraman, A. G. Vasavan and A. Sreenivasan.

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ADMINISTRATION REPORT OF THE
FISHERIES DEPARTMENT, 1954-55

VIII. FINANCE.

The total expenditure and receipts of the department for the year 1954-55 (vide Appendix XV for details) are furnished below :—

Expenditure.		Receipts.		Profit and loss.	
RS.	A. P.	RS.	A. P.	RS.	A. P.
26,05,614	7 2	22,33,752	1 1	— 3,68,862	6 1
<i>Deduct—</i>					
6,68,944	0 8	..		— 6,68,944	0 8
19,36,670	6 6	22,26,752	1 1	+ 3,00,081	10 7

From the above figures, it will be seen that the expenditure was considerably reduced and the receipt increased as directed by the Government during the last year. The charges on account of the supervision, education, welfare, engineering and research schemes alone come to Rs. 6,68,994-0-8 which is also much less than last year. As these schemes were of development nature, the expenditure relating to these schemes were deducted from the total charges for the purpose of working out profit and loss statement of the department. As furnished above, the department worked on a profit of Rs. 3,00,081-10-7. Thus there was an appreciable improvement in the financial structure of the department during the year under report.

APPENDICES

APPENDIX I.

STATEMENT OF ANALYSIS OF THE HYDROLOGICAL FACTORS OF BHAVANISAGAR RESERVOIR DURING THE YEAR 1954-55.

	1954.												1955.		
	April.	May.	June.	July.	August.	Septem-ber.	October.	Novem-ber.	Decem-ber.	January.	February.	March.	January.	February.	March.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(11)	(12)	(13)
Maximum temperature (°F) ..	97.6	92.0	91.2	91.5	91.5	94.5	90.5	88.5	85.0	87.8	93.0	93.5	87.8	93.0	93.5
Minimum temperature (°F) ..	81.5	77.5	88.0	77.0	77.0	76.5	73.5	69.5	67.5	69.5	70.0	74.5	69.5	70.0	74.5
Relative humidity ..	69.0	68.0	61.7	73.1	72.1	60.5	83.7	81.0	75.2	83.3	73.6	72.4	83.3	73.6	72.4
Total rainfall in inches ..	1.13	6.41	0.72	1.72	2.34	..	10.17	0.88	1.39	2.91	0.08	0.58	2.91	0.08	0.58
Average wind velocity (miles per hour) ..	3.71	9.50	8.93	9.38	8.74	11.52	4.32	2.52	2.96	2.35	3.14	3.03	2.35	3.14	3.03
Mean water level in feet ..	60.0	59	67	90	103	99	98	95	86	84	..	65	84	..	65
Surface temperature (°F) ..	85.1	82.6	81.4	81.7	80.2	81.0	81.7	81.0	77.9	79.4	80.1	..	79.4	80.1	..
Turbidity in cms. ..	28.0	25.2	23.1	23.8	28.0	28.0	26.1	24.9	28.0	30.0	27.5	..	30.0	27.5	..
PH ..	7.8	8.3	7.6	7.85	7.85	7.85	7.95	8.2	7.7	7.7	7.3	..	7.7	7.3	..
Dissolved O ₂ per cent ..	68.3	90.0	89.0	96.6	84.7	81.6	78.5	75.3	85.6	53.0	58.5	..	53.0	58.5	..
O ₂ p.p.m. ..	3.9	2.47	2.2	1.1	5.5	8.85	5.64	5.5	7.3	9.02	2.34	..	9.02	2.34	..
Bicarbonates p.p.m. ..	84.0	103.65	79.2	77.0	11.8	10.6	9.27	25.6	14.2	100.15	78.3	..	100.15	78.3	..
Chlorides p.p.m. ..	9.0	9.0	9.6	9.0	9.5	8.8	8.6	9.0	9.0	8.5	8.7	..	8.5	8.7	..
Silicates (SiO ₂) p.p.m. ..	11.0	Tr.	Tr.	Tr.	Tr.	6.3	8.2	9.6	8.0	11.0	10.6	..	11.0	10.6	..
Phosphates (P ₂ O ₄) p.p.m. ..	..	..	..	..	..	..	0.0059	0.0038	..	..	..	..	..	..	..
Phytoplankton per c.c. ..	154	21.0	6,417.1	1,995.2	1,452.4	123.3	..	3,507.2	14,834.8	2,399.0	762.8	2,037.7	2,399.0	762.8	2,037.7
Fish catches—															
(a) Carps in lbs. ..	183	334	220	103	8	416	836	504	274	203	271	315	203	271	315
(b) Cat fish in lbs. ..	99	113	180	548	582	485	837	658	985	182	361	249	182	361	249
Total catches ..	282	447	400	651	590	901	1,723	1,162	1,259	385	632	564	385	632	564

APPENDIX II.

FISH SEED COLLECTION CENTRES IN THE MADRAS STATE.

(i) *South Kanara.*

Name of centre.	Kind of fish seeds available.
1 Cheruvathur backwaters ..	Etroplus and Suratensis.
2 Nileshwar back-waters ..	Do.
3 Padubidri	Do.
4 Puttur	Barbus.
5 Shiradigaddy	Barbuster.
6 Kedi back-waters	Mullets, Chanos, Megalops and Etroplus.
7 Pyndur back-waters	Do.
8 Malpe back-waters	Do.

(ii) *Malabar.*

9 Malampuzha Reservoir area ..	Murrel and Barbus.
10 West Hill	} Magalops, Therapon, Mullet, Chanos Etroplus and Macropobus.
11 Korapuzha	
12 Piduppa	
13 Beypore	
14 Tellicherry	

(iii) *Vellore.*

Madras City—	
15 Adyar backwaters	Etroplus, Chanos, Mullet and Megalops.
Chingleput district—	
16 Ennore back-waters	Mullets and Gobius.
17 Pulicut lake	Do.
18 Tirupporur back-waters ..	Mullets.
19 Cheyyar river	Barbus, Sarana and Cirrhina.
20 Palar river	Do.
21 Poondi waters	Veba, Gourami, Ambassis and Zebra.
22 Chingleput moat	Murrel, Trichogaster and Mullet.
North Arcot district—	
23 Thiruvannamalai	Murrel.
24 Vellore moat	Murrel, Etroplus and Emaculatus.

(iv) *Mettur Dam.*

Salem district—	
25 Mettur Reservoir (Cauveri river)	Labeo, Cirrhina and Barbus.

(v) *Tanjavoor.*

Tanjavoor district—	
26 Vennar-Vettar regulator ..	Labeo, Cirrhina, Barbus and Catla.
27 Rajagiri	Do.
28 Mudikondan	Do.
29 Cauvery-Arasalar dam ..	Do.
30 Tirukkattupalli	Do.
31 Koravoikkal	Do.
32 Chakkottai	Do.
33 Manancheri	Do.
34 Madagambadi	Do.

APPENDIX II—cont.

FISH SEED COLLECTION CENTRES IN THE MADRAS STATE—cont.

(v) *Tanjavoor*—cont.

Name of centre.	Kind of fish seeds available.
Tanjavoor district—cont.	
35 Tiruvelangadu	Labeo, Cirrhina, Barbus and Catla.
36 Mandai	Do.
37 H.V. head	Do.
38 Korayar head	Do.
39 Mulliar head	Do.
40 Harischandranadhi	Do.
41 Serankulam	Do.
42 Kallukkudi	Do.
43 Rethamadagadi	Do.
44 Nasunniar	Do.
45 Vettukkadu	Do.
Tiruchirappalli district—	
46 Grand Anicut	Do.
47 Chintamani	Do.
48 Vathalai	Do.
49 Marudur	Do.
South Arcot district, Cuddalore taluk—	
50 North Rajan lower anicut ..	Do.
51 Veeranam lake	Do.
(vi) <i>Madurai.</i>	
Ramanathapuram district—	
52 Pamban creeks	Chanos.
53 Kilakarai	Do.
54 Kodaikand	Golden Carp and Barbus and Melanampyx.
(vii) <i>Tuticorin.</i>	
Tirunelveli district—	
55 Tuticorin	Chanos.
56 Jesu Krusadai	Do.
57 Kuruvithurai	Chanos and Etroplus.
58 Srivaikuntam	Etroplus and Eels.
59 Kadamba tank	Etroplus Murrels.
(viii) <i>Bhavanisagar.</i>	
Coimbatore district—	
60 Bhavanisagar Reservoir ..	Carp fry and fingerlings especially Barbus hexagonolepis and Barbus dubius.
61 Bhavani	Mirror Carp and Tench.
62 Ootacamund	Trout.
63 Mukurthi and Avalanchi ..	
64 Departmental Fish Farms distributed throughout the State.	Gourami and Tilapia.

APPENDIX III.

STATEMENT OF INTENSIVE SEED COLLECTION AND DISTRIBUTION IN THE MADRAS STATE DURING THE YEAR 1954-55.

Region.	Target fixed.	Fish seed collected.			Fish seed distributed and stocked.					
		Collected.	Received.	Total.	In departmental waters.	In provincialized waters.	Supplied to other officers.	Supplied to private parties.	Mortality.	Kept in nurs. res.
West Coast—										
South Kanara ..	700,000	559,576	144,770	704,346	351,114	94,990	135,836	11,613	58,826	52,467
Malabar ..	3,00,000	389,670	808,101	1,197,771	700,770	8,948	230,890	7,250	249,913	..
East Coast—										
Vellore ..	20,00,000	1,483,445	146,839	1,630,284	144,261	1,154,849	729	64,208	266,737	..
Tanjavoor ..	30,00,000	39,026,539	14,383	39,040,922	3,769,763	25,431,480	7,447,80	161,224	1,886,675	384,500
Madurai ..	4,00,000	2,209,977	1,020,959	3,230,936	2,062,309	350,000	73,500	35,221	694,108	10,238
Tuticorin ..	3,00,000	8,137,145	182,958	3,230,098	300,455	2,984,868	19,000	15,775	..	..
Mettur Dam ..	400,000	4,632,151	32,159	4,664,310	4,632,151	..	..	20,234	1,085	10,240
Bhavanisagar ..	9,60,000	9,941,022	4,852,484	14,793,506	4,864,832	4,020,000	5,200,161	11,494	696,933	86
Grand total for 1954-55 ..	50,00,000	61,379,525	7,202,648	68,582,173	16,826,155	34,044,635	13,072,396	327,019	3,854,437	457,531
Grand total for 1953-54 ..	50,00,000	20,094,956	891,450	20,986,406	5,319,862	9,686,800	3,855,986	290,794	778,616	1,139,738

APPENDIX IV.

STATEMENT OF INTENSIVE SEED COLLECTION (KIND-WAR) IN THE MADRAS STATE DURING 1954-55.

Region.	Seeds of food fish collected.												Seeds of larvicidal and other fishes.				
	Bhavanisagar.	Murrel.	Mirror carp.	Golden carp.	Tench.	Clari.	Barbus.	Catla.	Channa.	Ectopius.	Eels.	Mullet.	Macro-	Macro-	Macro-	Macro-	Macro-
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
West Coast—																	
Mangalore ..	..	107	..	..	..	..	..	2,940	..	1,445	392,606	..	160,382	1,503	88	..	..
Malabar ..	..	223,316	72	..	..	..	..	19,516	..	959	16,119	11,565	..	101,241	112	..	..
East Coast—																	
Vellore ..	..	336,957	..	..	..	..	..	34,600	..	131,452	64,215	..	894,246	150	737	..	..
Tanjavoor ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Madurai ..	..	..	..	..	..	..	..	..	..	2,201,500	..	..	..	..	..	..	..
Tuticorin ..	..	1,067	..	..	..	..	..	331,416	..	2,113,340	58,212	633,110	..	..	..	..	..
Mettur Dam ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Bhavanisagar ..	..	9,888,474	4,154	47,600	54	420	..	..	..	..	..	..	..	..	..	..	..
Total for the State, 1954-55 ..	9,888,474	566,101	47,672	54	5,697	..	43,658,900	438,462	..	4,448,387	491,215	644,765	1,025,178	102,929	937	..	..
Seeds of food fish collected—cont.																	
Region.	Seeds of food fish collected—cont.				Seeds of larvicidal and other fishes.												
	Gobius.	Collet.	Total	1 to 10.	Tricho-	Ambas-	Gambu-	Therap-	Haplo-	Micro-	Striped	Macro-	Total.	Macro-	Macro-	Macro-	Macro-
(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)
West Coast—																	
Mangalore ..	..	539,576	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Malabar ..	13,513	386,714	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
East Coast—																	
Vellore ..	..	1,442,470	29,535	6,205	175	5,000	..	..	..	..	..	..	..	..	..	..	..
Tanjavoor ..	..	39,026,539	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Madurai ..	..	2,206,777	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Tuticorin ..	..	3,187,145	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mettur Dam ..	..	4,632,151	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Bhavanisagar ..	..	9,940,702	140	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total for the State, 1954-55 ..	13,513	61,332,074	29,675	6,205	175	5,000	200	225	2,456	75	3,380	75	47,451	1,483,445	39,026,539	2,206,777	3,187,145

APPENDIX V.

STATEMENT OF WORKING OF DEPARTMENTAL FISHING VESSELS IN MADRAS STATE DURING 1954-55
(UNDER DEEP SEA FISHING SCHEME).

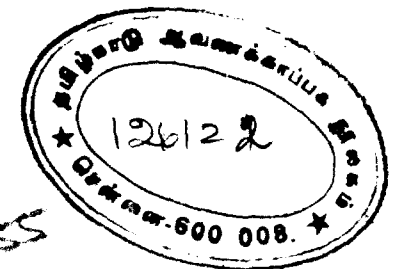
Name of centre.	Name of crafts used.	Number of days worked.	Tackle used.	Weight of fish caught.			Weight of shark livers rot. LB.	Total receipts. RS. A. P.	Total expenditure. RS. A. P.
				Sharks. LB.	Other fishes. LB.	Total fish. LB.			
Mangalore { Ullal Malpe Hunagarutia Tonapathil	..	7	Short lines	121,836	21,739	143,475	4,228	1,622 1 6	1,49 8 3
Madras { M.F.V. Vizianagaram.	..	203	Long lines	88,522	..	88,522	5,953	6,014 9 6	8,567 4 9
Negapatam { ..	..	184	R.C.H.	34,924	..	34,924	6,646	3,000 2 0	3,784 7 0
Adirumpatnam { ..	..	180	Nylon drift nets.	900	9,849	10,749	260	1,425 12 6	1,210 8 0
Pamban { ..	..	171	Long lines	6,809	12,608	19,417	215	1,881 0 9	6,651 5 2
.. { Dunlop net	..	..	Kolavala	..	..	..	..	..	..
Tuticorin { ..	..	..	Whipping lines	..	..	11,387	903	882 2 0	..
Do. { Local and Nylon	..	86	drift nets.	..	..	33,343	2,657	2,497 1 6	..
Do. { ..	..	180	..	..	..	60,364	97	3,129 5 3	43,160 0 10
.. { ..	..	220	..	..	..	..	..	..	..
Total for 1954-55				..	..	449,270	20,894	25,772 9 6	64,792 2 0
Total for 1953-54				..	..	196,901	11,918	18,408 10 10	77,297 8 10

APPENDIX VI.

LIST OF FISH TRANSPORT VANS IN THE MADRAS STATE DURING 1954-55.

Registration number. (1)	Description of van. (2)	Scheme under which working. (3)
1 MSZ 1262	Chevrolet	Quick transport facilities.
2 MSZ 1335	Do.	Do.
3 MSZ 2529	Ford	Do.
4 MSZ 2712	Belford	Do.
5 MSZ 2752	G.M.C. Pick-up	Do.
6 MSZ 2968	Fordson	Do.
7 MSZ 3192	G.M.C. Pick-up	Do.
8 MSZ 3589	Chevrolet	Do.
9 MSZ 1540	Ford	Intensive seed collection and distribution.
10 MSZ 2713	Land Rover	Do.
11 MSZ 2744	Do.	Do.
12 MSZ 2762	Do.	Do.
13 MSZ 2763	Do.	Do.
14 MSZ 2788	Do.	Do.
15 MSZ 2789	Do.	Do.
16 MSZ 2748	Austin Truck	Do.
17 MSZ 3158	Commer	Do.
18 MSZ 3351	Chevrolet	Do.
19 MSZ 3524	Do.	Do.
20 MSZ 3771	Dodge	Do.
21 MSZ 2937	Chevrolet Station Unit Van.	Propaganda.
22 MSY 0290	Insulated Van	Fish preservation and transport.
23 MSY 0291	Do.	Do.
24 MSZ 1550	Bedford	Mettur Reservoir Fisheries Exploitation.

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APPENDICES

APPENDIX VII.

LIST OF FISH CURING YARDS IN THE MADRAS STATE DURING 1954-55.

*East Coast.**A. Vellore.*

Name of yard. (1)	District. (2)	Yard Officer. (3)
1 Sathankuppam	Chingleput district	Petty Yard Officer.
2 Kadappakkam	Do.	Do.

B. Tanjore.

3 Adirampatnam	Tanjore district	Petty Yard Officer.
4 Muthupet	Do.	Do.
5 Arcot Thurai	Do.	Do.

C. Madurai.

6 Attankarai	Ramanathapuram district.	Petty Yard Officer.
7 Mukkur	Do.	Do.

D. Tuticorin.

8 Periatthalai	Tirunelveli district	Petty Yard Officer.
9 Ovari	Do.	Do.
10 Idinthakarai	Do.	Do.
11 Kuttapuli	Do.	Do.

*West Coast.**E. Malabar.*

12 Karimpuram	Malabar district	Petty Yard Officer.
13 Kodumbi	Do.	Peon.
14 Nattika	Do.	Petty Yard Officer.
15 Vatanapalli	Do.	Do.
16 Kadapuram	Do.	Sub-Inspector.
17 Blangad	Do.	Petty Yard Officer.
18 Puthenkadapuram	Do.	Do.
19 Ettakazhyur	Do.	Do.
20 Mannalamkunnu	Do.	Do.
21 Palapatty	Do.	Sub-Inspector.
22 Veliyangode	Do.	Petty Yard Officer.
23 Puduponnani	Do.	Do.
24 Ponnani	Do.	Sub-Inspector.
25 Kootayi	Do.	Petty Yard Officer.
26 Paravanna	Do.	Do.
27 Pudiakadapuram	Do.	Do.
28 Tanur	Do.	Sub-Inspector.
29 Parappanangadi	Do.	Do.
30 Kadalundi	Do.	Petty Yard Officer.
31 Beypore (South)	Do.	Do.
32 Beypore (North)	Do.	Peon.
33 Naduvattam	Do.	Do.
34 Calicut (Kozhikode)	Do.	Sub-Inspector.

APPENDIX VII—cont.

LIST OF FISH-CURING YARDS IN THE MADRAS STATE DURING—1954-55—cont.

*West Coast—cont.**E. Malabar—cont.*

Name of yard. (1)	District. (2)	Yard Officer. (3)
35 Pudiappa	Malabar district	Petty Yard Officer.
36 Elathur	Do.	Do.
37 Quilandy	Do.	Sub-Inspector.
38 Meladi	Do.	Petty Yard Officer.
39 Badagara	Do.	Sub-Inspector.
40 Madapalli	Do.	Petty Yard Officer.
41 Madakkara	Do.	Do.
42 Thalayi	Do.	Do.
43 Tellicherry	Do.	Sub-Inspector.
44 Edakkad	Do.	Petty Yard Officer.
45 Cannanore	Do.	Sub-Inspector.
46 Azhicoode	Do.	Petty Yard Officer.
47 Mattool	Do.	Do.
48 Madai	Do.	Sub-Inspector.
49 Palacode	Do.	Petty Yard Officer.

F. Mangalore.

50 Thaikadapuram	South Kanara district	Petty Yard Officer.
51 Poonjavi	Do.	Do.
52 Hosur	Do.	Sub-Inspector.
53 Bekal	Do.	Petty Yard Officer.
54 Kizhur	Do.	Do.
55 Adakathbail	Do.	Do.
56 Kumbla	Do.	Do.
57 Manjeshwar	Do.	Sub-Inspector.
58 Ullal	Do.	Petty Yard Officer.
59 Mangalore	Do.	Do.
60 Bockapatnam	Do.	Do.
61 Thannirbhavi	Do.	Do.
62 Baikampadi	Do.	Do.
63 Hosabettu	Do.	Do.
64 Moolky	Do.	Do.
65 Kaup	Do.	Do.
66 Polippu	Do.	Sub-Inspector.
67 Udaiawar	Do.	Do.
68 Malpe I	Do.	Petty Yard Officer (private yard) (closed).
69 Paduthonse	Do.	Sub-Inspector.
70 Hungareutta	Do.	Do.
71 Gangoli	Do.	Petty Yard Officer.
72 Marawanthe	Do.	Do.
73 Tarapathi	Do.	Do.

Number of yards.

At the beginning of the year	73
Newly opened	1
Closed	—
At the end of the year	72

Number of yards.

Under Sub-Inspector	17
Under Petty Yard Officer	53
Under Peon	2
Total	72

APPENDIX VIII.

FISH-CURING TRANSACTIONS IN THE MADRAS STATE DURING 1954-55.

Regional Offices.	Number of fish-curing parties.	Number of applications for salt received.	Stock of salt on hand 1st April 1954.		Salt supplied to yards during 1954-55.		Salt supplied from yards to others.		Wastage of salt.		Salt consumed.		Balance stock on hand 31st March 1955.		Issue price of salt.		Value of salt realized.		Fish let in.		Fish let out.			
			MDS.	SRS.	MDS.	SRS.	MDS.	SRS.	MDS.	SRS.	MDS.	SRS.	MDS.	SRS.	A. P.	RS.	A. P.	RS.	A. P.	MDS.	SRS.	MDS.	SRS.	
<i>West Coast.</i>																								
Mangalore	24	12,488	69,009	25	53,008	26	4	0	26	9	47,593	35	74,454	8	1	7	4	69,346	9	318,470	1	193,945	9	
Malabar	38	41,127	124,255	37	125,433	16	62	0	32	0	118,667	6	130,928	7	1	7	4	1,72,208	9	728,287	20	538,929	15	
<i>East Coast.</i>																								
Vellore	2	1,039	..	..	1,000	0	..	..	..	..	682	0	318	0	1	4	0	852	8	0	4,131	6	2,540	13
Tanjavoor	3	2,258	327	30	3,502	0	..	..	..	..	3,364	0	465	30	1	4	0	4,040	14	0	17,800	28	12,128	17
Madurai	2	473	1,167	0	1,340	0	..	..	..	..	1,212	20	1,204	0	1	4	0	1,515	10	0	7,192	12	5,906	18
Tuticorin	4	927	3,481	15	6,400	0	1,340	0	..	..	6,780	35	1,545	20	1	4	0	8,476	1	6	30,224	37	21,535	24
							(East Coast)																	
							177,774	0																
							(West Coast.)																	
Total for 1954-55	78	58,312	198,241	28	190,684	2	179,680	0	58	9	178,240	16	209,005	25	..	..	..	2,55,440	4	7	1,106,106	24	774,985	16
Total for 1953-54	72	69,644	199,700	5	220,177	4	205,024	0	23	5	212,868	16	198,241	28	..	..	..	2,80,287	8	6	1,434,539	35	928,456	18

APPENDIX IX.

STATEMENT OF SHARK LIVER OIL PRODUCTION IN THE MADRAS STATE DURING 1954-55.

Name of region.	Number of cwt. of		Shark liver obtained.		Weight of liver sent to Government Oil Factory.	Weight of liver & rated for oil.	Weight of oil extracted.	Cost of production.		Total cost.							
	Liver.	Oil.	Departmental supply.	Local purchases.				Total.	Cost of liver.		Cost of extraction.						
												LB.	LB.	RS.	A. P.		
<i>West Coast—</i>																	
Mangalore	8	8	4,236	55,694	60,130	37,213	22,017	8,486	7,490	12	6	7,793	10	0	15,293	6	6
Malabar	18	9	60	48,705	48,765	36,615	12,150	4,197	6,114	13	6	1,437	11	0	7,552	9	3
Government Oil Factory.	1	..	..	..	..	..	73,732	30,265	..	..	..	..	..	..	..	..	..
<i>East Coast—</i>																	
Vellore	..	3	9,825	2,422	12,247	..	12,247	6,851	3,422	5	6	727	10	0	4,150	0	3
Tanjavoor	..	8	9,641	10,738	20,369	..	20,369	11,371	6,166	0	6	881	15	6	7,048	0	0
Madurai	..	4	1,164	7,638	8,802	..	8,802	4,951	2,347	8	0	2,024	14	0	4,372	6	0
Tuticorin	..	5	3,665	16,161	19,846	..	19,846	9,534	5,388	11	6	733	5	8	6,122	1	2
Rameswaram	..	1	..	2,822	2,822	..	2,822	1,489	771	9	0	64	2	6	885	11	6
Total for 1954-55	27	38	29,091	144,390	172,981	73,828	172,885	77,154	31,710	12	6	13,663	6	2	45,374	2	8
Total for 1953-54	21	40	14,194	90,666	104,860	59,840	..	45,117	20,634	10	0	..	..	..	..	..	..

APPENDIX X.

LIST OF SHARK LIVER OIL EXTRACTION CENTRES IN THE MADRAS STATE DURING THE YEAR 1954-55.

East Coast.

- | | |
|-------------------|------------------|
| (I) Vellore— | (III) Madurai— |
| 1 Sathankuppam. | 12 Naveluthalai. |
| 2 Madras. | 13 Attankarai. |
| 3 Kadapakkam. | 14 Pamban. |
| | 15 Mukkur. |
| (II) Tanjavor— | 16 Rameswaram. |
| 4 Porto Novo. | |
| 5 Devanampatnam. | (IV) Tuticorin— |
| 6 Kaveripatnam. | 17 Tuticorin. |
| 7 Akkanapettai. | 18 Periathalai. |
| 8 Arcot Thenai. | 19 Ovari. |
| 9 Adirampatnam. | 20 Idinthakarai. |
| 10 Ammapatnam. | 21 Kootapuli. |
| 11 S. B. Chatram. | |

West Coast.

- | | |
|-------------------------------|-------------------|
| (V) Malabar— | (V) Malabar—cont. |
| 22 Nattika. | 45 Cannanore. |
| 23 Kadapuram. | 46 Mattool. |
| 24 Blangad. | 47 Madai. |
| 25 Puthenkadapuram. | 48 Palacode. |
| 26 Edakazhugore. | |
| 27 Palapatty. | (VI) Mangalore— |
| 28 Ponnani. | 49 Thakkadapuram. |
| 29 Kootayi. | 50 Poonjari. |
| 30 Tamur. | 51 Hosdurg. |
| 31 Pappananjadi. | 52 Bekal. |
| 32 Kadalundi. | 53 Kizhur. |
| 33 Neyyore (North and South). | 54 Adakathbail. |
| 34 Government Oil Factory. | 55 Kunka. |
| 35 Calicut. | 56 Ranjeshwar. |
| 36 Pudiappa. | 57 Ullal. |
| 37 Elathur. | 58 Mangalore. |
| 38 Quilandy. | 59 Moolky. |
| 39 Moladi. | 60 Kaup. |
| 40 Bidagara. | 61 Malpe. |
| 41 Madapalli. | 62 Hungarcutta. |
| 42 Madakkara. | 63 Gangoli. |
| 43 The'avy. | 64 Tarapathi. |
| 44 Tellicherry. | |

APPENDIX XI.

LIST OF PROVINCIALIZED WATERS IN THE MADRAS STATE DURING 1954-55.

Name of the tank. Name of the taluk. Name of the tank. Name of the taluk.

West Coast.

- | | | | |
|---|-------------|-------------------------|----------------|
| (i) South Kanara District. | | | |
| 1 Kolekere (Basrur) .. | Coondapur. | 17 Chandra madaga .. | Udipi. |
| 2 Kotakere (Hosangadi) | Do. | 18 Morgapakattakere .. | Puthur. |
| 3 Hanthanakere .. | Do. | 19 Guruvanakere .. | Do. |
| 4 Talmakere .. | Do. | 20 Sannatnekere .. | Do. |
| 5 Benkere .. | Do. | 21 Bangarakottakere .. | Do. |
| 6 Higgrekere .. | Do. | 22 Mattathekere .. | Do. |
| 7 Hosakere .. | Do. | 23 Oruvadukere .. | Do. |
| 8 Parapatnanalkakere. | Do. | 24 Venoer tank, Bylur. | Karkal. |
| 9 Kodalkere .. | Do. | 25 Magalakere, Nanda- | Do. |
| 10 Mokara tank .. | Do. | lekke. | |
| 11 Sooral tank .. | Do. | 26 Nagarbavi .. | Do. |
| 12 Merelakamadaga .. | Do. | 27 Pudiakulam .. | Kasargod. |
| 13 Mogabetta madaga .. | Do. | 28 Chakrapani temple | Do. |
| 14 Bijadi tank .. | Do. | tank. | |
| 15 Haggare tank .. | Do. | 29 Cheruvathur Railway | Do. |
| 16 Bikriguttu .. | Udipi. | tank. | |
| (ii) Malabar District. | | | |
| 30 Vyam lake .. | Ponnani. | 31 Malampuzha Reser- | Palghat. |
| | | voir. | |
| (iii) Vellore Region—Chingleput District. | | | |
| 32 Chingleput Fort Moat. | Chingleput. | (a) Below the regu- | |
| 33 Garuvanmedu Hissa | Do. | lator up to 100 | |
| tank. | | yards below the | |
| 34 Orgudam tank .. | Do. | Tamarapakkam | |
| 35 Sirukundram .. | Do. | Anicut. | |
| 36 Kondanki tank .. | Do. | (b) 100 yards both | |
| 37 Kolivoy tank .. | Do. | above and below | |
| 38 Sholavaram tank .. | Ponneri. | the Vallur anicut | |
| 39 Chinnambedu Periar | Do. | and the head | |
| eri. | | sluices of both | |
| 40 Alamadi tank .. | Do. | anicut. | |
| 41 Perumbedu tank .. | Do. | 57 Cooum river, 100 | Tiruvallur. |
| 42 Kattur tank .. | Do. | yards both above | |
| 43 Medur tank .. | Do. | and below Korat- | |
| 44 Thattamanji tank .. | Do. | tur anicut and its | |
| 45 Santhavelur tank .. | Do. | head sluices. | |
| 46 Nayar tank .. | Do. | 58 Chembarambakkam | Sriperumbudur. |
| 47 Sajjevāri pond .. | Do. | tank. | |
| 48 Rallakuppam tank .. | Do. | 59 Tinnanur tank .. | Do. |
| 49 Kambakkam tank .. | Do. | 60 Nemam hissa tank. | Do. |
| 50 Neidavayal tank .. | Do. | 61 Manimangalam tank. | Do. |
| 51 New Gummidipundi | Do. | 62 Red Hills Reservoir. | Saidapet. |
| tank. | | 63 Utthiramerur eri .. | Kancheepuram. |
| 52 Old Gummidipundi | Do. | 64 Utthiramerur chit- | Do. |
| tank. | | teri. | |
| 53 Negalapuram Karup- | Tiruvallur. | 65 Edamachi tank .. | Do. |
| pu eri. | | 66 Veliyur peria eri .. | Do. |
| 54 Vadamadurai Karup- | Do. | 67 Parandur tank .. | Do. |
| pu eri. | | 68 Thenneri tank .. | Do. |
| 55 Kamigaipeir Karup- | Do. | 69 Kuthimbarabakkam | Do. |
| pu eri. | | and Mantangal | |
| 56 Poondi reservoir with | Do. | tank. | |
| all the streams | | 70 Niravalur tank .. | Do. |
| emptying into it | | 71 Sevilimedu tank .. | Do. |
| and the sections of | | 72 Damal peria eri .. | Do. |
| Kortalayar river : | | 73 Govindavadi eri .. | Do. |
| | | 74 Siruvakkam eri .. | Do. |

APPENDIX XI—cont.

LIST OF PROVINCIALIZED WATERS IN THE MADRAS STATE DURING 1954-55—cont.

Name of the tank.	Name of the taluk.	Name of the tank.	Name of the taluk.
(iii) Vellore Region—Chingleput District—cont.			
75 Valathur eri ..	Kancheepuram.	78 Oratti tank ..	Madurantakam.
76 Karum peria eri ..	Do.	79 Thenbakkam tank ..	Do.
77 Madurantakam tank.	Madurantakam.		
(iv) Tanjavor Region—Tanjavor District.			
River Fishery.			
80 Cauvery, Coleroon and all their branches running within the Tiruchirapalli and Tanjavor districts.			
Provincialized tanks.			
81 Koranattukaruppur tank.	Kumbakonam.	84 Dhevananjeri ..	Kumbakonam.
82 Nagarasampet ..	Do.	85 Dhevananjeri tank ..	Do.
83 Tirucherian eri ..	Do.	86 Pidari tank ..	Do.
		87 Pachappa tank ..	Do.
Mayuram taluk.			
88 Tiruvilandur kuttai.	Mayuram.	121 Pappankulam ..	Mayuram
89 Tamaraikulam ..	Do.	122 Madhalartheva-kulam.	Do.
90 Ayyanarkulam ..	Do.		
91 Kothankulam ..	Do.	123 Soorangikulam ..	Do.
92 Sanikulam ..	Do.	124 Peryaritherukulam ..	Do.
93 Udayarakulam ..	Do.	125 Seenanvethadikulam.	Do.
94 Manikulam ..	Do.	126 Anathakudiyar Vettadikulam.	Do.
95 Omankulam ..	Do.		
96 Thirukulam ..	Do.	127 Thachankuttai ..	Do.
97 Ayyanarkulam ..	Do.	128 Motticupukulam ..	Do.
98 Tamaraikulam ..	Do.	129 Kookimodukuttai ..	Do.
99 Manikulam ..	Do.	130 Partharavettadai tank.	Do.
100 Thirumaraiyarkoil tank.	Do.	131 Kalinuthu vettadai tank.	Do.
101 Perumalkulam ..	Do.	132 Vettiyanikulam ..	Do.
102 Mudikulam ..	Do.	133 Kudiyannathamkulam.	Do.
103 Ayyanarkovilkulam.	Do.	134 Thamarakulam ..	Do.
104 Paravakulam ..	Do.	135 Ulaganathan tank ..	Do.
105 Periakulam ..	Do.	136 Puchathannar tank.	Do.
106 Thamarpannai tank.	Do.	137 Periyakulam ..	Do.
107 Kelumrudandan illur tank.	Do.	138 Kattucheri tank ..	Do.
108 Eas tank ..	Do.	139 Parava tank ..	Do.
109 West tank ..	Do.	140 Nachipoigai ..	Do.
110 Omakulam ..	Do.	141 Sivankoil Sannadi tank.	Do.
111 Pidarikulam ..	Do.	142 Periakulam ..	Do.
112 Pillayarkoil tank ..	Do.	143 Ponnankulam ..	Do.
113 Pappa tank ..	Do.	144 Narithirankulam ..	Do.
114 Ayyanarkulam ..	Do.	145 Tank in R.S. No. 116-1.	Do.
115 Nokkankuttai ..	Do.	146 Tank in R.S. No. 389.	Do.
116 Varadumpet odai ..	Do.	147 Tank in R.S. No. 394-1.	Do.
117 Vjllayanaallur stone-pit.	Do.	148 Tank in R.S. No. 475.	Do.
118 Pallikulam ..	Do.		
119 Nettikulam ..	Do.		
120 Thachankulam ..	Do.		
Nannilam taluk.			
149 Kilakulam ..	Nannilam.	158 L. F. Kulam ..	Nannilam.
150 Melakulam ..	Do.	159 Kuttai ..	Do.
151 Opapadikuttai ..	Do.	160 Pillaiyarkoilkulam.	Do.
152 Sathian odai ..	Do.	161 Mariyammankulam.	Do.
153 Vettukulam ..	Do.	162 Ayyanarkulam ..	Do.
154 Sathankulam ..	Do.	163 Pattithervukulam.	Do.
155 Vellachikuttai ..	Do.	164 Thachankulam ..	Do.
156 Anthu Thennamarattu-kuttai.	Do.	165 Sathrankulam ..	Do.
157 Ekkuruvankuttai ..	Do.	166 Pulakadaikuttai ..	Do.
		167 Periakulam ..	Do.

APPENDIX XI—cont.

LIST OF PROVINCIALIZED WATERS IN THE MADRAS STATE DURING 1954-55—cont.

(iv) Tanjavor Region—Tanjavor District—cont.

Provincialized tanks—cont.

Name of the tank.	Name of the taluk.	Name of the tank.	Name of the taluk.
Nannilam Taluk—cont.			
168 Northkulam ..	Nannilam.	196 Nettikulam ..	Nannilam.
169 Vadugankulam ..	Do.	197 Parathervukuttai ..	Do.
170 Kuppankulam ..	Do.	198 Kunaraperathukulam	Do.
171 Perumalkulam ..	Do.	199 Karuppanaikken	Do.
172 Ambattanikulam ..	Do.	kulam.	
173 Nallathannukuttai ..	Do.	200 Ayyanarkulam ..	Do.
174 Perumalkulam ..	Do.	201 Kurukankulam ..	Do.
175 School kulam ..	Do.	202 Thatchankulam ..	Do.
176 Mariamman koil-kulam.	Do.	203 Pallivasalkulam ..	Do.
177 Agaratharathidai-kulam.	Do.	204 Pidarikulam ..	Do.
178 Northvasalkulam ..	Do.	205 Perumalkulam ..	Do.
179 Koilpattiparthukulam.	Do.	206 Kaliannankulam ..	Do.
180 Vadakkuparthakulam	Do.	207 Othaveethikulam ..	Do.
181 Mariammankulam ..	Do.	208 Thattankulam ..	Do.
182 Kolakattankulam ..	Do.	209 Varakuppankulam.	Do.
183 Thamarakulam, etc.	Do.	210 Amma and Vettivasal-kulam.	Do.
184 Nallankulam ..	Do.	211 Kosalankuttai ..	Do.
185 Chettiteruvukulam.	Do.	212 Vettiyanikulam ..	Do.
186 Kuyavankulam ..	Do.	213 Ali and Vettikulam.	Do.
187 Therukuttaiyan	Do.	214 Veeranarkulam ..	Do.
kulam		215 Periakulam ..	Do.
188 Veerankuttai ..	Do.	216 Ayyanarkulam ..	Do.
189 Chettiarikulam ..	Do.	217 Thiru and Kannar-kulam.	Do.
190 Aryakulam ..	Do.	218 Sidambarankuttai ..	Do.
191 Madathukuttai ..	Do.	219 Thatchankuttai ..	Do.
192 Edayankulam ..	Do.	220 Ayyanarkulam ..	Do.
193 Paratheruvu kuttai	Do.	221 Madathukulam ..	Do.
and Chinnappan		222 Vennarkulam ..	Do.
kuttai.		223 Pandaratheru kuttai.	Do.
194 Karikaran kuttai ..	Do.	224 Pungavarthathakkikulam.	Do.
195 Veli Pallivasal kulam.	Do.	225 Tirukulam ..	Do.
Papanasam Taluk.			
226 R.S. No. 142 A-1 ..	Papanasam.	252 R.S. No. 178/1 ..	Papanasam.
227 R.S. No. 31-34 ..	Do.	253 R.S. 218-1, Chandikulam.	Do.
228 R.S. No. 201-6, Keela-pathikulam.	Do.	254 R.S. 262-1, Ayanarkulam.	Do.
229 R.S. No. 256-2, Ayan-kulam.	Do.	255 Perumalkulam ..	Do.
230 R.S. No. 261-2, Kara-kulam.	Do.	256 Periyankuttai ..	Do.
231 R.S. No. 116-2 ..	Do.	257 Bouthayukulam ..	Do.
232 R.S. No. 117-1 ..	Do.	258 Melakulam ..	Do.
233 R.S. No. 45 ..	Do.	259 Road Kuttai ..	Do.
234 R.S. No. 99 ..	Do.	260 Perumalkoil Kuttai.	Do.
235 R.S. No. 64-1 ..	Do.	261 R.S. 116-2 ..	Do.
236 R.S. No. 84 ..	Do.	262 R.S. 175/2 ..	Do.
237 R.S. No. 294 ..	Do.	263 Esankuttai ..	Do.
238 R.S. No. 203 ..	Do.	264 Melakulam ..	Do.
239 R.S. No. 157 ..	Do.	265 Keelakulam ..	Do.
240 R.S. No. 239 A-2 ..	Do.	266 Vadakkulam ..	Do.
241 R.S. No. 28 ..	Do.	267 Eravadikulam ..	Do.
242 R.S. No. 69 ..	Do.	268 Ayyankulam ..	Do.
243 R.S. No. 191-7 ..	Do.	269 Karambathankulam.	Do.
244 R.S. No. 358 ..	Do.	270 Atuvanapathikulam.	Do.
245 R.S. No. 400-4 ..	Do.	271 Moopathankulam ..	Do.
246 R.S. No. 299-B ..	Do.	272 Govindanallurkulam	Do.
247 R.S. No. 117 ..	Do.	273 B. Velayanikulam ..	Do.
248 R.S. No. 109-7 ..	Do.	274 Narasingamangalam-kulam.	Do.
249 R.S. No. 109-10 ..	Do.	275 Regunathapuramkulam.	Do.
250 R.S. No. 43 ..	Do.	276 Do.	Do.
251 R.S. No. 279 ..	Do.		

APPENDIX XI—cont.

LIST OF PROVINCIALIZED WATERS IN THE MADRAS STATE DURING 1954-55—cont.

(iv) Tanjavor Region—Tanjavoor District—cont.

Provincialized Tanks—cont.

Name of the tank.	Name of the taluk.	Name of the tank.	Name of the taluk.
Papanasam Taluk—cont.			
277 Nemmelikulam ..	Papanasam.	296 R.S. 48 ..	Papanasam.
278 Somasimandapankulam.	Do.	297 R.S. 115/1 ..	Do.
279 Korathukudikulam.	Do.	298 R.S. 140 ..	Do.
280 Chitrakulam ..	Do.	299 R.S. 143 ..	Do.
281 Pidarikulam ..	Do.	300 R.S. 220 ..	Do.
282 Sivankoilkulam ..	Do.	301 R.S. 147/c ..	Do.
283 Ayvankoilkulam ..	Do.	302 R.S. 92 A & B ..	Do.
284 R.S. 57/4 ..	Do.	303 R.S. 136 ..	Do.
285 R.S. 316/2 ..	Do.	304 R.S. 16 ..	Do.
286 R.S. 425/2 ..	Do.	305 R.S. 103 ..	Do.
287 R.S. 3-5/5 ..	Do.	306 R.S. 98 ..	Do.
288 R.S. 492/2 ..	Do.	307 R.S. 107 ..	Do.
289 R.S. 412/2 ..	Do.	308 K.S. 64 ..	Do.
290 R.S. 350/1 ..	Do.	309 R.S. 68 ..	Do.
291 R.S. 336 ..	Do.	310 R.S. 99 ..	Do.
292 R.S. 339 ..	Do.	311 R.S. 62/2 ..	Do.
293 R.S. 135/4 ..	Do.	312 R.S. 41 ..	Do.
294 R.S. 28 ..	Do.	313 R.S. 103-1 ..	Do.
295 R.S. 37/4 B ..	Do.	314 R.S. 148 ..	Do.
		315 R.S. 189 ..	Do.
Pattukottai Taluk.			
316 Sambaloor eri ..	Pattukottai.	354 Ralkuda tank ..	Pattukottai.
317 Tharmakulam ..	Do.	355 Archutti eri ..	Do.
318 Tannirpandalakuttai.	Do.	356 Kumelankulam ..	Do.
319 Nattukkarai eri ..	Do.	357 Kodikarambai eri ..	Do.
320 Annar eri ..	Do.	358 Manitturam eri ..	Do.
321 Kandarankuli eri ..	Do.	359 Peria Elumbai eri ..	Do.
322 Thyagara odai ..	Do.	360 Pannikondanviduthi eri.	Do.
323 Vellakulam ..	Do.	361 Keela ..	Do.
324 Pigochiappa eri ..	Do.	362 Viduthi eri ..	Do.
325 Kondikulam eri ..	Do.	363 Kannu kulam ..	Do.
326 Kanaruvaram eri ..	Do.	364 Avidayan kulam ..	Do.
327 Samurotikulam ..	Do.	365 Manikulam ..	Do.
328 Anandapallam ..	Do.	366 Neduva kulam ..	Do.
329 Sendan odai ..	Do.	367 Pisanathur eri ..	Do.
330 Sendan eri ..	Do.	368 Solangankulam ..	Do.
331 Sitar eri ..	Do.	369 Kurundan kulam ..	Do.
332 Kosavan kulam ..	Do.	370 Padura kulam ..	Do.
333 Neela eri ..	Do.	371 Peria eri ..	Do.
334 Peravallan kulam ..	Do.	372 Mohanpuri eri ..	Do.
335 Kottai eri ..	Do.	373 Vattuvakudi eri ..	Do.
336 Pettai kulam ..	Do.	374 Vanduvan odai ..	Do.
337 Peria eri ..	Do.	375 Vellayah eri ..	Do.
338 Thalungulam ..	Do.	376 Pappan odai eri ..	Do.
339 Krishna kulam ..	Do.	377 Odai kulam ..	Do.
340 Nadan eri ..	Do.	378 Kumuli kulam ..	Do.
341 Udayan eri ..	Do.	379 Vennan kulam ..	Do.
342 Kuruvadi eri ..	Do.	380 Ayyanar kulam ..	Do.
343 Elan kulam ..	Do.	381 Uppukulam ..	Do.
344 Peria eri ..	Do.	382 Edayar kulam ..	Do.
345 Venkulam eri ..	Do.	383 Rayar kulam ..	Do.
346 Pinaa kulam ..	Do.	384 Agastheswarswami kulam	Do.
347 Peria eri ..	Do.	385 Arasoor Keela kulam	Do.
348 Achiyapkudi eri ..	Do.	386 Rukkumani kulam	Do.
349 Perumangalore Peria eri.	Do.	387 Karpoorathottam kulam	Do.
350 Valayanvayal eri ..	Do.	388 Singaperumal kulam	Do.
351 Athamanthapurai eri.	Do.	389 Paracheri kulam	Do.
352 Karuoyakutta eri ..	Do.		
353 Palangulam eri ..	Do.		

APPENDIX XI—cont.

LIST OF PROVINCIALIZED WATERS IN THE MADRAS STATE DURING 1954-55—cont.

(iv) Tanjavor Region—Tanjavoor district—cont.

Name of the tank.

Name of the taluk.

Name of the tank.

Name of the taluk.

Provincialized tanks—cont.

Arantangi Taluk.

390 Mellinayakipuram eri ..	Arantangi.	452 Pudukkarakai eri ..	Arantangi.
391 Pudukkulam and Anna.	Do.	453 Thattanvayal eri ..	Do.
392 Vettikulam ..	Do.	454 Edayankottai eri ..	Do.
393 Thirukulam eri ..	Do.	455 Amanjaki eri C.M.P.	Do.
394 Murkku ii eri ..	Do.	456 Nililamagulam eri ..	Do.
395 Mallinayakipuram ..	Do.	457 Vodiagudi eri ..	Do.
396 Solagan eri ..	Do.	458 Thineyagudi eri ..	Do.
397 Thamabattan Mombadan	Do.	459 Sominvayal eri ..	Do.
398 Manadi eri ..	Do.	460 Namarangur eri ..	Do.
399 Mela eri ..	Do.	461 Srukandiyur ..	Do.
400 Thanthani eri ..	Do.	462 Brahmanayal eri ..	Do.
401 Thanthani Kila eri ..	Do.	463 Kambalathurvayal ..	Do.
402 Alathikolom ..	Do.	464 Nidayoor eri ..	Do.
403 Kudimori Mela eri ..	Do.	465 Boyyavayal eri ..	Do.
404 Kudimori Keela eri ..	Do.	466 Kudikadu eri ..	Do.
405 Sillattur eri ..	Do.	467 Ollanur eri ..	Do.
406 Kunnakurumbi Therku eri.	Do.	468 Melasthanam eri ..	Do.
407 Kunnakurumbi Vadak-kur eri.	Do.	469 Kuthadiyaval eri ..	Do.
408 Kanavayal eri ..	Do.	470 Mhaganapathipuram ..	Do.
409 Kollanvayal eri ..	Do.	471 Thahannalai eri ..	Do.
410 Manianpujari eri ..	Do.	472 Karuppurichi eri ..	Do.
411 Samaikkaran kulam ..	Do.	473 Keelaikurichi eri ..	Do.
412 Narjavalakudi eri ..	Do.	474 Signavayal eri ..	Do.
413 Kalayathipatti eri ..	Do.	475 Vellur eri ..	Do.
414 Alagamandal eri ..	Do.	476 Karavattangudi eri ..	Do.
415 Uthamanandal eri ..	Do.	477 Nolv li eri ..	Do.
416 Sundanavoor eri ..	Do.	478 Virkuduvayal eri ..	Do.
417 Songamari eri ..	Do.	479 Kollavayal eri ..	Do.
418 Arantangi eri ..	Do.	480 Peranoor eri ..	Do.
419 Kungudi eri ..	Do.	481 Manalur eri ..	Do.
420 Athani eri ..	Do.	482 Parayamangudi eri ..	Do.
421 Velaimonavayal eri ..	Do.	483 Anayurvayal eri ..	Do.
422 Kolathur eri ..	Do.	484 Perumardur eri ..	Do.
423 Pichalur eri ..	Do.	485 Sathakudy eri ..	Do.
424 Edayar eri ..	Do.	486 Sirkasa Vayal eri ..	Do.
425 Alanguai eri ..	Do.	487 Vattathur eri ..	Do.
426 Pakkudi eri ..	Do.	488 Puduvalayal eri ..	Do.
427 Urani eri ..	Do.	489 Palavarasan e i ..	Do.
428 Sullani eri ..	Do.	490 Sirumarudur eri ..	Do.
429 Vettathenam eri ..	Do.	491 Minnamoli eri ..	Do.
430 Keelavathivayal ..	Do.	492 Agambadiamonda eri ..	Do.
431 Panchathi eri ..	Do.	493 Saliem eri ..	Do.
432 Amanji Peria eri ..	Do.	494 Naikuppai eri ..	Do.
433 Kundagavayal eri ..	Do.	495 Kuduvaivayal eri ..	Do.
434 Allaraa eri ..	Do.	496 Poovalur eri ..	Do.
435 Keelacheri eri ..	Do.	497 Sathakudi eri ..	Do.
436 Athithanattir eri ..	Do.	498 Irdalur eri ..	Do.
437 Perian eri ..	Do.	499 Sivanagiri eri ..	Do.
438 Chinna eri ..	Do.	500 Okkakudy eri ..	Do.
439 Eryanpatti eri ..	Do.	501 Narikudi eri ..	Do.
440 Mamandan eri ..	Do.	502 Okkur eri ..	Do.
441 Kummakadu eri ..	Do.	503 Thunjanur eri ..	Do.
442 Thiruppavayal eri ..	Do.	504 Puduokkur eri ..	Do.
443 Muriyur eri ..	Do.	505 Murayur eri ..	Do.
444 Thothakudi eri ..	Do.	506 Meyyanoor eri ..	Do.
445 Madathivayal eri ..	Do.	507 Kavathakudy eri ..	Do.
446 Sanakarai eri ..	Do.	508 Patt. mangalam eri ..	Do.
447 Nagamangalam eri ..	Do.	509 Meriyur eri ..	Do.
448 Aramanganavayal eri ..	Do.	510 Ponbathi eri ..	Do.
449 Vannankadu eri ..	Do.	511 Keeranur eri ..	Do.
450 Karavayalsirupuda eri.	Do.	512 Perithivayal eri ..	Do.
451 Manjanakkadu eri ..	Do.	513 Elathampatti eri ..	Do.
		514 Sathakudy eri ..	Do.
		515 Koovanor eri ..	Do.

APPENDIX XI—cont.

LIST OF PROVINCIALIZED WATERS IN THE MADRAS STATE DURING 1954-55—cont.

(iv) Tanjavor Region—Tanjavor district—cont.

Name of the tank.	Name of the taluk.	Name of the tank.	Name of the taluk.
Provincialized tanks—cont.			
Arantangi taluk—cont.			
516 Sahamangalam eri ..	Arantangi.	534 Kadiramangalam eri ..	Arantangi.
517 Thiruharyanankulam eri.	Do.	535 Perumangalam eri ..	Do.
518 Vettivayal eri ..	Do.	536 Alamangalam eri ..	Do.
519 Murandankudy eri ..	Do.	537 Nallakudi eri ..	Do.
520 Keelamanjakudi eri ..	Do.	538 Sadayamangalam eri ..	Do.
521 Kodakudy Therkkudi eri.	Do.	539 Thiyyur eri ..	Do.
522 Kodakudy Vadakku eri.	Do.	540 Palayur Keela eri ..	Do.
523 Nilathur eri ..	Do.	541 Vemathur Mela eri ..	Do.
524 Sathinivayala eri ..	Do.	542 Alaganandal eri ..	Do.
525 Kavanur eri ..	Do.	543 Uttamangandal eri ..	Do.
526 Machiravayal eri ..	Do.	544 Sunda avoor eri ..	Do.
527 Chinna eri joint with ..	Do.	545 Vengalnam eri ..	Do.
528 Peria eri ..	Do.	546 Theenamari eri ..	Do.
529 Muramangalam eri ..	Do.	547 Mangalam eri ..	Do.
530 Nattani eri ..	Do.	548 Paiyangudi eri ..	Do.
531 Puraakudy eri ..	Do.	549 Mannan eri ..	Do.
532 Kurichi vayal ..	Do.	550 Kothangudi eri ..	Do.
533 Padirikudy eri ..	Do.	551 Agavayal eri ..	Do.
		552 Nattaresakottai eri ..	Do.

SOUTH ARCOT DISTRICT.

553 Coleroon, Vadavar, Vellar, Malattar, Tirukoilur Arcot and its channels.	554 Wellington Reservoir ..	Vridachalam.
	555 Veeranam lake ..	Chidambaram.

(vii) METTUR DAM REGION—SALEM DISTRICT.

556 Barur big tank ..	Krishnagiri.	567 River Nagavathi—Gundanahalli limits.	Dharmapuri.
557 Penugondapuram ..	Do.	568 River Nagavathi—Arakasanahalli limits.	Do.
558 Barur Surplus Channel.	Do.	569 River Nagavathi—Chinnapalli limits.	Do.
559 Ellupaikuttai ..	Do.	570 Chakulagudugupalli ..	Do.
560 Pungampatti Nagal eri.	Do.	571 Hanumantharayan Pallam.	Do.
561 Veeraraghavan eri ..	Hosur.	572 Kambalapadi Jubuki ..	Do.
562 Ramanayakan eri ..	Do.	573 Sakkiligudu Pallam ..	Do.
563 Cauvery river, Lots I, II and III.	Tiruchengode.	574 Raja channel ..	Namakkal.
564 Thoppiar river in Thoppiar limits.	Dharmapuri.	575 Komarapalayam channel.	Do.
565 Thoppiar river in Kammanpatti limits.	Do.	576 Mohanur channel ..	Do.
566 River Nagavathi—Perumbattai limits.	Do.		

APPENDIX XII.

LIST OF DEPARTMENTAL WATERS IN THE MADRAS STATE DURING 1954-55.

District.	Taluk.	District.	Taluk.
West Coast.			
(i) South Kanara District.			
1 Kollakere ..	Coondapoor.	6 Ramasamudram ..	Karkal.
2 Kodi tank ..	Do.	7 Tawarakere ..	Do.
3 Moovala tank ..	Puthur.	8 Gujarakere ..	Mangalore.
4 Kottakara ..	Do.	9 Yanmakere ..	Do.
5 Panchalingam tank.	Temple Do.	10 Theertham tank ..	Hosdurg sub-taluk.
(ii) Malabar District.			
11 Tharakad ..	Palghat.	20 Chalapuram tank ..	Kozhikode.
12 Mangetkulam ..	Do.	21 Nellore tank ..	Do.
13 Thondikulam ..	Do.	22 Thariode lake ..	Wynaad.
14 Alamkulam ..	Do.	23 Oottupura ..	Ponnani.
15 Aranurkulam ..	Do.	24 Thunoli ..	Chirakkal.
16 Kuttichira ..	Kozhikode.	25 Railway tank, Tellicherry.	Kottayam.
17 Kandankulam ..	Do.	26 Lotus tank ..	Kurumbranad.
18 Idiyankara ..	Do.	27 Kollen chira ..	Do.
19 Chakkorathukulam ..	Do.		
East Coast.			
(iii) Vellore (North Arcot).			
28 Vellore Fort moat ..	Vellore.		
Chingleput District.			
29 Poondi Fish Farm ..	Tiruvallur.	31 Sathiavedu Fish Farm ..	Ponneri.
30 Thanthipandal Fish Farm.	Ponneri.	32 Chingleput Fort moat ..	Chingleput.
Madras District.			
33 Adyar Fish Farm ..			
(iv) Tanjavor District.			
34 Ayyankulam ..	Tanjavor.	46 Durga tank ..	Nagapattinam.
35 West moat ..	Do.	47 Pachamuthu tank.	Do.
36 Webster moat ..	Do.	48 Pillai kulam ..	Do.
37 Pookulam ..	Do.	49 Chatram kulam ..	Do.
38 Tattankulam ..	Do.	50 Eachankulam ..	Do.
39 Ayikulam ..	Kumbakonam.	51 Kutcherikulam ..	Do.
40 Anayadikulam ..	Do.	52 Uppukulam ..	Do.
41 Pidari kulam ..	Do.	53 Sengulam ..	Mannargudi.
42 Thachankulam ..	Tiruturai-poondi.	54 Perumalkulam and Padikulam.	Do.
43 Pillaikulam ..	Adiramapattanam.	55 Ramatheertham (Hanumar Koil).	Do.
44 Aladikulam ..	Do.		
45 Pattarikulam Muthupet.	Do.		
Tiruchirappalli District.			
56 Keelanaeri ..	Pudukkottai.	60 Palaniandi urani ..	Pudukkottai.
57 Tirukulam ..	Do.	61 Vairanachi urani ..	Do.
58 Sivankoil Pushkarani.	Do.	62 Servarayankulam urani.	Do.
59 Kamudankulam ..	Do.	63 Sivayam tank ..	Kulithalai.

APPENDIX XII—cont.

LIST OF DEPARTMENTAL WATERS IN THE MADRAS STATE
DURING 1954-55—cont.

District.	Taluk.	District.	Taluk.
<i>East Coast—cont.</i>			
<i>South Arcot District.</i>			
64 Theerthakulam ..	Tindivanam.	71 Sevamandir pond ..	Porto Novo.
65 Anaikulam ..	Do.	72 Ghouse palli tank ..	Do.
66 Venkateswarankulam.	Do.	73 Appapalli tank ..	Do.
67 Chettikulam ..	Do.	74 Pudupalli tank ..	Do.
68 Cuddalore Old Town tank.	Cuddalore.	75 Mahadoom Appapillai tank.	Do.
69 Bhuvanagiri tank ..	Chidambaram.	76 Kidernabi tank ..	Do.
70 Public Works Department tank.	Cuddalore.	77 Vaithepalli tank ..	Do.
		78 Veeranam lake ..	Chidambaram.
(v) Madurai District.			
79 Mariamman teppam ..	Madurai.	87 Mankatti theppam ..	Melur.
80 Tirumakulam ..	Do.	88 Salakarayan ..	Do.
81 Valaivesi tappam ..	Do.	89 Navinipatti periaurani.	Do.
82 Race Course pond ..	Do.	90 Vaddugapatti ..	Nilakottai.
83 Tengal tank pond ..	Do.	91 Kallupatti peria teppam.	Tirumangalam.
84 District Board Nursery.	Do.		
85 Kodai lake ..	Kodaikanal (Dindigul taluk).	92 Kaluvankulam ..	Do.
		93 Kammanurani ..	Do.
86 Kodai Fish Farm ..	Do.	94 Agneeswarar teppam ..	Do.
<i>Ramanathapuram District.</i>			
95 Kallukatti teppam ..	Karsikudi.	97 Shenbaga Vinayagar tank.	Sivakasi.
96 Quarry pools (4) ..	Virudhunagar.		
(vi) Tuticorin.			
98 Kadayanallur tank (4).	Ambasamudram.	99 Gopalsamudram tanks.	Ambasamudram.
		100 Kalakkad tanks ..	Nanguneri.
(vii) Mettur Dam.			
101 Mettur Fish Farm ..	Omalur.	103 Yercaud lake ..	Salem.
102 Hosur Fish Farm ..	Hosur.		
(viii) Bhavanisagar.			
104 Ootacamund lake ..	Ootacamund.	112 Bhavanisagar Fish Farm.	Gobichetti-palayam.
105 Marvaakandy lake ..	Do.	113 Coronation Park Nursery.	Coimbatore.
106 Pykara reservoir ..	Do.	114 Verugopalaswamy temple tank.	Do.
107 Pykara Stew pond ..	Do.	115 Imperial Bank tank ..	Do.
108 Snowden park pond ..	Do.	116 Raja Street, Teppakulam.	Do.
109 Wellington lake ..	Coonoor.	117 Chidambaram tank ..	Erode.
110 Sims park pond ..	Do.		
111 Katteri reservoir ..	Do.		

APPENDIX XIII.

LIST OF FISHERMEN CO-OPERATIVE SOCIETIES IN THE STATE
DURING 1954-55.*West Coast.*

1. South Kanara District.

Udipi Section.

- 1 Hadavinakone Fishermen Co-operative Society (Marine).
 - 2 Tharapathy Fishermen Co-operative Society (Marine).
 - 3 Kirimanjeshwar Fishermen Co-operative Society (Marine).
 - 4 Maravanthe Fishermen Co-operative Society (Marine).
 - 5 Gangoli Fishermen Co-operative Society (Marine).
 - 6 Manoor Fishermen Co-operative Society (Marine).
 - 7 Bijady Fishermen Co-operative Society (Marine).
 - 8 Hangercutta Fishermen Co-operative Society (Marine).
 - 9 Barkur Fishermen Co-operative Society (Marine).
 - 10 Kodi Fishermen Co-operative Society (Marine).
 - 11 Padu Thonse Fishermen Co-operative Society (Marine).
 - 12 Malpe Fishermen Co-operative Society (Marine).
 - 13 Udiawar Moger's Fishermen Co-operative Society (Marine).
 - 14 Kaipunjai Fishermen Co-operative Society (Marine).
 - 15 Mulur Fishermen Co-operative Society (Marine).
 - 16 Bada Yerumal Fishermen Co-operative Society (Marine).
 - 17 Tenka Yerumal Fishermen Co-operative Society (Marine).
 - 18 Polippu Fishermen Co-operative Society (Marine).
 - 19 Kaup Fishermen Co-operative Society (Marine).
 - 20 Padubidri Fishermen Co-operative Society (Marine).
 - 21 Sashhiliu Fishermen Co-operative Society (Marine).
 - 22 Hejmady Fishermen Co-operative Society (Marine).
 - 23 Moolky Fishermen Co-operative Society (Marine).
- Mangalore Section.*
- 24 Iddya Moger's Fishermen Co-operative Society (Marine).
 - 25 Hosabettu Fishermen Co-operative Society (Marine).
 - 26 Baikampadi Fishermen Co-operative Society (Marine).
 - 27 Thanneerbhavi Fishermen Co-operative Society (Marine).
 - 28 Mangalore Mogaveera Fishermen Co-operative Society (Marine).
 - 29 Mangalore Bengre Fishermen Co-operative Society (Marine).
 - 30 The South Kanara District Co-operative Fish Marketing Society, Mangalore (Marine).
 - 31 Ullal Fishermen Co-operative Society, Mangalore (Marine).
 - 32 Uchil Bovis Fishermen Co-operative Society (Marine).
 - 33 Aila Bovis Fishermen Co-operative Society (Marine).
 - 34 Manjeshwar Fishermen Co-operative Society (Marine).
 - 35 Udiawar Bovis Fishermen Co-operative Society (Marine).
 - 36 Kumbha Fishermen Co-operative Society (Marine).
 - 37 Kavugoli Fishermen Co-operative Society (Marine).
 - 38 Kasaragode Fishermen Co-operative Society (Marine).
 - 39 Poonjavi Fishermen Co-operative Society (Marine).
 - 40 Kizhur Fishermen Co-operative Society (Marine).
 - 41 Kotikulam Fishermen Co-operative Society (Marine).
 - 42 Bekal Fishermen Co-operative Society (Marine).
 - 43 Manikoth Bovis Fishermen Co-operative Society (Marine).
 - 44 Ajanur Fishermen Co-operative Society (Marine).

APPENDIX XIII—*cont.*

- 45 Kanhangad Fishermen Co-operative Society (Marine).
- 46 Nileshtar Fishermen Co-operative Society (Marine).
- 47 Nileshtar Bovis Fishermen Co-operative Society (Marine).
- 48 Kadangot Bovis Fishermen Co-operative Society (Marine).
- 49 Padne Kadapuram Fishermen Co-operative Society (Marine).
- 50 Udinoorkadapuram Fishermen Co-operative Society (Marine).
- 51 Trikarpur Bovis Fishermen Co-operative Society (Marine).
- 52 Kavvayi Fishermen Co-operative Society (Marine).
- 53 Madai Fishermen Co-operative Society (Marine).
- 54 Azhicode Fishermen Co-operative Society (Marine).
- 55 Muzhappilangad Moger's Fishermen Co-operative Society (Marine).
- 56 Cannanore Women Fish Curers' Co-operative Society (Marine).
- 57 Thayyil Fishermen Co-operative Society (Marine).
- 58 'Thayyil Fishing Net-Makers' Society (Marine).
- 59 Dharmadam Fishermen Co-operative Society (Marine).
- 60 Tellicherry Women Fishing Net Makers' Co-operative Society, (Marine).
- 61 'Tellicherry Fish Curers' Co-operative Society (Marine).
- 62 'Tellicherry Aryajana Fishermen Co-operative Society (Marine).
- 63 Thalayi Fish Curers' Co-operative Society (Marine).
- 64 Azhiyoor Fishermen Co-operative Society (Marine).
- 65 Madakkara Mukkuva Fishermen Co-operative Society (Marine).
- 66 Madapilli Fish Curers' Co-operative Society (Marine).
- 67 Kuriyadi Fishermen Co-operative Society (Marine).
- 68 Meladi Fishermen Co-operative Society (Marine).
- 69 Kollam Fishermen Co-operative Society (Marine).
- 70 Quilandy Fishermen Co-operative Society (Marine).
- 71 Tikkodi Fishermen Co-operative Society (Marine).
- 72 Velloor Moger's Fishermen Co-operative Society (Marine).
- 73 Kannan Kadavu Fishermen Co-operative Society (Marine).
- 74 Vengalam Fishermen Co-operative Society (Marine).
- 75 Elathur Fishermen Co-operative Society (Marine).
- 76 Pudiappa Fishermen Co-operative Society (Marine).
- 77 Kozhikode (North) Fish Curers' Co-operative Society (Marine).
- 78 Kozhikode Fishermen Co-operative Society (Marine).
- 79 Kozhikode Women Fish Net Makers' Co-operative Society, (Marine).
- 80 Naduvattam Fishermen Co-operative Society, (Marine).
- 81 Chaliyam Fishermen Co-operative Society (Marine).
- 82 Kadalundi Fishermen Co-operative Society (Marine).
- 83 Parappanangadi Fishermen Co-operative Society (Marine).
- 84 Aryan Kadapuram Fishermen Co-operative Society (Marine).
- 85 Pudia Kadapuram Fishermen Co-operative Society (Marine).
- 86 Paravanna Fishermen Co-operative Society (Marine).
- 87 Koottayi Fishermen Co-operative Society (Marine).
- 88 Ponnani Fishermen Co-operative Society (Marine).
- 89 Kodavanad Fishermen Co-operative Society (Marine).
- 90 Puduponnani Fishermen Co-operative Society (Marine).
- 91 Vellangode Fishermen Co-operative Society (Marine).
- 92 Palapatty Fishermen Co-operative Society (Marine).
- 93 Mannalamkunnu Fishermen Co-operative Society (Marine).
- 94 Tirunallur Fishermen Co-operative Society (Marine).
- 95 Puttenkadapuram Fishermen Co-operative Society (Marine).
- 96 Kadapuram Fishermen Co-operative Society (Marine).
- 97 Blangad Arya Jana Fishermen Co-operative Society (Marine).
- 98 Pallikadavu Kaivarthajana Fishermen Co-operative Society (Marine).
- 99 Chettuvayi Kaivarthajana Fishermen Co-operative Society (Marine).
- 100 Engandiyoor Devarajana Fishermen, Co-operative Society (Marine).
- 101 Engandiyoor South Kaivarthajana Fishermen Co-operative Society (Marine).

APPENDIX XIII—*cont.*

- 102 Talikulam Kaivarthajana Fishermen Co-operative Society (Marine).
- 103 Vatanapalli Kaivarthajana Fishermen Co-operative Society (Marine).
- 104 Talikulam South Mukkuva Kaivarthajana Fishermen Co-operative Society (Marine).
- 105 Talikulam Muslim Fish Traders' Co-operative Society (Marine).
- 106 Arrekara Bhagavathi Fishermen Co-operative Society (Marine).
- 107 Nattika South Arayajana Fishermen Co-operative Society (Marine).
- 108 Kodumbi Aryajana Fishermen Co-operative Society (Marine).
- 109 Pallipuram Arayajana Fishermen Co-operative Society (Marine).
- 110 Chandrappini Arayajana Fishermen Co-operative Society (Marine).
- 111 Vekkade Arayajana Fishermen Co-operative Society (Marine).
- 112 Perinchanam Arayajana Fishermen Co-operative Society (Marine).
- 113 Fort Cochin Arayajana Fishermen Co-operative Society (Marine).
- 114 Kozhikode South Beach Arayajana Fishermen Co-operative Society (Marine).
- 115 Palghat Inland Arayajana Fishermen Co-operative Society (Inland).

East Coast.

3. Vellore Region.

Madras district.

- 1 Kasimode Fishermen Co-operative Society (Marine).
- 2 Kasipuram Fishermen Co-operative Society (Marine).
- 3 Rayapuram Fishermen Co-operative Society (Marine).
- 4 Triplicane Fishermen Co-operative Society (Marine).
- 5 Mattan Kupam Fishermen Co-operative Society (Marine).
- 6 South Madras Fishermen Co-operative Society (Marine).
- 7 Nochi Kupam Fishermen Co-operative Society (Marine).
- 8 Uroor Kupam Fishermen Co-operative Society (Marine).
- 9 Narayanaswami Garden Inland Fishermen Co-operative Society (Marine).

Chingleput district.

- 10 Pulicat Fishermen Co-operative Society (Marine).
- 11 Vallambedu Bharathavar Fishermen Co-operative Society (Marine).
- 12 Ennore Fishermen Co-operative Society (Marine).
- 13 Thiruvottiyur Fishermen Co-operative Society (Marine).
- 14 Tiruchira Kupam Fishermen Co-operative Society (Marine).
- 15 Tiruvannamiyoor Fishermen Co-operative Society (Marine).
- 16 Neelankarai Fishermen Co-operative Society (Marine).
- 17 Kanthu Reddi Kupam Fishermen Co-operative Society (Marine).
- 18 Padur Fishermen Co-operative Society (Inland).
- 19 Mahabalipuram Fishermen Co-operative Society (Marine).
- 20 Uyyalur Kupam Fishermen Co-operative Society (Marine).
- 21 Sadras Fishermen Co-operative Society (Marine).
- 22 Pudupattanam Fishermen Co-operative Society (Marine).
- 23 Kadalur Periakuppam Fishermen Co-operative Society (Marine).
- 24 Kadapakkam Fishermen Co-operative Society (Marine).
- 25 Karunguzhi Fishermen Co-operative Society (Inland).
- 26 Uthiramerur Fishermen Co-operative Society (Inland).
- 27 Tenpakkam Fishermen Co-operative Society (Inland).
- 28 Iyengarkulam Fishermen Co-operative Society (Inland).
- 29 Kancheepuram Fishermen Co-operative Society (Inland).
- 30 Wallajabad Fishermen Co-operative Society (Inland).
- 31 Sriperumbudur Fishermen Co-operative Society (Inland).
- 32 Poonamallee Fishermen Co-operative Society (Inland).
- 33 Poondi Fishermen Co-operative Society (Inland).
- 34 Kalpakkam Fishermen Co-operative Society (Marine).

APPENDIX XIII—*cont.*

North Arcot district.

- 35 Polur Sembadayar Fishermen Co-operative Society (Inland).
- 36 Kaveripauk Fishermen Co-operative Society (Inland).
- 37 Wallajapet Fishermen Co-operative Society (Inland).
- 38 Vengalathur Fishermen Co-operative Society (Inland).

4. *Tanjavoor Region.*

South Arcot district.

- 39 Chidambaram Parvatharajakulam Taluk Fishermen Co-operative Society (Inland).
- 40 Vallampadugu Fishermen Co-operative Society (Inland).
- 41 Kurunjipadi Fishermen Co-operative Society (Inland).
- 42 Lalpet Fishermen Co-operative Society (Inland).
- 43 Kattumannargudi Fishermen Co-operative Society (Inland).
- 44 Udayangudi Fishermen Co-operative Society (Inland).
- 45 Killai Fishermen Co-operative Society (Marine).
- 46 Thandavaraya Sholagarpettai Fishermen Co-operative Society (Marine).
- 47 Porto Novo Fishermen Co-operative Society (Marine).
- 48 Tindivanam Fishermen Co-operative Society (Marine).
- 49 Kaipanikuppam Fishermen Co-operative Society (Marine).
- 50 Hanumanthakuppam Fishermen Co-operative Society (Marine).
- 51 Koonimedu Fishermen Co-operative Society (Marine).
- 52 Mudaliar Chavadi Fishermen Co-operative Society (Marine).
- 53 Chellamkuppam Fishermen Co-operative Society (Marine).
- 54 Tiruppapuliur Fishermen Co-operative Society (Inland).
- 55 Ilinjanpettai Fishermen Co-operative Society (Inland).
- 56 Uppalavadi Fishermen Co-operative Society (Inland).
- 57 Sivanarpuram Fishermen Co-operative Society (Inland).
- 58 Sonankuppam Fishermen Co-operative Society (Marine).
- 59 Kodaiampalayam Sea Fishermen Co-operative Society (Marine).
- 60 Tiruvotti Fishermen Co-operative Society (Inland).
- 61 Tirukkoilur Fishermen Co-operative Society (Inland).

Tanjavoor district.

- 62 Tirumalaivasal Fishermen Co-operative Society (Inland).
- 63 Kaveripatnam Sea Fishermen Co-operative Society (Marine).
- 64 Koolaiyur Sea Fishermen Co-operative Society (Marine).
- 65 Tiruvanagiri Sea Fishermen Co-operative Society (Marine).
- 66 Madathukuppam Sea Fishermen Co-operative Society (Marine).
- 67 Tranquebar Sea Fishermen Co-operative Society (Marine).
- 68 Perumalpettai Sea Fishermen Co-operative Society (Marine).
- 69 Chandrapadi Sea Fishermen Co-operative Society (Marine).
- 70 Akkarapettai Sea Fishermen Co-operative Society (Marine).
- 71 Nambiarnagar Fishermen Co-operative Society (Marine).
- 72 Sambandanpettai Sea Fishermen Co-operative Society (Marine).
- 73 Thuraikadu Sea Fishermen Co-operative Society (Marine).
- 74 Vedaranyam Arcot Street Sea Fishermen Co-operative Society (Marine).
- 75 Kodiakurai and Kodiakadu Sea Fishermen Co-operative Society (Marine).
- 76 Pettai Jambuvanodai Sea Fishermen Co-operative Society (Marine).
- 77 Eripurakkurai Sea Fishermen Co-operative Society (Marine).
- 78 Karayur Fishermen Co-operative Society (Marine).
- 79 Muthukuda Sea Fishermen Co-operative Society (Marine).
- 80 Kattumavadi Jambuga Mahadevapatnam Sea Fishermen Co-operative Society (Marine).
- 81 Pudukudi Sea Fishermen Co-operative Society (Marine).
- 82 Pudupatnam Sea Fishermen Co-operative Society (Marine).
- 83 Tanjavoor Parvatharajakula Fishermen Society (Inland).
- 84 Kumbakonam Parvatharajakula Fishermen Society (Inland).
- 85 Papanasam Parvatharajakula Fishermen Society (Inland).

APPENDIX XIII—*cont.*5. *Mathurai Region.*

Ramanathapuram District.

- 86 Rajapalayam Fishermen Co-operative Society (Inland).
- 87 Mukkaiyur (Mukkur) Fishermen Co-operative Society (Marine).
- 88 Pasipatnam Fishermen Co-operative Society (Marine).
- 89 Tiruppalakudi Fishermen Co-operative Society (Marine).
- 90 Thondi Fishermen Co-operative Society (Marine).
- 91 Nambuthalai Fishermen Co-operative Society (Marine).
- 92 Mullimunai Fishermen Co-operative Society (Marine).
- 93 Karangadu Fishermen Co-operative Society (Marine).
- 94 Devipatnam Fishermen Co-operative Society (Marine).
- 95 Ranaikulam Fishermen Co-operative Society (Marine).
- 96 Muthupettai Fishermen Co-operative Society (Marine).
- 97 Irumeni Fishermen Co-operative Society (Marine).
- 98 Attankarai Fishermen Co-operative Society (Marine).
- 99 Irumeni Fishermen Co-operative Society (Marine).
- 100 Mandapam Fishermen Co-operative Society (Marine).
- 101 Thangachimadam Fishermen Co-operative Society (Marine).
- 102 Rameswaram Fishermen Co-operative Society (Marine).
- 103 Dhanushkodi Fishermen Co-operative Society (Marine).
- 104 Keelakarai Fishermen Co-operative Society (Marine).
- 105 Watrap Fishermen Co-operative Society (Marine).
- 106 Tiruppuvanam Fishermen Co-operative Society (Inland).

Mathurai District.

- 107 Palani Fishermen Co-operative Society (Inland).
- 108 Periyakulam Fishermen Co-operative Society (Inland).

Coimbatore District.

- 109 Harale Fishermen Co-operative Society (Inland).
- 110 Kilwani Fishermen Co-operative Society (Inland).

6. *Tuticorin Region.*

Tirunelveli District.

- 111 Tuticorin Fishermen Co-operative Society (Marine).
- 112 Pinnakayal Fishermen Co-operative Society (Marine).
- 113 Veerapandiapatnam Fishermen Co-operative Society (Marine).
- 114 Alanthalai Fishermen Co-operative Society (Marine).
- 115 Manapad Fishermen Co-operative Society (Marine).
- 116 Periaithalai Fishermen Co-operative Society (Marine).
- 117 Ovari Fishermen Co-operative Society (Marine).
- 118 Koottapulli Fishermen Co-operative Society (Marine).
- 119 Tenkasi Fishermen Co-operative Society (Inland).
- 120 Periasamipuram Fishermen Co-operative Society (Inland).
- 121 Terku Kallikulam Fishermen Co-operative Society (Inland).
- 122 Seruthamangalam Fishermen Co-operative Society (Inland).
- 123 Melapavoor Fishermen Co-operative Society (Inland).

Mettur Dam Region.

Salem district.

- 124 Mettur Dam Fishermen Co-operative Society (Inland).

APPENDIX XIV.

LIST OF FISHERIES SCHOOLS RUN BY THE MADRAS FISHERIES DEPARTMENT.

West Coast.

1. South Kanara.

1 Kasarakodi	..	..	..
2 Hadavinakone	..	..	..
3 Tarapathi	..	..	..
4 Kirimanjeshwar	..	..	..
5 Navunda	..	Higher Elementary.	..
6 Manoor	..	..	..
7 Kodi	..	..	..
8 Hungarcutta	..	..	..
9 Uppoor	..	..	..
10 Malpe	..	High School (VI Form opened).	..
11 Malpe	..	Newly opened.	..
12 Udiawar West	..	..	..
13 Polippu	..	Higher Elementary.	..
14 Kaup	..	..	..
15 Mooloor	..	..	..
16 Yermal	..	..	..
17 Yermal South	..	Newly opened.	..
18 Pavalidu	..	..	..
19 Hejmadikodi	..	Higher Elementary.	..
20 Sandspit	..	..	..
21 Sri Gnanodaya	..	..	..
22 Kumbala	..	..	..
23 Adakathabail	..	..	..
24 Kizhur	..	Higher Elementary (VI Standard opened).	..
25 Bekal	..	High School (VI Form opened).	..
26 Bekal	..	Newly opened.	..
27 Ajanur	..	..	..
28 Hosdrugadapuram	..	..	..
29 Kanhangad	..	Higher Elementary.	..
30 Cheruvathur	..	..	..
31 Udinoorkadapuram	..	..	..
32 Thaikadapuram	..	Newly opened.	..

2. Malabar.

33 Kavvayi	..	..	..
34 Azhicode	..	..	..
35 Madakkara	..	..	..
36 Madapalli	..	Newly bifurcated.	..
37 Madapalli	..	High School.	..
38 Kuriyadi	..	..	..
39 Meladi	..	..	..
40 Quilandi	..	Higher Elementary.	..
41 Kannankadavu	..	..	..
42 Korapuzha	..	..	..
43 Pudiappa	..	Higher Elementary.	..
44 Vellayil	..	Higher Elementary.	..
45 Naduvattam	..	..	..
46 Chaliyam	..	..	..

APPENDIX XIV—cont.

47 Kadalundi	..	..	..
48 Parappannangadi	..	..	..
49 Ponnani	..	..	..
50 Puduponnani	..	..	..
51 Kadavanad	..	Higher Elementary.	..
52 Veliangode	..	..	..
53 Palappetty	..	Higher Elementary.	..
54 Mannalamkunnu	..	..	..
55 Puthendkadapuram	..	..	..
56 Blangad	..	..	..
57 Kottakadapuram	..	Higher Elementary.	..
58 Kundazhiyur	..	..	..
59 Talikulam	..	..	..
60 South Nattika	..	Newly bifurcated.	..
61 South Nattika	..	Middle School (Newly converted).	..
62 Pallipuram	..	..	..
63 Kaipamangalam	..	Higher Elementary.	..
64 Vekkode	..	..	..
65 Kadapuram	..	..	..

East Coast.

3. Vellore.

66 Sathankuppam	..	..	..
67 Amanalichikuppam	..	..	..
68 Alambaraikuppam	..	Newly opened.	..

4. Tanjore.

69 Kaveripatnam	..	..	..
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Adult Night Schools.

Vellore.

70 Santhankuppam	..	..	..
71 Thelankuppam	..	Closed.	..
72 Doominkuppam	..	Do.	..

APPENDIX XV.

STATEMENT OF EXPENDITURE AND RECEIPTS OF THE FISHERIES DEPARTMENT
FOR THE YEAR 1954-55.

40. Agriculture—XXXIX. Agriculture.

Head of account.	Expenditure.		Receipts.		Profit/Loss.
	“m. Fisheries”		“b. Fisheries”		
	RS.	A. P.	RS.	A. P.	RS. A. P.
(a) Direction	88,491	10 5	..	..	
(b) Pearl and Chank Fisheries	3,09,117	13 3	13,46,422	5 0	
(c) West Coast Fisheries	27,290	9 0	..	..	
(d) Technological Institute, Tuticorin.	437	12 3	..	..	
(e) Inland Fisheries	2,05,034	9 7	1,98,430	7 8	
(f) Exploitation of Mettur Reservoir Fisheries.	1,33,658	13 3	1,21,253	3 5	
(g) Inland Fisheries Research including Chetput Farm and Statistical Station.	28,818	12 8	..	..	
(h) Oyster Farm, Pulicat	1,399	8 0	2,866	14 0	
(j) Marine Biological Section and Aquarium.	65,109	8 10	9,637	14 0	
(k) Manufacture of semi-dried prawns.	6,900	9 6	10,051	10 9	
(l) Minor Carp Fish Farm at Ooty ..	12,851	0 3	8,951	15 3	
(m) Fish Preservation and transport ..	23,765	11 0	11,265	1 6	
(n) Fishery Marketing and Information.	33,048	5 8	..	..	
(o) Rural Fishery Demonstration Units.	1,30,919	8 5	29,093	12 8	
(p) Fisheries Schools	4,81,599	8 10	..	..	
(q) Development of Hope Lake ..	4,528	2 0	..	..	
(r) Madras Rural Pisciculture Research Scheme (Fresh-water Biological Station).	24,512	13 9	..	..	
(s) Scheme for Marine Fishery development with T.C.A. aid.	7,399	14 3	617	8 0	
(t) Schemes financed wholly or partly by I.C.A.R. Collection of marine fishery statistics.	10,994	8 3	10,994	8 3	
(u) Scheme for the provision of Technical Assistance by F.A.O.	38,829	12 11	7,712	1 9	
Total ..	16,34,688	14 1			

“N” Works.

C. Fisheries	129	3 0	..
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APPENDIX XV—cont.
O. DEVELOPMENT SCHEMES.

(i) Schemes included in the Five-Year Plan.

Head of account.	Expenditure.		Receipts.		Profit/Loss.
	RS.	A. P.	RS.	A. P.	RS. A. P.
<i>G. Fisheries—</i>					
(i) Deep-sea fishing	1,07,569	2 7	21,029	12 9	
(ii) Installation of ice-making plant for providing cold storage for fish.	17,400	11 0	..	..	
(iii) Fishcuring yards	5,00,115	1 0	3,40,647	9 10	
(iv) Intensive cultivation schemes Headquarters staff.	6,270	8 0	..	..	
(v) Intensive seed collection and distribution for stocking inland waters.	1,33,950	11 0	11,674	10 6	
(vi) Improvement of indigenous craft and tackle.	76,735	7 4	12,326	14 11	
(vii) Provision of quick transport facilities.	27,886	0 1	4,784	15 9	
(viii) Sale of proceeds of yarn and other essential materials.	..	..	17,546	2 6	

(ii) Other Development Schemes.

<i>D. Fisheries—</i>					
(i) Public Health	5,806	15 9	..	..	
(ii) Fisheries Technological Station, Kozhikode.	36,983	7 7	508	2 6	
(iii) Fisheries Engineering staff ..	6,833	15 0	..	..	
(iv) Fisheries Demonstration Factories.	18,751	7 7	19,651	9 9	
Receipts of overpayments	..	..	1,596	0 9	
Collection of payments for service rendered.	..	..	50	6 0	
Rent on buildings	..	..	1,720	7 0	
Miscellaneous	..	..	45,516	12 7	
Other receipts	..	..	551	15 0	
(v) Fisheries Welfare Scheme ..	32,492	10 0	..	..	
(vi) Nilgiris fisheries	..	..	3,340	8 0	
Deduct—Refunds	..	..	—1,789	5 1	
Grand total ..	26,05,614	7 2	22,36,752	1 1	(-) 3,68,862 6 1
Deduct—Charges on Supervision, Education, Welfare, Engineering and Research Schemes which are of developmental nature but not profit-making.	6,68,944	0 8	..	..	(-) 6,68,955 0 8
Hence Nett Profit ..	19,36,670	6 6	2,236,752	1 1	3,00,081 10 7



AGRICULTURE DEPARTMENT

G.O. No. 434, 17th February 1956

Administration Report—Fisheries—1954-55—Recorded with remarks.

READ—the following paper:—

Letter from the Additional Director of Industries and Commerce,
dated 2nd December 1955, No. 8960-Q2/55.

Order—No. 434, Agriculture, dated 17th February 1956.

The report on the working of the Fisheries Department during the year 1954-55 submitted by the Additional Director of Industries and Commerce is recorded with the remarks given below.

2. *Administration.*—The year under report was the second year after the Fisheries Department was amalgamated with the Department of Industries and Commerce, and brought under the control of the Director of Industries and Commerce. Sri E. P. Royappa, I.A.S., the Director of Industries and Commerce, continued to be in charge of the department till Sri T. K. Palaniappan, I.A.S., took charge as the Director of Industries and Commerce on 10th December 1954.

During the year under review the following schemes included in the Five-Year Plan were continued besides the several other development and socio-economic and welfare schemes:—

- (a) Intensive Seed Collection and Distribution Scheme.
- (b) Salt Subsidy Scheme.
- (c) Deep-sea Fishing Scheme.
- (d) Scheme for improvement of indigenous craft and tackles.
- (e) Scheme for the provision of quick transport facilities.
- (f) Fish preservation and transport—Provision of Ice Plant and Cold Storage Scheme.

3. *A. Fisheries Research.*—Marine Biological Research at the four stations at West Hill (Kozhikode), Ennore, Tuticorin and Krusadai was continued satisfactorily during the year. Besides, a scheme sponsored by the Indian Council of Agricultural Research for evolving a suitable sampling technique was also worked at the West Hill Station and the data collected were forwarded to the Indian Council of Agricultural Research for drawing conclusions. However, it is pointed out that instead of drawing up a comprehensive programme of research work covering too many subjects of more academic interest and conducting research accordingly, attention should be concentrated on problems closely connected with the day-to-day fishery development activities of the Department. Further, the data available should be put to use instead of allowing them to accumulate. The Additional Director of Industries and Commerce is requested to take suitable action in this regard.

B. Inland Fishery Research.—This was carried on satisfactorily at the Fresh Water Biological Station, Bhavanisagar, during the year under review. A study on pollution of inland waters such as the Bhavani and Cauvery rivers by effluent waters from factories was conducted and remedial measures suggested to the factory authorities. The Department should see that those remedial measures are carried out by the factory authorities in order to avoid any large-scale mortality of fish due to pollution of water.

C. Fisheries Technological Research.—The Government note that Fisheries Technological Research was continued during the year at the only Fisheries Technological Station, namely, that at Kozhikode and that the Home Economics Section of the Station prepared large number of varieties of new dishes of fish using different types of recipes and several kinds of fish biscuits. But it is observed that publicity given to the method of preparing several dishes by using different types of recipes was inadequate. The feasibility of producing biscuits on a large scale for regular sale in markets should also be examined thoroughly. It is gratifying to note that several firms in the West Coast have availed themselves of the facilities available at the station for analytical study of fish products during the year.

D. F.A.O. Aid.—Under the F.A.O. Aid, the Department availed of the services of two F.A.O. Experts, viz., Mr. G. S. Illugason, a Fisheries Engineer, and Mr. Paul Ziener, a Naval Architect. Mr. Ziener conducted a thorough survey of the available fishing crafts with a view to select the most suitable of the existing fishing boat designs for purposes of motorization and also solved the difficult problem of evolving a suitable design of Beach Landing Craft to replace the catamaran. Two Danish Boats were also received and they were put to good use. On the whole, it is gratifying to note that the year under review marked an appreciable progress in Fisheries Technology and a favourable reaction among the fishermen in favour of the modern mechanized fishing crafts and tackles.

4. Schemes included in the First Five-Year Plan—(a) Intensive Seed Collection and Distribution Scheme.—During the year under review the total number of seeds collected exceeded the target fixed and that several new collection centres were located. On the whole, 61,379,525 fish seeds were collected during the year. The scheme should be continued with vigour as the successful development of inland fisheries mostly depend on the availability of suitable fish seeds.

(b) Salt Subsidy Scheme.—The Government note that the target fixed under this scheme was not achieved during the year under review, attributed partly to a poor fishing season. Every effort should be made to achieve the target in each and the variation in results should be explained.

(c) Deep-sea Fishing Scheme.—The Government appreciate the increase in the total quantity of fish caught under this scheme during the year, it being 449,270 lb. as against 196,901 lb. during 1953-54. But the receipts realized from the catches do not show a proportionate increase. This should be investigated. Any leakages in revenue should be put down by taking stern measures. The expenditure should also be kept down to the barest minimum. The vessels and other equipments received under the T.C.M. and F.A.O. Aids should be made use of fully for the better working of the scheme. The Government hope that the scheme would show better results in the coming years failing which the scheme may have to be closed down.

(d) Scheme for the improvement of indigenous crafts and tackles.—The Government observe that the Department did not succeed again during the year under review in inducing the fishermen co-operative societies, individual fishermen, or groups to take on hire or loan all the mechanized boats under this scheme as it is seen that except one or two of these boats all were engaged in mere demonstration fishing at different centres. As more number of such motorized boats will be built by the Department for distribution among fishermen it is essential that effective steps should be taken to create a favourable response to this scheme.

(e) Scheme for the quick transport facilities.—The Government observe that the target fixed under this scheme for the year under review was not achieved. They, however, feel that a more judicious distribution of the motor vans, taking into account the heaviness of catches and the distance of the markets would result in better results. The Additional Director of Industries and Commerce is requested to take suitable action in this regard.

(f) Fish preservation and transport.—The construction of the Ice plant-cum-cold storage plant at West Hill, Kozhikode, was completed during the year and trial run was started. The plant at Mangalore was nearing completion. The plant at Kozhikode has been leased out to a private firm. The department should see that the lessees of the plant make available sufficient quantity of ice at reasonable prices and provide storage facilities to the local fishermen.

5. Development and exploitation—A. Marine Fisheries.—(i) Pearl Fisheries.—The Government note with satisfaction that the time-honoured Pearl Fishery off Tuticorin coast was revived towards the end of the year (i.e., 18th March 1955) onwards after a lapse of more than 25 years. There was a receipt of Rs. 1,46,000 against an expenditure of Rs. 48,000. The fishery would have been more successful and the receipts better but for labour trouble by the divers which was not successfully tackled in advance by the Department. Pearl fishing should be made an annual feature in order to bring more revenue to the Department by systematic inspection of pearl banks and proper supervision.

(ii) Chank Fishery.—The Government note that there was a decline in catches of the chanks during the year, the total catches being 4,03,860 against 9,16,080 during 1953-54, which is partly explained by the pearl fishing which drew off some divers. The Additional Director of Industries and Commerce is requested to see that better results are shown during the coming years.

(iii) Fish-curing yards.—The year under review marked a decrease in yard transactions throughout the State except in Tanjore and Tuticorin regions due to poor fishing season as well as slight increase in the issue price of salt. It is seen from the report that curers in their eagerness for economy have resorted to private curing under unhygienic conditions. It is the duty of the department to dissuade the curers from resorting to such unhygienic private curing in order to ensure that fish cured under unhygienic conditions is not sold and also to increase the yard transactions. The Government also note that there was considerable increase in the wastage of salt in yards during the year which works out to 58 maunds as against 23 maunds in 1953-54. The Additional Director of Industries and Commerce is requested to see that this waste is avoided in future. The Government appreciate the increase in the shark liver oil produced during the year under report.

(iv) Fisheries demonstration factories.—Owing to poor fishing, there was a slight decrease in the output of fishmeal and fish-manure in the Fisheries demonstration factories during the year, the output being 55,954 lb. of fish-manure and 12,167 lb. of fishmeal as against 60,095 lb. of fish-manure and 17,097 lb. of fishmeal during 1953-54. The Government hope that better results will be achieved during the coming years.

There was an increase in the quantity of semi-dried prawns produced in Fisheries Demonstration Factories, during the year, the total quantity being 3,957 lb. as against 3,787 lb. during 1953-54. As there is still more scope for the improvement of this industry consequent on the availability of a very potential shrimp (prawn) fishery in the West Coast, every effort should be made to exploit the same to the maximum extent possible.

B. Inland Fisheries.—(i) Licensing system of fishing.—The Government note the successful working of the licensing system of fishing in several waters in the State and also the appreciable increase in the receipts realized by way of licence fees during the year, the receipts being Rs. 32,508 during the year under review as against Rs. 20,758 during 1953-54. The Government also note the increase in the revenue realized from the several State-owned waters during the year under review, the revenue being Rs. 1,58,293 as against Rs. 1,30,074 during 1953-54.

(ii) *Rural Fishery Demonstration Units*.—The several Rural Fishery Demonstration Units spread all over the State continued to function satisfactorily during the year. Though demonstration of scientific methods of pisciculture, is the primary object of the scheme, every effort should be made to augment the receipts and to make it a self-supporting scheme, in the coming years.

(iii) *Mettur Reservoir Fisheries*.—Towards the end of the year (i.e., in March 1955) the departmental procurement of fish from licensees was discontinued. The very object of the departmental procurement of fish was to ensure the fishermen (the licensees) a reasonable price for their catches and to make fresh water fish available to the public. Inasmuch as the departmental procurement has been discontinued the Department should make efforts to see that the licensees are not unduly exploited by the private fish traders and no scarcity is felt for fresh fish. The feasibility of starting a co-operative society of the licensees for marketing their catches should also be examined.

The Government note with concern the failure of the paddy-cum-fish culture scheme launched in July 1954 in an area of 300 acres in Tanjore. However they hope that the Department would take necessary steps to remedy the defects in order to work the scheme to a successful conclusion.

The Government also note the successful working of the *Gourami Popularization Scheme*. The *Scheme for fish culture* in backyard wells should be continued with vigour as it would augment the fish production at negligible cost.

6. *Fish Marketing and Information*.—The Government note the increase in the revenue by way of hire charges on the fish transport van, and the quantity of fish marketed in Madras City during the year. The question of improving the conditions of fish market has been engaging the attention of the Department. During the year the small Aquarium started on the Marina progressed satisfactorily. Several new varieties of pet fishes from Ceylon were added to the exhibits. The Department took part in about 30 exhibitions during the year at different centres. The Biological Supplies unit at Ennore continued to supply specimens to the various institutions in the country. It is gratifying to note that during the year a number of publications were issued by the various Research Officers of the Department.

7. *Socio-Economic and other Welfare Scheme*—(i) *Fishermen Co-operative Societies*.—The Government note the increase in the number of fishermen co-operative societies during the year the total being 234 besides 4 cottage industries co-operative societies as against 231 during the previous year. However, complaints are often heard that many of the Fishermen Co-operative Societies are ill-managed. The Department should take steps to do away with all mal practices in the running of these societies. The organization of more number of cottage industries co-operative societies of fishermen should be pursued with vigour as it would help to augment the income of fishermen and also provide occupation during off-season.

(ii) *Fishery education*.—The Government note the satisfactory working of 69 fishery schools, consisting of 3 high schools, 1 middle school, 13 higher elementary schools and 52 lower elementary schools during the year. During the year grants were given to fishermen affected by cyclone in South Kanara district and the question of providing alternate house sites to those fishermen rendered homeless due to sea erosion north of Madras was taken up and pursued. The Department also solved the problem of drinking water-supply to the fishermen of Indindakarai in Tirunelveli district. The Department made arrangements with the Meteorological Department for the communication of weather warning message to the headmen of the fishing villages in this State for being communicated to the fishermen.

(iii) *Community Project and National Extension Service Scheme*.—The Government note that the Department played a useful role in the development of fisheries in the Community Project and National Extension Service Scheme areas but more remains to be done. Adequate attention may be given to these areas.

8. *Finance*.—The total revenue of the Department for the year under review was Rs. 22,36,752-1-0 and the expenditure Rs. 26,05,614-7-0 as against the revenue of Rs. 21,21,600 and expenditure of Rs. 28,78,000 for the previous year. The increase in revenue and the decrease in expenditure are gratifying. They also hope that the deficit will be reduced still further by increasing the yield from several schemes now working and by preventing leakages of revenue, if any. They also stress the necessity to minimize the expenditure to the extent possible.

The Government note that in the present report several omissions pointed out in the Government's review of the previous reports, have been rectified. The present report does not however contain a preliminary chapter giving the salient features of the administration of the Department written personally by the Director and a glossary explaining the various Latin terms and their corresponding local names. The future reports should rectify these omissions.

9. *General*.—The working of the Department is satisfactory. The deep-sea fishing operations which have immense possibility should be more efficient and profit yielding. Biological research and technological improvement should be co-ordinated and raised to a higher tempo and the training of personnel should be given special importance. Systematic survey of in-shore and off-shore fisheries should be taken up and the craft and tackles obtained under the F.A.O. and T.C.M. aids should be put to the best use. Inland fisheries should be augmented and adequate and efficient marketing arrangements should be made. On the eve of the Second Five-Year Plan which contemplates bigger schemes of fisheries development, the Government trust that the Department will rise to the occasion and contribute to the fisheries development of the State.

(By order of the Governor)

N. MURUGESA MUDALIAR,
Deputy Secretary to Government.

To Sri S. Aruldas, I.A.S., Additional Director of Industries and Commerce, Madras.
,, the Controller of Stationery and Printing, Madras.



**LIST OF AGENTS FOR THE SALE OF MADRAS
GOVERNMENT PUBLICATIONS.**

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