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Madras Fisheries Dept.

Admin. Report 1933-34

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Madras Fisheries Department

ADMINISTRATION REPORT FOR THE YEAR 1933-34

BY

DR. B. SUNDARA RAJ, M.A., PH.D.,
Director of Fisheries

MADRAS

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FISHERIES DEPARTMENT.

Subject.

Fisheries—Administration Report—1933-34—Submission of.

Ref. No. 2211 G/34.

STATION, MADRAS.

Dated the 31st October 1934.

From

DR. B. SUNDARA RAJ, M.A., PH.D.,

DIRECTOR OF FISHERIES,

MADRAS,

To

THE SECRETARY TO THE GOVERNMENT OF MADRAS,
DEVELOPMENT DEPARTMENT.

SIR,

I have the honour to submit the Administration Report of the Fisheries Department for the year ending 30th June 1934.

INTRODUCTION.

2. The outstanding event of the year which has brought back some measure of prosperity to the fishing industry of the West Coast was the return of the oil sardine in unexpected abundance after an absence almost complete for an unusually long series of years. Sardine is unquestionably the most important economic fish of the West Coast and its absence for several years had reduced the fishermen to extreme poverty and despair and had demoralized the fishing and allied industries. The sardine returned this year just in time to save the industry from extinction, though maximum advantage could not be taken of the abundance of fish owing to the prevailing economic depression.

3. Research, biological and technological, continued to receive special attention in spite of the restriction on expansion of work imposed by the financial stringency of Government :—

- (i) The most noteworthy result of marine biological research was the success obtained in keeping live oysters under artificial conditions at the Krusadai Biological Station. This points the way to the possibility of establishing an

Oyster Park which is one of the primary aims of this station. Notwithstanding more than a century of research in Ceylon and India on the Indian pearl oyster, never before have pearl oysters been kept alive for so long a period as one year and more.

- (ii) In Inland Pisciculture this year for the first time indisputable evidence was obtained of the success of the Catla stocking operations in the Cauvery river. Since 1922 Catla have been released in the Cauvery but their subsequent fate was unknown as no fish caught from the river was ever traced.

One of the chief problems of the Pisciculturist in India for which there is no parallel in Western countries has been solved by a simple but effective device. The chief enemies of fish in ponds are the ubiquitous murrel, tortoise and snake which travel long distances over land and have proved almost impossible to exclude from even the most carefully guarded fish ponds. As these animals cannot climb a smooth vertical surface the provision of a cemented wall or surface about 2 feet high all round the pond has proved the best remedy and can now be recommended as the safest and the best means of permanently excluding these insidious animals.

Ever since the Præma fish farm was started there have been disputes with the local ryots about its water-supply. All reasonable efforts to settle these disputes by the Department and by successive Collectors have not yet succeeded. An unexpected way out of this impasse has been found by a piscicultural survey of the neighbourhood. An abundance of good sub-soil water more than sufficient for several ponds has been located in a swamp adjoining the farm in reserved forest and preliminary tests of the quality and quantity of water have proved most satisfactory. If the supply can be utilized there will not be any need to use the springs on which the Præma fish farm now depends to the dissatisfaction of the ryots.

- (iii) In the field of technology, the most important event of the year was the success obtained in the use of CO₂ as the best preserving medium for the long storage of prawns. Prawns in this medium remained in good condition for as long as six months when the control had perished beyond recognition.

4. The other salient features of the year relate to the socio-economic activities of the department and the financial assistance

obtained for two important schemes of development long postponed for want of funds. The clamant demand for help by the fishermen and curers on the West Coast under the stress of an unprecedented economic depression, aggravated as it was by the continued absence of sardine for years, necessitated the planning of new schemes of assistance in marketing. The ordinary statistics collected and published annually in English by the department are of no use to the ignorant and impecunious curer whose trade is extremely local. Investigations have proved the existence simultaneously of wide variations in the market price of cured-fish in the important dry fish markets of the Presidency, caused largely by the alternating monsoons on the East and West Coasts. A scheme has been devised to collect and publish weekly the range of prices in these markets in all the yards of the Presidency as part of the statistical work of this department for the information of the curer.

5. The scheme of research for a central freshwater biological station and fish farm at Madras extending over a period of five years received the sanction of the Imperial Council of Agricultural Research. Their contribution has been promised in 1936-37.

6. Another scheme of research relating to fish oil, guano and manure was unanimously recommended by the Sub-Committee appointed by the Imperial Council of Agricultural Research and has been sanctioned by them since the close of the year.

PART I.

ACTIVITIES OF THE DEPARTMENT.

I. MARINE FISHERIES.

A. RESEARCH.

(a) Scientific Research.

7. (i) TRAWLER.—The third and final report on the Trawler's systematic survey of deep sea-fishing grounds was completed by the Assistant Biologist, and is under scrutiny before being sent to the Press. The sea urchins collected during the survey were sent to Dr. Th. Mortensen of the University Museum, Copenhagen, Denmark, at his request and have been identified by him as follows :—

- (1) *Clypeaster humilis* (Leske).
- (2) *C. rarispinus* de Weijere.
- (3) *C. destinatus*, Kœhler.
- (4) *Toxopneustes pileolus* (Lamke).

- (5) *Echinodiscus auritus* (Leske).
- (6) *Stylocidaris albidens*, H. L. Clarke.
- (7) *Stomopneustes variolaris* (Lamke).
- (8) *Paraster gibberulus* (Ag. & Desor).
- (9) *Temnopleurus toreumaticus* (Leske).
- (10) *Salmacis virgulata* (L. Agassiz).
- (11) *S. dussimieri*, L. Agassiz.
- (12) *Brissopsis luzonica* (Grey).
- (13) *Phyllacanthus forcipulatus* Mrtu.
- (14) *Prionocidaris taculosa* var. *annulifera* (Lamk).

The named specimens have been added to the collection at Ennur.

One of the species, *Phyllacanthus forcipulatus* happens to be new to science and Dr. Th. Mortensen has applied for permission to describe it in the report of the John Murray Oceanographical Expedition to the Arabian Sea.

8. Mr. Burton has promised to identify the rest of the sponges collected by the trawler as soon as convenient (vide paragraph 14 of last year's report).

9. (ii) WEST HILL BIOLOGICAL STATION, CALICUT—*Plankton investigation*.—Plankton was collected tri-weekly excluding the monsoon months on 139 days during the year as against 59 days last year. The acquisition of a canoe for research work rendered the more frequent collection of plankton possible. This year in addition to these collections arrangements were made with long-line fishermen at Calicut and Tanur to collect off-shore plankton. Eighteen such collections were made off Calicut and 22 off Tanur in depths varying from 12 to 20 fathoms. The off-shore plankton differed in its composition from the in-shore plankton. Animal organisms usually formed the bulk of the off-shore plankton and plant organisms were scarce.

10. The quantitative study of plankton was continued on the usual lines (vide paragraph 17 of last year's report). The plankton was most abundant in January, the bulk of it being *Copepods*, and least abundant in September. The reverse was the case last year. In August, December and February plankton occurred in moderate quantities, when *Copepods*, *Coscinodiscus*, *Fragillaria* and *Noctiluca* predominated.

11. Among the plant organisms, *Conscinodiscus*, represented by five species, *C. gigas* var. *dioramma*, *C. oculus-iridis*, *C. jonesianus*, *C. excentricus* and *C. concinus*, was most abundant during the year, occurring in swarms in August and January and in slightly less numbers in February.

12. The following table shows the dominant groups of diatoms and when they occurred:—

Genus.	Occurrence.
Fragillaria	In swarms during September and October and in slightly less numbers during February.
Trichodesmium	Abundant during February.
Biddulphia	Common in September and January.
Chaetoceras	Common in September, October, November and January.
Thalassiosira	Common in September, October and November.

13. Animal organisms were more abundant during the year than plant organisms. Among the animal organisms, *Copepods* were predominant, occurring in swarms from December to April.

14. The following *Copepods* were well-represented in the plankton of the year: *Acartia erythræa*, *Acartia spinicauda*, *Temora turbinata*, *Oithona plumifera*, *Oithona* sp. *Paracalanus* spp. *Acrocalanus* sp. *Eucalanus* spp. *Oncea* sp. and *Corycaeus* spp.

15. The occurrence of the flagellate, *Phæocystis*, and whether or not its appearance synchronizes with the absence of sardine shoals was studied this year also. The results obtained last year were confirmed.

16. The following statement shows the seasonal abundance of the dominant forms:—

Genus.	Occurrence.
Noctiluca	Appeared in swarms during August and September and in slightly less numbers during October.
Evadne	Occurred in swarms during August and in slightly less numbers during September.
Daphnids	In swarms during November and in slightly less numbers during October.
Larval Bivalves	Plenty from October to December and in March.
Lucifer	Plenty in January.
Peridiniæ	Plenty in February and less abundant in January.
Fish eggs	Plenty in September.
Ctenophores and Poly- chaet larvæ	Common in August.
Larval prawns	Common in January.
Ceratium	Common in October, November and January.
Sagitta	Common from October to January.
Dinoflagellates	Common in October.

17. *Fish eggs and larvæ*.—The study of fish eggs and larvæ found in the plankton with a view to working out the life-histories of important food fish received special attention. The study showed the presence of eggs of *Clupeidæ* (a family to which the oil sardine belongs) chiefly in the months of September and October. As sardines with ripe oozing eggs in the act of spawning have not so far been collected it was not possible to decide whether the eggs actually belonged to the oil sardine. There are at least eight species of sardine (*Clupea* spp.) in South Indian Seas.

18. *Sardine investigation*.—The oil-sardine which was scarce during the last ten years appeared in large numbers during the year. They first appeared off West Hill, Calicut, on 18th August 1933. The period of maximum abundance was the last week of October. Heavy catches were obtained throughout November and thereafter there was a gradual decline. Their occurrence was irregular from January and the catches became poor in February and March. After the second week of March they did not appear at all except once in April and twice in May. Throughout June there were no catches.

19. Samples of 100 oil-sardines (*Sardinella longiceps*) taken at random from the catches were examined twice a week. They were studied in detail noting their size, sex, stomach contents, condition of gonads and fat, and the results have been tabulated. Four thousand two hundred and seventy-eight specimens were so examined during the year. As will be seen from the statement below, 13 cms. was the majority size and the sizes represented in the catches ranged from 8 cms. to 19 cms. over all.

1933-34.													Total number of speci- mens in each size.
	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
8 cms.	..	2	..	..	..	..	..	..	..	..	..	..	2
9 "	..	10	..	..	..	..	..	..	..	..	..	..	10
10 "	..	157	12	..	..	..	..	..	..	..	..	..	169
11 "	..	127	119	1	1	10	..	..	..	..	..	..	249
12 "	..	6	379	230	66	10	..	..	..	..	..	..	694
13 "	..	..	307	489	538	231	210	148	135	..	..	..	2,058
14 "	..	..	3	78	188	145	240	145	157	..	..	..	956
15 "	..	1	..	2	6	13	41	6	4	..	..	..	73
16 "	..	1	..	..	4	..	5	1	..	..	..	..	11
17 "	..	19	..	..	7	..	2	..	1	..	..	..	29
18 "	..	5	..	..	8	..	1	..	..	..	..	..	14
19 "	..	6	..	..	8	..	..	..	..	..	..	..	14
Grand total												..	4,278

20. The figures obtained from the fish-curing yard returns indicate an intensive shoaling of the fish off Udayavar, Tanur, Madai and Vadanapalli. At present we have no information as to why such concentrations of shoals occurred in those areas. They may be due to unusually favourable hydrographical conditions or a super-abundance of the kind of food favoured by the

oil-sardine, or to some other cause. Skeletons of 400 specimens were prepared for observing the variation in the number of vertebrae and other osteological characters for the study of races in the oil-sardine.

21. Efforts were made to obtain specimens of the oil-sardines from neighbouring countries in order to study any racial distinctions which may exist. Institutions and officials at Mombasa, Aden, Muscat, Karachi, Bombay, Ceylon, Andamans, Burmah, Singapore and Manila were addressed for specimens and information. Specimens from some of these places have been received. Until the fish from all the localities are examined, it is not possible to say whether or not the Malabar oil-sardine is a local race peculiar to that coast. Unless the Malabar sardine proves to be a distinct local race confined to that coast the question of depletion by fishing does not arise though this has often been alleged to be the reason for the scarcity of the fish in some years. Remedial measures such as regulations of mesh, restriction in areas to be fished and so forth must necessarily await the results of the study which is in progress.

22. At the commencement of the season the fish were lean. Later in October and November they were very fat but from December onwards there was a decrease in their fat contents.

23. *Other fishery investigations*.—The daily collection and identification of the important food fishes was continued and the data recorded in the fish register maintained for the purpose. A study of the economically important shoaling fishes other than *Sardinella longiceps* such as Mackerel (*Rastrelliger kanagurta*), Chala mathi (*Sardinella fimbriata*, etc.), Soles (*Cynoglossus semifasciatus*), Silver bellies (*Leiognathus* sp.) and Horse Mackerel (*Trachuropus crumenophthalmus* Bloch.) was also attempted. One thousand and two hundred specimens were examined and the data relating to their rate of growth, food, condition of gonads, etc., noted in Fish Register No. II.

24. *Hydrographical investigations*.—The usual daily record of maximum and minimum temperatures of air, moisture from the wet and dry bulb thermometers, and the conditions of the sea, weather and sky were noted; besides recording the temperature, specific gravity and hydrogen in concentration (pH value) of sea water.

25. A chlorine titration apparatus was set up in the station towards the close of the year and the Research Assistant was instructed in the method.

26. In order to see whether any variations in temperature, salinity, pH, weather, currents and rainfall had occurred this year to account for the reappearance of sardine shoals after an absence of several years, hydrographical data of the previous famine years recorded at the West Hill Station were examined and compared with those of the year under review. No intelligible correlation between chemical and physical conditions of the sea and the return of the sardine was discernible due apparently to the meagre data available and the very short period (three years) during which such observations have been made. The enquiry will have to be continued for some years more before the influence exercised by these factors on sardine migration can be traced.

27. In addition to the meteorological data recorded at the West Hill Station, such data for over a decade from 1922-23 were obtained from the Government Observatory, Madras. An intensive study of the data in relation to the reappearance of the sardine is in progress.

28. *Miscellaneous*.—The Research Assistant continued to teach Zoology to the students of the Fisheries Training Institute and examined them in the subject for the final examination.

29. (iii) KRUSADAI BIOLOGICAL STATION.—*Plankton investigation*.—Plankton was collected from the Kundugal channel daily except when weather conditions prevented the collection. Two hauls were made as usual on each occasion, one for qualitative analysis and the other for quantitative study. Though the greatest variety of organisms was found in the plankton in October the largest quantity was found in September, November and February.

30. Numerically the most important plant organisms in the order of their abundance were as follows:—

Genus.	Occurrence.
Rhizosolenia	In swarms during September, January and March and less abundant during August, October and February.
Coscinodiscus	In swarms during January and February and less abundant during August and March.
Trichodesmium and Asterionella	In swarms during April.
Thalassiothrix	Plenty during August, September and October.
Thalassiosira	Plenty in August.
Biddulphia	Plenty in October and January.

Similarly the dominant animal organisms in the plankton in the order of abundance were the following:—

Genus.	Occurrence.
Copepods	In swarms during the months of January, February and March and less abundant during November, December and April.
Lucifer	In swarms during February and less abundant in January.
Pteropods	In swarms in March.
Ctenophores	In swarms during April.
Noctiluca	Plenty in October and November.
Medusoids	Plenty in January and March.
Larval Bivalves	Plenty in March.
Sagitta	Do.

31. *Research on East Coast Food fish*.—The daily collection and study of the food fish of the Pamban area was continued. Thirty-one species were identified and recorded in Fish Register No. I. Biometrical and statistical studies on shoaling fish for which a second Fish Register No. II was opened last year were continued. Data relating to the fisheries of the 1933-34 season yielded by *Lactarius lactarius*, *Dussumieria hasseltii* and *Gazza minuta* and some specimens of *Leiognathus* were collected and recorded at the station.

32. One hundred and sixty-four specimens of East Coast sardines were examined during the year and consisted of the following species:—

Sardinella gibbosa, *Hilsa kanagurta*(?), *Sardinella sindensis*, *Sardinella fimbriata*, *Sardinella brachysoma*, *Sardinella* sp(?) and *Hilsa toli*(?).

33. The collection of silver-bellies (*Leiognathus* spp. and *Gazza minuta*) and of "Kuthippu" (*Lactarius lactarius*) could not be completely worked out on account of the unavoidably frequent change of Research Assistants. The Zoology graduates among Research Assistants and Inspectors are very junior men and any reduction in staff affects them immediately. The last in the list has acted off and on as Research Assistant and Inspector during the last four years.

34. *Hydrographical and Meteorological data*.—These were recorded as last year. Data collected in the Kundugal channel regarding surface temperature, salinity and pH value and compared with those obtained in the vicinity of Galaxea Reef on the seaward side of the Island showed that there were marked differences. Certain springs of low salinity which are active on the southern fringe of the Island are suspected to be the cause.

This probably had some bearing on the heavy mortality of pearl oysters noticed on 30th June 1933 in cages kept in the Galaxea Reef.

35. *Aquarium Studies*.—Again this year it has not been possible to install the aquaria and resume studies.

36. *Pearl Fishery Investigation*.—The most noteworthy research done at the Krusadai Biological Station during the year is the experiment in the rearing of oysterlings for the eventual establishment of an oyster park. The attempt to keep the oysterlings obtained last April in captivity and to grow them in an oyster park in suitable places round the Island has succeeded beyond expectation. The earliest attempts in this direction known were those of Dr. Kelaart in 1857 in Trincomalee, Ceylon. The period for which the oysters were maintained in cages is not stated. But it is clear from Dr. Kelaart's report that he did not attempt to rear oysters in cages for any considerable period or study the age and the rate of growth in captivity. In 1868 large numbers of young pearl oysters were reported to have been spread on the muddy bottom of Dutch Bay in Ceylon in depths of 1-2 fathoms but the site proved unfavourable. The next experiment was the attempt to keep oysters in artificial enclosures at Tuticorin which proved a failure. In 1885 Captain Donnan attempted to cultivate the pearl oyster in a tank dug on a coral reef 3 miles from the shore in Ceylon. Out of 12,000 oysters transplanted only 27 survived after 7 months. In March 1886 another experimental tank on a more sheltered part of the reef was tried but not one of the oysters survived in the following year. Messrs. Hornell and Herdman record experiments of a similar nature but it does not appear that pearl oysters were kept by them longer than 36 days. Later, the Ceylon company of pearl fishers who took the lease of the Ceylon banks in 1906 conducted experiments in the culture of pearl oysters in model experimental tanks at Marichchukkadi but nothing was published regarding the results. In 1912, Dr. Pearson stated that for the purpose for which they were built they were of little value. Reporting on the Ceylon Pearl Fisheries of 1925 after 13 years as Marine Biologist controlling pearl fisheries in Ceylon he summed up the position with regard to the culture of pearl oysters as follows:—

“The only place fulfilling these conditions (required for the location of an oyster ‘Park’ or ‘nursery’) near the pearl banks is Portugal Bay, but the water is too shallow and consequently too warm and we cannot believe that the delicate oyster spat would survive these trying conditions;

and still less can it be conceded that there would be the remotest chance of the oysters surviving to the end of their first year.”*

In view of the failure of all previous attempts the value of the present experiment at Krusadai cannot be exaggerated.

37. By frequent inspections of the pearl oyster cages, adjusting their position with reference to depth, periodical cleaning both of the oyster cages and the pearl oysters themselves of silt, and a constant watch over turbidity, salinity, pH, temperature, etc., of sea water, casualties were much reduced. Last year within 3 months (April to June 1933) 298 casualties occurred among 558 oysterlings brought to the Island (vide paragraph 43 of last year's report). Out of the balance of 260 oysterlings 138 were alive at the close of the year (June 1934). Most of the 122 deaths occurred in the oysters transferred to the Galaxea Reef on the seaward side of the Island as an experiment (vide paragraph 43 loc-cit). The five oysters which survived in the two cages were returned to Porites Bay in the Kundugal channel. The Kundugal channel has thus proved so far the best for the location of the oyster park. The oysters have grown to almost the adult size and naturally the percentage of mortality expected must be less. Thanks also to the experience gained and the special personal attention paid to this important investigation by the Assistant Biologist who camped on the Island during the critical period (South-west monsoon), there was only one casualty in June this year as against 192 last June.

38. Two hundred and forty-eight oysterlings from the Tholayirai, Cruxian and Thundan pars obtained during the pearl bank inspection in March 1934 have been added to the Krusadai collections in four cages.

39. *Age and rate of growth*.—The correct determination of the age and rate of growth of pearl oysters is of vital importance for the scientific development and administration of pearl fisheries. Apart from the practicability of maintaining the Indian pearl oyster in captivity for prolonged periods proved for the first time by the above experiment, it has also furnished indisputable evidence of the growth rate of the oyster by direct observation and the possibility of thereby determining the age of the oyster. These have both been highly controversial subjects ever since research on Indian pearl oysters began in Ceylon and India in the early fifties.

* Page 13, paragraph 3. Reports on the Pearl Fishery of 1925, Ceylon Sessional Paper 15, June 1926.

40. The oysterlings from (30 mm.—40 mm.) have lived in the cages well over a year during which several have grown to almost the adult size (50 mm.—65 mm.). Not only have groups of oysters of different sizes obtained on different dates been under observation but effective methods have been devised for making and isolating individual oysters in the three collections for a continuous study of their growth. Thus precise data by direct observation of the rate of growth of marked oysters extending over a year have been collected. Against the possible objection that the rate of growth under conditions obtaining in a cage may not be the same as under natural conditions on the pearl banks, steps have been taken to watch the growth of the same group of oysters on the Thondan Par bank from which the samples were obtained and compare it with the rate of growth of the oysters in the cages. The rates of growth during the year in both cases have been found to be almost identical proving that natural conditions prevail at the site selected for the experiment.

41. There is evidence of the larger oysters in the cages having spawned in captivity. Pearl oysters are known to attain sexual maturity when a year old. Oyster spat has been noticed in the cages from March 1934. A pycnogonid (*Endeis mollis*) found swarming in the cages had young microscopic pearl oyster spat attached to the lateral processes. I am indebted to Colonel Winckworth for the identification of the oyster spat. As pearl oyster spat has not been found anywhere in the neighbourhood and did not occur prior to March 1934 in the cages, the inference that it is not foreign but belongs to the pearl oysters in the cages is warranted. Breeding is another sure sign of the vigorous health of these oysters.

42. A special report on the experiment and the results obtained so far is under preparation.

43. One great objection to the cultivation of pearl oysters in the neighbourhood of Porites Bay in Kundugal channel is that the bottom is muddy and a heavy deposit of silt occurs, both of which are considered inimical to pearl oysters which are generally confined to rocky or gravelly beds in their natural haunts. But the latter is not the sole habitat of the oyster. With reference to the Tondi pearl oysters, Mr. Hornell observes as follows: "Never before have I seen pearl oysters living on muddy grounds in the Gulf of Mannar; the oysters are always found either on continuously rocky grounds, or else in patches on commingled stretches of sand and rock. It is there an axiom, that pearl oysters cannot live on mud. The Tondi bed disproves this." (Fisheries Bulletin No. VIII, page 73). The Krusadai experiments seem to show that

a muddy bottom and silt laden waters are not necessarily unfavourable to pearl oysters. It should however be noted that the oysters are suspended in cages and are therefore not in contact with the muddy bottom and in the weekly inspections the deposit of silt is cleaned and layers sufficiently heavy to choke the oysters are not allowed to accumulate.

44. *Chank investigation.*—The sampling of catches at Rameswaram and other neighbouring chank fishing centres and their statistical and biometrical studies started at the station last year were continued. The size of the majority of the chanks this season ranged from 61 to 70 mm. and the largest fished measured 100 mm. in diameter against a range of 50—70 mm. and a maximum size of 106 mm. last year. The research on the eggs and the early stages of the chank was continued. Four egg capsules collected at Pamban Bridge, Kundugal channel and the Thundan Par off Tuticorin were under observation during the year.

45. *Miscellaneous.*—As usual specimens of marine invertebrates were supplied to the Zoological Supply Section, Ennur. Seventeen turtles were supplied to the Madras Club and a pair for exhibition at the Marine Aquarium, Madras.

46. The exotic larvicide, *Gambusia*, is thriving in the two ponds specially constructed.

47. *Visitors.*—(1) From 20th to 23rd September 1933 a party of Zoology students and staff of Central College, University of Mysore, Bangalore, headed by Assistant Professor B. R. Seshachar, M.Sc., worked on the island.

(2) On 7th October 1933, M.R.Ry. A. R. Gopala Ayyar, M.Sc., of the Department of Botany, Central College, Bangalore, visited the island for a collection of botanical specimens.

(3) From 17th to 20th December 1933, a party of 15 Zoology students under Prof. John E. Chelladurai, M.A., of the College of Science, Trivandrum, worked at the station.

(4) On the 7th and 8th January 1934, Prof. H. K. Mukerjee, D.Sc. (Lond.), D.I.C., Head of the Department of Zoology of the University College of Science and Technology, Calcutta, with a party of five post-graduate students visited the station.

(5) On the 4th and 5th March 1934, Dr. H. Faouzi, D.Sc., Director of Fisheries Research, Egypt, paid a visit.

(6) From 28th April to 3rd May 1934, Col. H. C. Winckworth, A.D., M.S., of Debra Dun collected different kinds of marine molluscs at the station.

(7) On the 13th June 1934, Prof. C. P. Gnanamuthu, M.A., F.Z.S., of the American College, Madura, collected specimens at the station.

48. (iv) VIZAGAPATAM STATION.—The difficulties experienced hitherto in carrying on laboratory work due to want of accommodation were considerably relieved by the transfer of the Office of the Inspector of Fisheries, Vizagapatam, in May last to a portion of the old Collector's office where accommodation is available for a small laboratory and museum. The collections relating to research on the marine food fish of the Northern Circars, the Hilsa fisheries of the Godavari and the Kistna and the prawn fisheries of the Collair lake on which the Inspector of Fisheries is mainly engaged, will form the nucleus of the museum at Vizagapatam.

49. Besides the interest evinced by the local educational authorities of Mrs. A. V. N. College, Vizagapatam, and the Andhra University towards the establishment of a Biological station and Aquarium at Vizagapatam, Mr. Bisvanandadas of Puri, the proprietor of an amusement show, is said to be examining the feasibility of constructing an aquarium there.

50. The studies on the clam (*Meretrix*) and plankton undertaken by the lecturer in Zoology of Mrs. A. V. N. College in collaboration with this department were continued.

51. Further progress was made with the collection of specimens of important food fish and the compilation of information about their fisheries in the Northern Circars.

52. (v) MARINE AQUARIUM LABORATORY.—Two hundred and sixty-two samples of sea water collected by the West Hill and Krusadai Biological Stations were titrated for the estimation of chlorine at the laboratory. Sodium hypochlorite was prepared and supplied to the Tanur Experimental Station for experiments.

53. (vi) FISH STATISTICS.—The nine statements of fish statistics for each of the years 1928-29, 1929-30 and 1930-31 compiled for the West Coast have been thoroughly scrutinized and finally corrected for publication.

54. It was found on scrutiny that the names of villages in the three census statements for 1928-29 and 1929-30 were not uniform with those in the statements for 1927-28 already published, because the yard staff was giving the names of amsams and desams which were not really revenue villages. To systematize the preparation of census statements a list of the names of all the fishing villages, on the basis of revenue villages, served by each yard in geographical order from north to south has been prepared.

55. For the compilation of detailed statistical reports for the East Coast on the lines of those now published for the West Coast, the old statistical return prescribed for the yards was revised and

made comprehensive. A detailed census of the fishing hamlets along the East Coast, their population, number of boats, nets, etc., has also been undertaken.

56. The different kinds of shoaling fish constitute the most important commercial fisheries on the East and West Coasts. The opening of a new register in which the yard officers give a resume of the fish statistics relating to shoaling fish has enabled inspecting officers to note readily the progress or decline of these seasonal fisheries during the periodical inspection of the fish-curing yards.

57. *A weekly bulletin on market prices.*—A new departure made during the year which is calculated to confer great benefits on curers in fish-curing yards and to push the sale of Tanur goods consists of a scheme for the publication of a weekly bulletin on the ruling price of cured fish in the important markets of the Presidency. This is explained in the section of the report dealing with socio-economic work (vide paragraphs 264 to 268 below).

(b) Technological Research.

58. (i) FISHING METHODS—*The Yorkshire Coble.*—The coble was tried at the request of the Proprietor of the Western India Tin Manufacturing Company, Ernakulam, who has purchased the Chaliyam Cannery. He was present at the demonstration and made an offer to work the boat for a season at Chaliyam before deciding to buy it or one similar to it. But the negotiations fell through as the applicant found it difficult to accept the following conditions imposed by Government:—

- (1) The boat would be placed on trial for a month and during this period it would be manned by departmental staff.
- (2) The firm should bear all the expenses of trial, including cost of staff and any repairs or alterations needed during the period of trial, the cost of insurance and damage to property of third parties, and compensation for any loss of life.
- (3) And the firm should also bear transport charges from where the boat is now lying to Chaliyam.

59. Proposals have been made to transfer the coble to the Mettur Reservoir for patrol and subsequent fishing operations when the scheme of exploitation of the lake materializes.

60. (ii) TANUR EXPERIMENTAL STATION—*Advanced research on fish manure, etc.*—The sub-committee appointed by the Imperial Council of Agricultural Research has accepted and unanimously recommended the scheme of research on fish manure formulated for the Tanur Experimental Station. The scheme with their

recommendations was under the consideration of the Advisory Committee of the Council at the close of the year.

61. *Drift net experiments.*—This year also conditions were not favourable for resuming these experiments. In spite of a good fishing season the prices were unremuneratively low and the economic distress among fishermen continued.

62. *Experiments in pickling fish in brine for long storage.*—The economically important fisheries such as sardine, mackerel and seer are seasonal in India just as all over the world, i.e., they occur only during a part of the year, in most cases only for a few weeks. It is well known that the primitive methods of preservation, chiefly salting and sun drying, practised in the Presidency are quite inadequate to keep the fish edible and saleable throughout the year or even for a few weeks after the season closes. Consequently sardine, mackerel and other food fish, however abundant when they appear, are available only during the season and all fish in excess of what can be sold as fresh or salted fish is either converted into manure or lost. An even distribution of fish in and out of season, if rendered possible by improved methods of preservation, will not merely eliminate the glut and consequent cheapness in the season and the scarcity and the resulting dearness out of season of fish but will secure for the consuming public a vast quantity of available food which is now lost as manure or through putrefaction and decay. In addition to the well-known but expensive methods of refrigeration and canning which have secured this benefit for Western countries and in the course of time are sure to come into general use in a backward country like India, it is necessary to ascertain if possible some cheap process of preservation which will achieve this end and be within the reach of the ignorant and impecunious curer for immediate adoption. In the experiments conducted at Tanur pickling in brine in airtight barrels was found to keep mackerel for months after the fishery free of defects in a fit condition to be sun-dried and sold according to demand. The applicability of this process remains to be tried for other kinds of fish.

63. Two sets of experiments were conducted during the year. In the former, some miscellaneous small fish, such as *Lactarius*, *Engraulis*, *Sciænids*, etc., were first treated with heavy salt in the proportion of 1 part salt to 3 parts fish and after a week they were emptied of their self-formed brine, repacked and stored in an earthen jar, with fresh saturated brine. Another batch of similar fish, but with guts removed, was also treated likewise and stored. These when examined after 2½ months were found without any brine on the surface. Consequently the top layer of fish had

putrified and the bottom layer, though preserved well, was emitting a putrid smell. Hence the experiment had to be repeated again with a liberal supply of brine, but only mackerel were available at the time. More experiments have been planned for the next fishing season.

64. *Experiments in pickling prawns.*—The large set of samples asked for by the Trade Commissioner for the three firms in London interested in our prawns (vide paragraph 66 of last year's report) was sent to him in November 1933. The firms rejected the samples from private curers as unsuitable for European markets but tested the Tanur samples both for pickling in brine as whole prawns and for the manufacture of prawn paste. They have expressed the opinion that the "semi-drying" process adopted at Tanur renders the prawns hard and tasteless, while the colour, attractive to begin with, fades and gives the prawns an unsavoury appearance when pickled in England. They therefore recommended that the present method of semi-drying should be abandoned and pickling in brine or brine and vinegar or packing in salt as is done in the United States and Holland, respectively, substituted when they expect there will be a market for Indian prawns in England. A set of seventeen initial experiments in pickling prawn (i) in saturated brine, (ii) in Sodium Hypochlorite, (iii) in vinegar, (iv) in brine and vinegar and (v) in brine and Sodium Hypochlorite, in various strengths and proportions, was conducted at the station. These have proved the superiority of a mixture of saturated brine and vinegar in the proportion of 8 : 1 in keeping the prawns fresh and tasty. The defects noticed in the course of the above experiments however were a tendency on the part of the prawns (i) to putrefy before the end of a month and (ii) to get extremely soft and friable. To overcome these defects further experiments are in progress. Another set of experiments in pickling after subjecting prawns to various degrees of drying was contemplated but could not be undertaken for want of prawns. The Indian Trade Commissioner has been asked for samples of shrimps packed in salt in Holland as well as those pickled in bottles in the United States of America.

65. *Experiments with carbon-di-oxide.*—Experiments for lengthening the period of storage of semi-dried prawns and checking the defects of fading colour, hardness, salt excrescence and deterioration of flavour which supervene in storage have proved beyond doubt the superiority of carbon-di-oxide as a packing medium over all other methods. Prawns packed in tins filled with CO₂ kept their colour, consistency and taste remarkably well for

more than five months while the 'control' deteriorated beyond recognition. To perfect the process and to extend the period further experiments are in progress.

66. The occurrence of prawns is seasonal and limited to a few weeks but the market demand for prawns is perennial. In the absence of any known method of storing prawns for long periods, the manufacture of 'semi-dried' prawns at Tanur and similar prawns by private curers has to be strictly limited to the quantity that can be disposed of in the course of 6 or 8 weeks. The result is that customers have to be disappointed when prawns are out of season, and when manufacture for any reason exceeds sales during the season the excess deteriorates and becomes unsaleable. This great handicap on the prawn industry has now been remedied by the new method of storing cured prawns in carbon-di-oxide discovered and successfully experimented with at Tanur. This is yet another instance where research at Tanur has come to the help of the fish-curing industry.

67. *Experiments with Sodium Hypochlorite.*—Further experiments with Sodium Hypochlorite solution with 1 per cent available chlorine were conducted during the course of the year with prawns and miscellaneous small fish. In the case of fish, it was found that different species of small fish react differently to treatment with this re-agent. In the case of prawns, Sodium Hypochlorite solution was tried in various proportions mixed with saturated brine. The outstanding feature of this preservative, is that it keeps the colour of prawns but gives an over-cooked softness to them. For successful use by fishermen and for further experiment a stronger solution than that with 1 per cent available chlorine is needed. Messrs. Mather and Platt, Limited, Manchester, offer a new vulcanite body with 5 cells together with a set of electrodes including the terminals to be used with the existing plant for increasing the strength to 2 per cent available chlorine and have quoted £13-10-0 for it.

68. *Artificial drier.*—Towards the close of the year the eastern half of the drier was remodelled with the experience gained so far. The dome of the fire-chamber which was narrow was widened to cover more or less the full length of the trays. The air holes were enlarged and increased to four. Adjustable shutters were fitted to the air holes. The arrangement of the fire-bricks under the dome was improved and the chimney was lengthened to increase the draught. From the few experiments made before the close of the year it was found that these alterations have removed several defects noticed in working the western half and has further reduced

the cost of dryage from 2 pies to about 1 pie per lb. of dried prawns. A full trial of the remodelled side will be made during the ensuing year, with a view to its further improvement.

69. Mr. Soma, a leading fish merchant of Malpe who was one of the three members who attended the demonstration last year has constructed his own drier on the model of the improved drier at Tanur.

70. *Fish meal.*—The recent discovery of an enormous quantity of sea-weed along the coast of the Gulf of Mannar and Palk Bay has suggested the possibility of establishing two novel and valuable fishery industries in South India, (1) the manufacture of a potent stock food and manure, and (2) the manufacture of kelp and iodine.

(1) "*Scapa flour.*"—A very recent development in the fish manure and meal industry that is bound to have far-reaching results for Madras Fisheries and Agriculture is the use of sea-weed in the manufacture of fish meal. This product is marketed under the trade name "*Scapa flour*" its ingredients which are certain classes of sea-weed, fresh fish and shells, and their exact proportions and methods of manufacture are jealously guarded trade secrets. The three ingredients being available in abundance in South India the first essential—raw material—for the inception of the industry seems assured, and it only remains for the methods of manufacture to be investigated and determined by experiment. Though the services of a Bio-chemist would have been invaluable the process seemed to be sufficiently simple for initial experiments at Tanur. Some preliminary tests were made with the available raw material during the year prior to starting serious experiments at Tanur. The value of the sea-weed by itself as manure was tried in the coconut plantation on Krusadai Island and has borne amazingly encouraging results. The peculiar property of sea-weed is that a single application lasts for several years. This is not the case with any other organic manure. Krusadai is a coral island consisting of a layer of clean sand with a substratum of coral rock. The coconut trees on the island have been poor and unhealthy with discoloured yellow leaves and hardly any nuts for years as the soil was barren, chiefly lacking in nitrogen. Fish guano was tried but effected no permanent improvement and was found too expensive to be profitable. The sea-weed however has within a year of its use effected a complete change; the leaves are now of a healthy dark-green colour and the yield also has vastly increased. The

improvement effected was so phenomenal that the lessee who has seen the experiment has begun to use sea-weed for all his coconut plantations. The proportion of fresh fish to dry weed which will yield a stable non-putrescible sufficiently dry meal free of odour was next investigated. This required my personal attention and could not for that reason be carried out at Tanur. A few of the common kinds of fish in different proportions and different conditions of dryage have been tried at Madras and the resulting meal has been kept under observation. Simultaneously enquiries have been instituted in India and abroad for a suitable mealing machine.

(2) *Kelp and Iodine*.—Here again the need for a Bio-chemist was keenly felt. As the Government of the Irish Free State is stated to be engaged in the development of these industries just now in conjunction with a British firm of manufacturers in London, enquiries were made regarding the process and plant through the High Commissioner. The firm has advised the collection of samples of the common weeds and a preliminary chemical analysis of their ash to ascertain the iodine content. In their opinion if the iodine content falls below 0.8 per cent it will not be economical to start the extraction of iodine on a commercial scale.

71. *Research on vitamin A of fish oils*.—The Director of Nutritional Research, Indian Research Fund Association, Coonoor, asked for the extraction and supply of oils from different classes of fish for the estimation of their vitamin A content. Samples of sardine oil manufactured at Tanur and of shark and turtle oils manufactured at Tuticorin that were available were sent to him in June. Specimens of oil-sardines and shark liver were sent in April to the Professor of Bio-chemistry, Indian Institute of Science, Bangalore, for similar test there.

72. *Experiments with glazed pots and cement vats*.—Experiments to test the durability of glazed pots and cemented vats were continued during the year. The glazed pots were tested by storing saturated brine and the cement vat by both saturated brine and used brine from the public fish-curing yard at Tanur. Neither the jars nor the vat appeared to have been affected by brine. In fish-curing yards the curers do not put their utensils to uninterrupted use. If therefore the jars and the vat are kept dry at intervals, the effect would probably be more apparent. They will be subjected to such intermittent treatment in the next set of experiments.

73. *Preservation of craft and tackle*.—(1) *Nets*.—The whole of the capital investment in the case of the fishing industry is the cost of craft and tackle. On the East Coast a sea-going catamaran with 3 logs costs Rs. 250 and its complement of nets costs Rs. 1,080. The annual loss to the owner is calculated at Rs. 50 for the catamaran and Rs. 206 for nets. The loss of capital investment therefore amounts to Rs. 260 per annum which is disproportionately large compared with the earnings of the fishermen. The required chemicals referred to in paragraph 70 of last year's report for the dip recommended for nets by United States Bureau of Fisheries were not available in India and the Scientific Supplies (Bengal), Company, who quoted the cheapest rates and with whom an order was placed have ordered them from Germany.

In the discussions with Mr. Kamesam regarding the treatment of nets and gunnies a new formula was decided on. The experiment has been awaiting the erection of a suitable plant at Tanur.

(2) *Craft*.—The commonest fishing craft on the East and West Coasts of the Presidency are the catamaran and the dug-out canoe. Enquiries show that more or less efficient methods of preservation are already in use on the West Coast. Smearing with crude fish oil, or a mixture of fish oil and slaked lime seems to preserve canoes from the action of sea-water and borers for long periods extending to even 50 years in some cases. On the East Coast however no preservative is employed. With constant soaking and sun-drying the light wood of which catamarans are made deteriorates rapidly. Sea-going catamarans are imported at high cost from Ceylon and from the Agencies in the Northern Circars, and do not last for more than 2 to 3 years, or in rare cases 5 years. The surface wood of the logs to the depth of an inch or more perishes within this period and has to be shaved off and what is left is fit only to be employed for fishing in rivers and creeks. If this rapid deterioration could be checked by wood preservation methods it would save the fishermen the recurring capital investment on catamarans which represents an unduly large proportion of his earnings. The "Fal-Kamesam" process is the cheapest of the modern methods of wood preservation. Moreover the most expensive items of the required machinery represented by the 3 h.p. engine and the compressor which can pump to a pressure of 160 lb. per square inch or exhaust when reversed forming a vacuum of twenty inches are fortunately already available. In the diving experiments conducted last year this engine and compressor were found inadequate and have to be substituted shortly by a more powerful engine and a two-stage compressor—vide paragraph 182 of report for 1932-33. The engine and compressor have been

transferred to Tanur. A pressure cylinder which is the only item required to complete the "Kamesam" plant has been purchased from Messrs. Crompton Engineering Company, Madras, at a cost of Rs. 300. With the help of the Industries Department the plant will be erected shortly at Tanur for experiments in the preservation of nets and craft.

74. *Purchase and manufacture.*—Six thousand nine hundred and fifty-nine pounds of fish were purchased for Rs. 208-10-0 for curing and 260,768 lb. of fish for Rs. 1,795-13-0 for oil and guano work, during the year, as against 5,815 lb. of fish for Rs. 187-8-3 for curing and 15,515 lb. fish for Rs. 321-15-6 for oil and guano work in the previous year. The total output for the year was 1,823 lb. of cured fish, 6,580 lb. fish-meal, 1,036 lb. pink-meal and 32,243 lb. of scrap and 1,180 gallons (328 gallons I class oil, 580 gallons II class oil and 272 gallons III class oil) of oil at a cost of Rs. 4,269-11-0, against 890½ lb. of cured fish, 2,332 lb. of fish-meal and 5 bottles of II class oil at a cost of Rs. 799-12-5 in the previous year.

75. Out of 260,768 lb. of fish treated for oil and guano this year, 217,690 lb. were sardines, 41,956 lb. were small sole and the rest, 1,122 lb., were miscellaneous fish; whereas in the previous year the entire quantity (15,515 lb.) treated for the above purpose were miscellaneous fish and hence the oil output was practically nil. Even this year, when the above quantity was purchased and treated, the sardines had very little oil and hence the output of oil is far less than it should have been for the total quantity of sardines treated. When the sardines became rich in oil, and boat loads were available at a nominal price, the station had run out of funds. When the funds were actually sanctioned, the sardines had ceased to occur and the amount had to lapse. The opportunity of dealing with larger quantities of fish was thus lost, but it is doubtful if the manufactured oil and guano could have been sold.

76. *Sales.*—One thousand four hundred and fifty-seven and three-fourth pounds of cured fish, 5,241½ lb. of fish-meal, 112 gallons of oil and miscellaneous articles amounting to Rs. 2,730-6-7 were sold during the year, as against 594¾ lb. of cured fish, 2,909 lb. of fish-meal, 97 gallons of fish oil and miscellaneous articles amounting to Rs. 2,104-6-6 in the previous year. The fish famine in Malabar last year having prevented Tanur from meeting the demand for fish-meal—vide paragraph 74 of last year's report—the larger poultry farms sought for other sources of supply and several appear to have obtained a substitute styled 'Milled fish' from a local firm in Madras as equivalent to the Tanur meal but far cheaper, 8 pies per lb. as against 4 annas and 2 annas for

first and second-class Tanur meal. 'Milled fish,' a sample of which was sent by a long-standing customer for opinion, proved on analysis to be cheap third rate guano manufactured from putrid fish and subsequently ground into fine powder, and bore no comparison with the high class Tanur product either in the absolute freshness of the fish mealed or in the scrupulously sanitary and hygienic methods of manufacture, designed to conserve the best nutrient elements including vitamin of the fish treated—vide table below :—

Number and heads of analysis.	Tanur meal.		Milled fish.	
	ACS.		ACS.	
1 Moisture	..	9.76	..	15.10
2 Loss on ignition	..	67.02	..	47.87
3 Insoluble matter	..	2.80	..	7.85
4 Soluble mineral matter	..	..	..	29.18
5 Phosphoric acid	..	8.88	..	4.95
6 Nitrogen	..	8.18	..	6.12
7 Lime	..	8.82	..	5.64
8 Acid value	..	10.32 *	..	115.30
9 Oil	..	9.66	..	..
10 Proteins	..	51.13	..	38.25
11 Albuminoids	..	38.64	..	..

* Expressed as so many mgms. of KOH per gram of the oil.

Such an undesirable substitution though it may succeed for a season in profiting by the reputation and market built up by Tanur cannot last. In the meantime however the adverse effect on Tanur transactions was appreciable. There has been a fall in the orders for fish meal and a demand for the lowering of prices. Fortunately on account of the unusual abundance of sardine and the inordinate low prices that prevailed during the season it was found possible to reduce the price of sardine meal to As. 1-6 per pound without risk of loss. Even so the sales have not come up to expectation. The maintenance of the market standard being an accepted duty of the station, the loss, if any, that may accrue in the manufacture of high class meal must be faced if the station is to achieve its aims.

77. The Accountant-General who audited the accounts of the station desired that Government sanction for the practice of fixing prices and allowing credit sales and commission should be obtained. In G.O. Ms. No. 986, Development, dated 17th August 1933, Government were pleased to permit the Director of Fisheries to fix the price of the various articles produced at the Tanur station

provided they are not below the cost of production and to allow commission up to 6½ per cent. Government however were of opinion that the existing system of sending articles by V.P.P. would be sufficient and that there was no need to introduce a credit system which was suggested.

78. *Stock*.—The stock on hand at the end of the year was—

- (a) *Cured fish*.—Sixty-five pounds big and 35 lb. small prawns, 145 lb. of beheaded and unshelled prawns, 205 lb. of podimin, 24 lb. of small seer and 16 lb. of sardine.
- (b) *Fish-meal*.—Two thousand five hundred and sixty-six and one-fourth pounds of fish-meal, I class, 235½ lb. of fish-meal, II class, and 124¾ lb. of fish-bones.
- (c) *Fish scrap*.—Thirty thousand and sixty-seven pounds.
- (d) *Fish-oil*.—Three hundred and fourteen gallons of I class oil, 579 gallons 3 bottles, II class oil, 210 gallons 3 bottles, III class oil.

79. *Receipts and expenditure*.—The receipt for the year was Rs. 6,020-0-7 including value of closing stock and exceeded that of the previous year by Rs. 3,838-3-2. The expenditure excluding the establishment charges of Rs. 3,573-5-7 amounted to Rs. 5,891-13-0, whereas it was only Rs. 2,042-6-9 last year. This increase is due to heavy oil and guano operations. The gradual decline in operations due to the absence of fish and the economic depression since 1930 has ceased and a distinct improvement in the volume of operations is noticeable during the year under report.

80. *Advertisement*.—The products of the station were as usual advertised in the Villager's Calendar. Mr. Hansen, editor of the *Allahabad Farmer* has offered to advertise the value of the Tanur meal.

81. *Training of apprentices*.—Two students from the Travancore State underwent the usual course of training at Tanur this year. Acting Inspector Mr. A. Somayaji was given a demonstration in the manufacture of fish-meal. The pupil-teachers of the Fisheries Training Institute, Calicut, also visited the station as usual.

82. In G.O. Mis. No. 1299, Development, dated 4th October 1932, the Government sanctioned the continuance of the Tanur station for a further period of two years ending 31st March 1934, and called for a report early in January 1934, on the work done till then and its value to the fishing industry as carried on on the West Coast and on the necessity for the retention of the station

beyond 31st March 1934. Accordingly a detailed report on the work done at the station and the contribution it had made to the development of the fishing industry was submitted to Government in my letter No. 100-E/34-2, dated 22nd January 1934. Therefore the Government sanctioned the continuance of the station for a further period of one year from 1st April 1934 or until a decision is reached on the scheme relating to the station under the consideration of the Imperial Council of Agricultural Research whichever is earlier. It is understood that in their meeting last September, the Advisory Committee of the Council have unanimously approved of the scheme.

B. ADMINISTRATION.

(a) Public fish-curing yards.

83. At the beginning of the year there were 104 fish-curing yards in the Presidency and only 103 at the close of the year; of these 25 yards were in charge of Sub-Inspectors, 36 in charge of Petty-yard Officers, and 42 in charge of peons.

84. In September 1933 a proposal for the reorganization of the entire staff employed in fish-curing yards was submitted to Government. The important recommendations made were the revision of the pay of the Sub-Inspectors and Petty-yard Officers, the placing of all yards hitherto in charge of peons under Petty-yard Officers, the increasing of the inspecting staff and the permanent retention of certain temporary staff attached to fish-curing yards.

In G.O. No. 807, Development, dated 16th June 1934, Government accepted my report on the economics already effected and still to be effected in fish-curing yards (vide paragraph 84 of Annual Report for 1932-33).

85. (i) EAST COAST (NORTHERN SECTION).—There has been no change in the number of fish-curing yards which remained at 30.

86. The Chairman of the Vizagapatam Municipality has permitted the opening of the Srirangapuram yard in Vizagapatam, but has reserved to himself the right of cancelling the permission, if it is found prejudicial to the health, safety or convenience of the public. The land for the erection of the buildings, etc., has been taken on lease by the fishermen. In view of the conditional nature of the permission they have offered to put up only thatched sheds in the first instance. A properly built and efficiently managed fish-curing yard would result at least in the prevention of the insanitary and dangerous practice of drying fish in all places, such as the beach and streets of the town in the fishermen's quarters. When, however, the municipal authorities repeal the proviso and

issue an unconditional permission, which they are expected to do once they are convinced of the value (in improving the sanitation of the locality) of a fish-curing yard of the type and design approved by the department, the fishermen have agreed to convert the thatched sheds into permanent asbestos-roofed buildings.

87. For the proposed yard at Bunderpettah, instead of the land previously objected to, another suitable site, unobjectionable from all points of view, was selected with the help of the Tahsildar, Chicacole, and the necessary grant from the Collector obtained. The proposal to open the yard was, however, not accepted by Government who in G.O. Ms. No. 1531, Development, dated 15th December 1933, desired as an essential preliminary step in the opening of a new yard that the ticket-holders should, among other things, undertake to make good the loss in each case. The Bunderpettah men have, however, given an agreement binding themselves to bring to the yard for cure such a quantity of fish as would consume at least 400 maunds of salt per annum provided the fishing season is not a disappointment. If 400 maunds of salt are issued for curing fish in a year, the receipts will more than equalise the cost of establishment, conveyance charges and purchase of salt. Attempts to open new yards at Gollapalem and Kottapalem near Nizampatam proved a failure due in the main to the Government's new policy in insisting on the curers' guaranteeing the possible loss by a deposit.

88. *Transactions*.—The total quantity of fresh fish brought to the yards was 82,783 maunds 32 seers against 124,988 maunds 20 seers, and the quantity of salt issued was 11,854 maunds 29 seers against 17,023 maunds 39 seers, last year. The fishing season was far below normal. Only three out of the thirty fish-curing yards showed an increase over last year's transactions. The sardine and the ribbon-fish fisheries were a failure throughout. Sardines were, however, plentiful at Gopalpur, ribbon-fish at Raziapeta and Chatoessus at Prayagi, and led to increased operations in these three yards. Jew-fish fisheries were steady throughout the year. The decrease in operations is mainly due to the poor fishing season.

89. *Supply of salt*.—Salt supplied to the yards was as usual 'monopoly' and 'excise' salt. Polavaram is the only factory supplying monopoly salt, excise salt being purchased from licensees at all the other factories, viz., Humma, Sumadi, Konada, Bimlipatam, Balacheruvu and Gurzanapalli. The quantity of monopoly salt purchased was 1,278 maunds as against 2,300 maunds last year and that of excise salt 10,664 maunds as against 14,916

maunds the previous year. The cost of monopoly salt varied from 5 to 5 annas 6 pies per maund and that of excise salt from 3 to 9 annas 6 pies.

90. *Wastage of salt*.—There was no wastage of salt during the year.

91. *Balance of salt*.—The stock of salt on 30th June 1934 in the yards was 2,183 maunds 19 seers as against 2,096 maunds 8 seers on the corresponding date of the previous year.

92. *Reforms in yards*.—Experiments with wire-net drying platforms were continued at Uppada. The reason adduced by certain curers against their adoption, namely, that the fish so treated become excessively dried was proved to be imaginary. The model quarters built at Uppada with asbestos roofing were occupied by the staff early during the year. A model curing shed was constructed at Lawson's Bay where the yard staff will be able to demonstrate to the curers better methods of curing and preservation in periods of glut. The combined storeshed and quarters with asbestos roof at Lawson's Bay which was badly damaged by gales was completely renewed during the year. Ten of the steelyard weighing frames erected in the yards in 1931-32 were provided with cement platforms.

93. *Miscellaneous*—(1) *Fence*.—In most yards the substitution of a live fence of aloes, screwpine, etc., for the prickly-pear fence destroyed by the cochineal insect, is proceeding satisfactorily though in a few places, e.g., Pundi, Manchineelapetah and Althada the ravages of cattle had almost nullified the efforts of the staff in raising the fence. The expansion of the prickly-pear fence had formerly obliterated the boundaries and made it impossible to locate the survey stones of yards. Now that the prickly-pear is destroyed and the boundaries are clear, disputes regarding lands (including trees growing on them) that were formerly not claimed by the owners and allowed to be considered as part of the yard from the days of the Salt Department arose at Bimlipatam, Kothuru and Lawson's Bay and had to be settled with reference to the boundary stones.

(2) *Petty construction and repairs*.—The repairs to the buildings in the yards were as last year attended to departmentally, the Sub-Inspector supervising the work, wherever possible, the yard staff helping to procure the required materials and the necessary labour.

94. (ii) *EAST COAST (CENTRAL SECTION)*.—There was no change in the number of fish-curing yards in this section which remained at nine. Of these, two are in charge of Petty-yard Officers and seven in charge of peons.

95. *Transactions.*—The total quantity of fresh fish brought to the nine yards during the year was 77,131 maunds 33 seers and the quantity of salt issued was 11,481 maunds 13 seers as against 69,812 maunds 16 seers of fish and 10,183 maunds 12 seers of salt in the previous year.

96. There was an increase in transactions over those of last year in all the yards except those at Irakkam, Pulianjerikuppam and Kadapakkam. The increase was due to a favourable season for mackerel, black pomfret, ribbon fish, mullet and silver bellies. The yards which showed considerable increase in operations are Kondurpalayam, Kottapatnam, Mangodu and Sathan-kuppam.

97. *Supply of salt.*—The total quantity of salt supplied to the nine yards during the year was 11,590 maunds of which 5,100 maunds was monopoly salt and 6,490 maunds excise salt. The cost of monopoly salt varied from 3 annas 3 pies to 5 annas 9 pies per maund, and that of excise salt from 2 annas 5 pies to 4 annas per maund. The following are the salt factories from which supplies were made at the prices noted against each :—

		Price per maund.		
		RS.	A.	P.
Excise salt	Chunampet	0	4	0
	Krishnapatam	0	2	5 to 0 2 8
	Tada	0	3	9
Monopoly salt	Madras Depot	0	3	3 to 0 5 9

98. *Wastage of salt.*—A wastage of 2 maunds 6 seers of salt occurred in ten salt bags which got drenched during a storm in the Nellore district in November 1933. The storm caused heavy damage to the store shed in the Nelathur yard.

99. *Balance of salt.*—The stock of salt in the nine yards at the beginning of the year was 562 maunds 6 seers and at the close of the year 668 maunds 27 seers.

100. *Miscellaneous.*—(1) *Yard fence.*—In the attempt to provide a live fence in the place of the prickly-pear fence destroyed by cochineal, aloes and screw-pine suckers were tried. The hot summer this year destroyed them in several yards. Scarcity of fresh water is the chief difficulty in growing a live fence. Palmyra plants will be tried. But as it will take at least six or seven years for them to grow to a sufficient height to be useful as a fence, the question of providing barbed wire fencing around the yards will have to be considered immediately funds are available.

(2) The damaged condition of some locks in the Buckingham Canal en route to Krishnapatam salt factory delayed the transport of salt to the fish-curing yards supplied by that factory.

(3) In the heavy rains and stormy weather in October 1933, two sheds in the Kondurpalayam fish-curing yard collapsed. The attempt to carry salt from Krishnapatam salt factory in time did not succeed on account of inclement weather. Consequently a depletion of salt in the Nelathur fish-curing yard for a few days resulted.

A storm in the Nellore district in November 1933 destroyed all the sheds in the Nelathur fish-curing yard and they had to be rebuilt causing extra expenditure under petty construction and repairs. During the intervening period of about three months the yard staff had to reside in rented houses outside the yard premises. In G.O. Ms. No. 678, Development, dated 21st May 1934, Government sanctioned payment of rent for the private houses at Re. 1 per mensem for each member of the staff.

(4) As the excise salt in the Tada salt factory was cheaper, supplies to the five yards, viz., Sattankuppam, Mangodu, Pulianjerikuppam, Irakkam and Medicalkuppam, were obtained from that factory from November 1933 to January 1934. On account of the exhaustion of the stock of salt in the Tada factory, further indents for supplies for the above yards were made upon the Madras Salt Depot for monopoly salt from February 1934 to the end of the year.

101. (iii) *EAST COAST (SOUTHERN SECTION).*—During the year the number of yards continued to be 14. The curers of Kuthankuli yard arranged to purchase a new site for the location of the yard. They have undertaken to provide the necessary buildings and fence and also to meet any loss that may be incurred in the working of the yard. They will be asked to furnish the necessary security as soon as the purchase of the land is completed.

102. Proposals for opening new yards in Pamban, Killai and Devanampatnam did not materialize owing to the inability of the curers to furnish the securities stipulated by Government.

103. The new site selected for shifting the Tranquebar yard from its present position was not available as the revenue authorities consider it objectionable from a sanitary point of view on account of its close proximity to dwelling houses. No other site is available.

104. *Transactions.*—The following 10 yards showed an improvement in transactions :—

1 Vanagiri.	6 Nambuthalai.
2 Arcot Thurai.	7 Attankarai.
3 Point Calimere.	8 Mukkur.
4 Muthupet.	9 Sippukulam.
5 Sethubavachatram.	10 Overi.

There was a decline in operations in the Tranquebar, Adirampatnam, Pinnakayal and Idinthakarai yards. The increase in transactions in Vanagiri is mainly due to good catches of large fish such as kendal, parai and skates. The decrease in the transaction of the Tranquebar yard is due to good facilities for transport of raw fish. The prohibition of swamp salt has contributed to increased transactions at Arcot Thurai, Point Calimere and Muthupet yards. The fall in transactions in Adirampatnam yard is due to the absence of the usual shoaling fishes of Hilsa and Cat-fish ("pothi keluru" and "mantlan keluru"). Due to good catches of sharks and rays operations in the Sethubavachatram and Nambuthalai yards improved. The increased transactions in Attankarai yard are attributed to good catches of 'kalar,' and in Mukkur to a successful Sardine (thodan) fishery.

105. Fishermen hitherto used to take their fish from Sippikulam to Tuticorin for disposal as fresh fish. The protest of the fishermen of Tuticorin this year resulted in increased curing at the yard. The Sardine (thodan) fishery was also successful as at Mukkur. The fall in transactions in Idinthakarai and Pinnakayal are due to the absence of Ribbon-fish and the increase in transactions in Ovari is due to good catches of "Kuthippu."

106. The total quantity of fresh fish brought to the yards was 67,461 maunds 35 seers and the quantity of salt issued was 13,395 maunds 32 seers against 63,062 maunds 35 seers and 12,188 maunds 31 seers, respectively, in the previous year.

107. *Supply of salt.*—A total of 13,608 maunds of salt was supplied to all the yards, against 12,208 last year.

108. *Wastage of salt.*—The sheds in the Vanagiri yard were damaged by a cyclone on the 14th and 15th December 1933 resulting in a wastage of 5 maunds 5 seers of salt.

109. *Balance of salt.*—The stock of salt in the 14 yards at the beginning of the year was 4,004 maunds 2 seers and at the close of the year 4,113 maunds 5 seers.

110. *Reforms in the yards.*—The ticket-holders of the Ovari yard requested permission to remove cured fish within 12 hours from the yard premises to suit a weekly market. The concession was granted on condition that the salt used is finely powdered and completely dissolved before fish are removed. The working hours of the Vanagiri, Point Calimere, Sethubavachatram, and Mukkur yards were extended up to 9 p.m. to suit the convenience of the curers, and the ticket-holders of Ovari and Idinthakarai yards were

permitted to remove cured fish during night till 9 p.m. The well at Nambuthalai yard was completed and one at Mukkur yard was constructed.

111. The most urgent reform needed in the East Coast yards is the substitution of a cheap but hygienic curing vessel for filthy mud pots, scooped palmyra stems, wooden tubs, etc. Though efforts have been made since the transfer of the yards to this department to introduce glazed pots or stoneware jars they were not a success on account of the prohibitive cost. In the last experiment conducted at Tanur two stoneware jars supplied as samples by a newly established pottery in the Cochin State proved suitable, but the factory has since been closed. Likewise another stoneware factory in Bezwada which promised jars for the yards has suspended work. Enquiries will be made at the Mysore Government Porcelain Factory and The Perfect Pottery Company, Ltd., Jubbulpore.

112. Efforts of the Assistant Director, Pearl and Chank Fisheries, to introduce hygienic cemented pots in place of the ordinary porous mud pots reeking with fish effluvia, though unsuccessful during the last four years, have at last borne fruit. During the year a few curers of Sippikulam and Mukkur yards where the demonstration was conducted have commenced to use the cemented pots.

113. The most noteworthy development, however, is the adoption, by an educated and enterprising fish merchant of Madras who has constructed a fish refrigeration factory at Arcot Thurai with the advice and help of the department, of all the reforms in fish-curing methods advocated by Tanur. He has taken a ticket in the Arcot Thurai yard where he has built a curing-shed of the latest model with cement vats of approved design and has also erected drying flakes, thus stealing a march over the curers of even the West Coast. In response to his appeal for assistance in the adoption of radical reforms in the methods of curing, Tuticorin white salt which is the purest and the whitest manufactured in the Presidency was specially supplied to him. The experiment is being watched by the fish-curing public of the locality with keen interest and may pave the way to the reformation of age-long methods long sought for by the department.

114. *Miscellaneous*—(1) *Yard fence.*—The Sethubavachatram yard was provided this year with wire-fencing. Palmyra, aloe and screw pine are being tried in all the yards to form a good live fence.

(2) *Petty construction and repairs.*—These were carried out departmentally or under departmental supervision. During the

severe cyclone and heavy rains of December 1933, the buildings in the Vanagiri and Tranquebar yards were destroyed and had to be reconstructed.

(3) *Pit-manure and kitchen-gardens.*—A number of pits filled last year and allowed to mature were opened this year and the manure was used for the live fence. In the yards at Idinthakarai and Muthupet, the manure was sold.

115. (iv) WEST COAST.—At the beginning of the year there were 51 fish-curing yards of which two were the private yards of Malpe and Padu Tonse. The temporary yard at Vekkode was closed during the year, and the number of yards at the end of the year was 50. Of the 50 fish-curing yards, 25 are in charge of Sub-Inspectors, 21 in charge of Petty-yard Officers and 4 in charge of peons.

116. The temporary yard at Hosabettu was continued as it yielded a profit of Rs. 135-7-8 for the year ending 7th December 1933. The temporary yards at Baikampadi and Pudiakadapuram resulted in a loss of Rs. 122-7-4 and Rs. 223-9-0 during the year 1933-34 and the question of their retention is under consideration. The working of the Nattika yard for the year ending 30th November 1933 resulted in a loss of Rs. 127-6-0. The curers are unable to pay for the loss. The question of its retention is also under consideration.

117. The closed Vekkode yard worked at a loss of Rs. 414-9-1 during 1932-33 and till its closure on 3rd August 1933 in 1933-34 it sustained a loss of Rs. 154-4-0. The deposit of Rs. 225 made by Mr. Moidunni Haji, the only ticket-holder of substance in that yard, and Rs. 111 due to him as petty construction and repairs works contractor, have been adjusted towards the loss. A net amount of Rs. 232-13-1 remains to be recovered.

118. The Government have sanctioned the acquisition of a new site for the Mattool yard. The site suggested is now held under lease by a private party. According to the terms of the lease, the lessee has to vacate the site without compensation if he is given one year's notice. It is accordingly proposed to evict him without compensation and it is expected that the yard will be shifted to the new site in a couple of years.

119. Government have sanctioned the acquisition of a new site for the Vadanapalli yard and the construction of buildings at a cost of Rs. 6,700. The acquisition proceedings are in progress.

120. *Transactions.*—The total quantity of fresh fish brought to the yards was 962,650 maunds 36 seers and the quantity of salt

issued was 152,727 maunds 12 seers against 727,441 maunds 31 seers of fish and 119,003 maunds 13 seers of salt in the previous year. There has thus been a perceptible increase in transactions which is attributed to the reappearance in great abundance of sardine and mackerel this year after years of dearth, and to heavy catches of cat-fish in most of the yards in the latter part of the year.

121. In South Kanara the operations in the Kirimanjeshwar, Gangoli, Hosabettu, Bockapatnam, Mangalore, Ullal, Manjeshwar, Hosdrug and Thaikadapuram fish-curing yards showed a fall compared with those of the previous year. The decrease in consumption of salt is mainly attributed to the reduced demand for cured fish and the low ruling price. As oil-sardine appeared and was caught throughout the season along the coast, catches of small varieties of fish, which generally consume a good quantity of salt, were not brought for cure. A striking decrease in consumption is that of the Hosdrug fish-curing yard. The salt consumed in this yard during the year was 2,611 maunds 14 seers against 6,181 maunds 32 seers in the previous year. The consumption at the Thaikadapuram fish-curing yard during the year was less by nearly 600 maunds than that of 1932-33. Operations in Ullal yard showed a decline. There is an appreciable increase in the consumption of salt this year, however, in Malpe I yard over that of last year. 22,558 maunds 18 seers of salt were consumed this year against 15,400 maunds 10 seers last year. Besides this yard, Udayavar, Baikampadi, Tannirbavi, Kumbala and Bekel fish-curing yards also have shown increased operations in spite of the low price of cured fish. Bekal fish-curing yard records a consumption of salt nearly double that of the previous year. More salt was used for Ratnagiri and Colombo systems of curing this year, against 514 maunds 34 seers for Ratnagiri system and 8,006 maunds 11 seers for Colombo system consumed in the previous year. 791 maunds 26 seers and 12,414 maunds 28 seers, respectively, were issued during the year under review. This is due to the fact that mackerel this year was as cheap as 12 annas to Re. 1 per 1,000, and large quantities were cured under Colombo and Ratnagiri systems. Operations in the Kirimanjeshwar fish-curing yard were slightly below those of the previous year and were due to very poor catches of miscellaneous kinds of fish that usually abound. Persons not known to the fish-curing business and trade are now taking an interest in the industry and have this year applied for grant of tickets for curing fish under the Colombo system, a method which did not exist in the yard before. For the purpose of accommodating Colombo sheds, the yard compound

is being extended by 150 feet to the south. After the issue of Colombo tickets, the yard is expected to show a further increase in operations.

122. At Madai, however, operations showed a heavy fall. The absence of big varieties of fish such as cat-fish, kora, shark, etc., accounts for the fall under big fish. Sardine were the main catches in the locality and as there were 22 oil and guano factories working in Madai and in the neighbouring villages, the fishermen realized ready cash for their catches and they did not engage in deep sea fishing. It is curious that operations are heavy only in alternate years but among the bad years this is the worst. Salt consumed is only 7,447 maunds 19 seers as against 13,395 maunds 28 seers in the previous year.

123. The Thalayi yard shows an increase in operations. This is mainly due to heavy catches of sardine which were cured in large quantities.

124. The Madakkara yard records a decrease in operations. The main defect with this yard is reported to be its bad location. It is about a mile north of the Madakkara fishing village and, being away from their homes, the women are not able to help their men in curing operations. The fishermen are Mogeyers and they are less industrious than their Mukkuva or Mappilla brethren as they are fairly well off. Salt consumed was only 473 maunds 15 seers against 649 maunds 39 seers in the previous year.

125. Madapalli yard has again showed a decline and the main reason is the poor catches in the locality.

126. In the Badagara yard, in spite of extensive private curing carried on with bazaar salt operations have been satisfactory. It is reported that about 600 bags of duty-paid Tuticorin salt were used for private curing this year. Salt consumed is 2,250 maunds 7 seers against 1,658 maunds 12 seers in the previous year.

127. There are 70 tickets in force in the Quilandy fish-curing yard and if all the holders would conduct regular operations, this would be the best yard in the section. Hardly 30 curers resort to the yard regularly. The other curers bring in an occasional consignment to keep their tickets in force. The yard, however has done very well this year and operations show an increase. Here also private curing is carried on with bazaar salt and about 400 bags of salt are reported to have been consumed. Salt consumed in the yard is 5,542 maunds 28 seers against 3,021 maunds 31 seers in the previous year.

128. The Pudiappa yard is the best among the minor yards and has done exceedingly well this year, the consumption of salt being three times that of the previous year. The increase is attributed to very good catches of cat-fish and sardine. The progress of the yard is very satisfactory. Salt consumed this year is 2,473 maunds 26 seers against 731 maunds 34 seers in the previous year.

129. The Calicut North is another yard which did very well this year, the consumption being more than three times that of the previous year. The heavy increase in operations was due to good catches of cat-fish, small sole and sardine. Salt consumed is 5,627 maunds 26 seers against 1,870 maunds 18 seers in the previous year.

130. The Beypore South yard showed an increase in consumption of salt more than five times that of the previous year, viz., 1,259 maunds 26 seers against 225 maunds 5 seers. The good operations are due to heavy catches of cat-fish and sardine.

131. The Parappanangadi yard also had better operations and the salt consumed was double that of the previous year, viz., 4,121 maunds 28 seers against 2,131 maunds 15 seers. Good catches of cat-fish and sardine are responsible for the better operations.

132. The consumption of salt in the Mannalamkunnu yard showed a remarkable increase. It was 3,043 maunds 8 seers this year against 586 maunds 34 seers last year and 2,605 maunds 34 seers for 1931-32.

133. *Supply of salt.*—All the fish-curing yards possessed a good supply of salt at the beginning of the season. Altogether 146,400 maunds was purchased; of this 12,400 maunds were obtained at 1 anna 3 pies a maund, 126,400 maunds at 1 anna 5 pies a maund, and 7,600 maunds at 1 anna 6 pies a maund. As usual competitive tenders were called for and salt was transported during the year from Tuticorin to the West Coast exclusively by sea.

134. *Wastage of salt.*—A wastage of 867 maunds 10 seers occurred during the year against 992 maunds 7 seers in 1932-33. Of this 650 maunds 35 seers was due chiefly to monsoon floods and long storage, 74 maunds 1 seer was lost in inter-yard transport and 142 maunds 14 seers in the transport from Tuticorin. All the wastages were written off during the year except a wastage of 31 maunds 16 seers incurred in transport from Tuticorin and written off after the close of the year and 2 maunds 39 seers on which cost and duty were recovered from the contractor responsible for wastage in inter-yard transport.

135. *Balance of salt.*—The stock of salt on 30th June 1934 in the fish-curing yards on the West Coast was 152,109 maunds 15 seers against 159,625 maunds 29 seers on 1st July 1933.

136. *Demonstration of curing methods.*—Five thousand mackerel were cured in the demonstration shed at the Malpe yard at a cost of Rs. 10-14-0 and the cured-fish was sold for Rupees 13-2-0, resulting in a net profit of Rs. 2-4-0. The demonstration shed at the Calicut North yard standing in the name of the Headmaster, Fisheries Training Institute, was used only for two days in the year for curing 36 seers of Seer fish purchased for Rs. 2-6-0. The consignment was cured with 7 seers of salt and the cured product sold for Rs. 2-2-3.

137. *Standard curing-sheds.*—In the South Kanara district, 17 sheds were constructed during the year and the tickets of three curers who owned permanent sheds were cancelled. In Malabar seven sheds were constructed and the tickets of two curers cancelled. The number of permanent type-design sheds increased during the year from 536 to 555.

138. *Damage to yards.*—There was a slight encroachment of the sea at Hungarcutta and the western fence was damaged. The north-eastern portion of the Bockapatnam yard site is subject to erosion by the river at Bolur. A portion of the fence was washed away. The sea is encroaching on the Mangalore yard and the fence has been damaged to a length of about 30 yards. At Malpe the private-curing yard of Mr. Soma Markala has been affected by an encroachment of the sea. The sea entered the Mattool yard premises as usual and washed away a portion of the compound. The fence had to be set right several times and the curing-sheds near the fence have sustained damage. The proposal to shift the yard to a new site has been sanctioned by Government but the acquisition proceedings will take time as the site proposed to be acquired is held under a lease and the lessee has to be given 12 months' notice to enable Government to take possession of the site without paying him compensation. Owing to danger from the sea, no salt has been sent to the Mattool yard.

139. The Tellicherry yard continued to be threatened by the sea. In the beginning of the year a portion of the western side was washed away by the sea. At the close of the year, between the 4th and 13th June the fence on the west was completely washed away. It is proposed to put up a new fence at a distance of 20 feet from the present one. The Government building at the Kadalundi yard was accidentally destroyed by fire on 2nd February 1934.

140. *Miscellaneous—Petty construction and repairs.*—The Government have sanctioned the construction of two permanent store sheds at Malpe for Rs. 4,000 and one permanent store shed at Mangalore for Rs. 1,000.

141. The construction of the Ponnani yard building sanctioned in G.O. Ms. No. 403, Development, dated 1st April 1933, was completed during the year at a total cost of Rs. 5,100. The yard was shifted to the new site on 16th October 1933.

142. A new well was sunk in the Puthenkadapuram yard premises at a cost of Rs. 216. It is proposed to construct a platform to it during the current year.

143. Sanction has been accorded for the construction of permanent store sheds at Kootayi, Mannalamkunnu, Puthenkadapuram and Kadapuram but the construction had to be deferred for want of funds.

144. The two 'Gollahs' at Ponnani had to be vacated for repairs and the Government in G.O. No. 386, Development, dated 21st March 1934, sanctioned the renting of a private godown on Rs. 60 per mensem to store salt that arrived from Tuticorin in April 1934. Repairs have not yet commenced and the matter is under correspondence with the Public Works Department.

(b) Private Oil and Guano Factories.

145. One hundred and sixty-nine private oil and guano factories worked in the South Kanara district against 25 in 1932-33. The number of factories in Malabar that worked during the year was 132. During 1932-33 no factory worked in Malabar.

146. Oil-sardine, the continuous absence of which demoralized the fishing industry during the last few years, appeared in abundance and was caught in large quantities. But the demand for oil and guano was not encouraging, the market being very dull owing to the general trade depression. In spite of the fact that sardine was abundant, the fishermen did not benefit by the fish trade. Bengal used to consume a large quantity of fish oil in its jute mills but some of the mills are reported not to be working and Japan oil being available in the market at a very cheap rate, the demand from Bengal has been very poor. The following statement shows the quantity of fish oil and guano produced in Malabar and South Kanara, respectively.

	Oil.	Guano.	Fish manure.
	TONS.	TONS.	TONS.
South Kanara	820	5,000	9,600
Malabar	1,500	5,000	4,000

The price of fish-oil ranged between Rs. 40 and Rs. 120, guano from Rs. 20 to Rs. 30; and fish manure from Rs. 7 to Rs. 40 per ton, which is appallingly low compared with prices last year.

II. MINOR MARINE AND ESTUARINE FISHERIES.

A. Prawns.

147. The prawn investigations in the Collair lake are being continued and data regarding size, sex, availability or otherwise of fry, etc., are being noted during all seasons at regular intervals.

148. The attempt to secure Burmese markets for the Akividu prawns was continued, and full information regarding the position of the industry was furnished to Mr. S. Ahmed of Burma, who desired to engage in the trade. Mr. A. Rao Jattar, a dry fish merchant of Masanganj, Bilaspur, was also given the necessary information about prawns but no prawns could be sent as his request came after the close of the season.

149. Samples of prawns manufactured at the Government Experimental Station, Tanur, were shown to the prawn merchants of Akividu and others interested elsewhere. As a result Mr. C. Yerajaja Rao of Vizagapatam has applied for an agency at Vizagapatam for the sale of Tanur products.

B. Edible Oysters.

150. (i) OYSTER RESEARCH.—As stated in paragraph 123 of last year's report, the experiment with dead oyster shells as cultch spread on bamboo mats pegged to the muddy bed of the oyster park was found to be the most successful out of the four methods experimented with (paragraph 124 *ibid*). In order to rehabilitate gradually the depleted beds, mats with dead oyster shells are being added gradually to cover the entire mud flats in the beds. The experiments have shown (1) that growth is most favourable in the Chinnaparaval bed, (2) that spat fall occurs every month from January to June, though most abundant between February and May with a maximum about May, and (3) that the spat attain a maximum size of 81 by 58 mm. in $1\frac{1}{2}$ years.

151. (ii) SONAPUR BEDS.—Pending the establishment of an edible oyster farm at Sonapur the depletion of the live-oyster beds by the shell pit contractors is being guarded against. This March, the shell-lease for 1934-35 at Sonapur was not auctioned for want of bidders. The question as to the account to which the fishery rentals of Surla and adjoining swamps should be credited was referred to Government and their order (G.O. Ms. No. 3833, L. & M., dated 27th August 1934), that the income from shell and pearl fisheries is creditable only to provincial revenues has been

received since the close of the year. On the recommendation of the Fisheries Department, Government have written off the unpaid lease amounts during the last two seasons.

152. (iii) OYSTER SUPPLY.—The last season closed on 28th October 1933 and the current season commenced on 15th February 1934. The supply still continues. All the oysters were supplied from Gokulapalli beds as in the previous year. During the year 82,450 oysters were sold for Rs. 1,741-5-0 against 93,825 oysters sold for Rs. 1,899-12-0 in the previous year. The actual expenditure amounted to Rs. 1,663-5-0 against Rs. 1,810-12-0 in the previous year; the total receipts from the oyster farm, however, was Rs. 2,141-5-0 against Rs. 2,571-12-0 and the net receipts Rs. 478 against Rs. 761 in 1932-33.

153. (iv) SHELL LEASES.—In September 1933, it was apprehended that the dead 'mattee' shells lying in the area reserved for oyster culture in Ennur back-water would be washed into the sea during monsoon rains if not sold. The right to collect the shells was therefore sold for Rs. 100 for the period ending 31st December 1933 and subsequently the right to collect the mattee shells on the shores of Ennur back-water between miles 10/2 and 11/4 of the Buckingham Canal in the oyster area was auctioned for one year from 1st January 1934 for a sum of Rs. 300.

III. INLAND FISHERIES.

A. Research.

154. (i) RESEARCH ON RURAL PISCICULTURE.—The scheme of intensive research on Inland Pisciculture, including the opening of a Fresh-water Biological Station at Madras to be financed partly by the Imperial Council of Agricultural Research and partly by the Local Government, is awaiting allotment of funds by the Council. Expecting a grant from the Council in 1934-35, the local Government provided as the current year's allotment of its share a sum of Rs. 19,500 in the Budget Estimates of 1934-35 for the construction of fish ponds at Chetput. The Imperial Council not being in a position to give an assurance that they would finance the scheme during 1934-35 or 1935-36 the local Government have resumed the funds allotted and have ordered that the scheme should be renewed as a Part II Scheme for 1936-37. Out of the provision of Rs. 19,500 an amount of Rs. 1,500 has, however, been retained for the construction of a pond and store at the Government Brickfields at Chetput if the Military Department find a sale for the land and building at the Powder Factory occupied by the fish-farm.

155. (ii) DEEP-WATER TANK FISHING EXPERIMENTS.—There was much improvement in the water-supply of the reservoir at Mopad. Though the rains were not abundant, the reservoir began to receive a supply of water from the last week of August onwards and by the end of December the level was 18 feet above the sill level of the outlet. During the first three months of the fisheries year fishing was done in low water; in subsequent months it was conducted in more or less deep water. Owing to a storm in November the old boat was shattered; from then till the end of the year fishing experiments were done without a boat. With this great disadvantage the catch was naturally poor and further owing to the economic depression the demand was limited and the price of fish had to be reduced from 4 annas a pound to 3 annas a pound. The following statement gives details of the fishing methods employed, the number of fish caught, their total weight, etc., and the amount realized for the fishery year ending 30th June 1934 :—

Month.	Total number of fish caught.	Total weight in pounds.	Amount realized.	Names of implements used in the reservoir during the month.	Catla.	
					Number.	Total weight.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1933.			RS. A. P.			
July ..	1,834	1,803	150 4 0	Ennore net ..	815	1,254
August ..	1,354	1,182	97 0 0	Ennore, drift and cast net ..	570	672½
September ..	1,300	864	72 0 0	Cast net ..	205	154½
October ..	939	742	61 13 4	Drift net ..	365	320½
November ..	716	603	50 4 0	Drift and cast net ..	439	399½
December ..	864	588	49 0 0	Do. ..	141	129
1934.						
January ..	345	399½	33 4 8	Drift, cast and night line ..	2	
February ..	398	396	33 0 0	Drift and cast net ..	Nil.	Nil.
March ..	549	507	42 4 0	Do. ..	28	35½
April ..	459	459½	38 8 8	Do. ..	43	47
May ..	507	564½	44 4 0	Do. ..	49	61½
June ..	493	586	44 14 8	Do. ..	97	150½
	9,758	8,694½	716 9 4		2,759	3,226½

NOTE.—Column 2 shows the total number of fish caught including Catla.
Column 3 shows the total including the weight of Catla in column 7.

156. From the comparative figures given below it will be seen that the catch is less than that of last year by nearly 25 per cent, but is 30 per cent more than that of the preceding year. The low amount realized in 1933-34 is due to the small catch and reduction in price :—

	1931-32.	1932-33.	1933-34.
Number of fish caught ..	6,133	11,965	9,768
Weight of fish (lb.) ..	8,717	13,833	8,694½
Amount realized (Rs.) ..	812-1-4	1,197-7-5	716-9-4

157. For continuing the deep-water tank fishing experiments at Mopad Government sanctioned the purchase of a steel punt for Rs. 275 in the place of the old wooden boat which was wrecked

by the storm in November (vide G.O. Ms. No. 201, Development, dated 14th February 1934). The new steel punt built at Bezwada has been supplied to the station during the year.

158. (iii) FISH BREEDING—*Avalanche Hatchery for trout.*—The Avalanche hatchery was operated during the cold weather as usual. Anglers have been resorting to the Bhavanipuzha between Attapadi and Neeralai during the cold weather, and on 18th December 1933, one Mahseer weighing 30 lb. was reported to have been caught.

159. *Hilsa hatchery.*—The outhouses of the Bezwada Lock Bungalow with the compound containing the borewell have been retained pending the results of the hatching experiments now in progress at Bobberlanka to test its suitability as a permanent site for the hatchery. A shed and a ringwell were put up at Bobberlanka, and boring was done for testing the quality and finding out the level of the sub-soil water-supply. During the last Hilsa season attempts to hatch Hilsa eggs were not successful. The main difficulty felt was the distance between the boats plying the drift nets, which float down the river for some miles with nets trailing behind them. When a ripe female was secured and oozing eggs collected, it was not possible to secure immediately a male with milt for purposes of fertilization. The suggestion to speed up the fishing boat which takes the collector from one net to another by fitting it with an outboard motor should be tried next season. Apart from this main difficulty described above, the Hilsa fishing season was interrupted by the outbreak of cholera during October in the villages round about. The year was also marked by unseasonal and unusually high floods, so much so that as late as February large Hilsa were caught at Polavaram far above the Dowlaishweram anicut.

160. Hilsa investigations in the Godavari from the Dowlaishweram anicut to the sea were undertaken during the year and led to interesting and unexpected results. Regular visits to Narsapur and Razolu on the Vasishta Godavari, the main branch of the river, proved the existence of Hilsa of varying sizes throughout the year. This is the first record of a perennial Hilsa fishery in any South Indian river. Young Hilsa of 4½ to 8½ inches as well as adult Hilsa have been found, but a more extensive collection and a thorough study of the sizes and their seasons in relation to floods, fresh and brackish water as well as to tidal reaches, is expected to shed light on the little understood life-history of this migratory fish. At any rate the important fact that young Hilsa up to 8½ inches reside in the lower reaches of the river and do not

go to the sea seems fairly established. The investigation will be pursued in the ensuing year.

161. *Gourami*.—The Malayan fish, Gourami, are growing and breeding well in all the fish-farms. The experiments referred to in last year's report (paragraph 142) of placing small bundles of date fibre to enable the fish to utilize them for nest-building proved a great success both at Sunkesula and Præma. More nests were in evidence in both these farms, and in Præma more than 40 nests—an unusual number—were noticed during the year. Though the breeding ponds have not been netted for young fish the presence of large numbers of nests is an indication of extensive breeding.

162. The Assistant Inspectors in charge of fish-farms have been gaining experience in making scientific observations and notes and the following further information regarding the nest-building habits of Gourami has been gathered from the observations made during the year at the Sunkesula fish-farm. Both the male and female fish are found to take part in the building of the nest, which takes about a month to complete. Both the parents have been observed to guard the nest. The fish prefer shallow muddy places near the margin of the ponds where clumps of bulrush (*Typha elephantina* Roxb.) grow for nest-building. To begin with they scoop a hole in the muddy margin of the pond among the grass or bulrush. Then they carry in their mouth grass, fibre, weeds or other material available for nest-building to the selected spot and commence building a nest. The nests are securely attached to the grass or bulrush to counteract wind and wave-action. In most cases a small portion of the nest was visible above the surface of the water. This, however, might be due to a lowering of the level of water in the summer. As observed last year the nests measure 6 inches in diameter and 7 inches in height and are hollow cup-shaped structures of weed and grass and closely resemble birds' nests. They are set with the opening facing horizontally. The cup-shaped depression is lined with soft vegetable matter (weeds). While the fish are engaged in building the nest they are very pugnacious and do not allow even their own species to approach the spot. If the intruder is a solitary fish they chase it away but if many, the parents simply keep close to the nest on guard.

163. Indian waters unlike those of Europe and Japan present the pisciculturist with a peculiar problem of great difficulty, that of excluding from his ponds the ubiquitous murrel (*Ophiocephalus* sp.) a highly predaceous mud-fish which breathes air and can

travel long distances over land, and once in the pond can dive into mud when the pond is drained or runs dry and is consequently difficult to eradicate. Pond tortoises (*Geomyda* and *Lissemys*) and water snakes (*Tropidonotus piscator*) are also common everywhere, being capable of covering long stretches of country in search of ponds, and next to murrel are the chief enemies of the Pisciculturist. These three pests if uncontrolled will invade unnoticed the most secluded and jealously guarded fish preserves, and take so high a toll as to paralyse all attempts at culture. The ordinary mud-bunds of ponds, however high, are quite ineffective against the invasion of these insidious enemies. Hitherto, following the pattern of the otter fences of European fish-farms, small-mesh wire net fences sufficiently let into the earth at bottom have been in use as the only preventive measure known. Unless the mesh is very small—which adds considerably to the cost—a wire net fence does not prevent the intrusion of young snakes or murrel; besides the high initial cost, a wire net fence is expensive to maintain in India as it rapidly rusts and perishes. During the year under report a new and comparatively cheap preventive measure which will effectively and permanently exclude fish, snakes and tortoises of all sizes was devised after long experimentation. This is an important advance in the technique of Indian Pisciculture as it has no precedent in the accepted Western methods of fish-breeding. Murrel, snakes and tortoises are incapable of climbing smooth vertical surfaces about 24 inches high. The cheapest way to provide such a surface is to construct a dwarf parapet wall round the pond or to cement-plaster the outside of the bund to the required height. One of the two experimental ponds for tracing the causes which have prevented the proper breeding and growth of Gourami at Ippur (vide paragraph 143 of last year's report) was provided with such a ferro-concrete parapet wall.

164. Following the successful experiment conducted last year in a trial pit the saline water in the brackish pond was completely baled out and the pond was filled immediately with fresh water from the supply channel on 8th June 1934. The water has continued to be fresh till now. If the brackishness of the pond is successfully remedied and conditions in the two experimental ponds are equalized the projected experiments in Gourami culture will be started next year.

165. The ponds in the Mopad farm which had to be abandoned last year owing to failure of water in the reservoir were re-started this year, and three ponds were stocked with Gourami fingerlings from Sunkesula.

166. Mr. Bell of the Victory Memorial Blind School, Poona-mallee, who was supplied with 50 Gourami fingerlings in August 1932 for the school pond reports that the fish have grown well and bred and young of 3 inches and above are seen in the pond.

167. *Mullet*.—As in the previous years, mullet fry from estuaries were utilized for stocking a large number of provincialized tanks in the Kandukur and the Kavali taluks of the Nellore district.

168. *Catla*.—This fish continues to be caught in the Willingdon Reservoir where it was introduced. In the Dusimamandur tank, which was stocked with Catla in 1932, big fish measuring 2 feet were caught and sold for about Rs. 2-8-0 each in the Madras market. The Assistant Director (Inland) reports that this year for the first time since 1922 when the stocking of the Cauvery with Catla was undertaken, definite and reliable information has been received about the capture of this fish in the river in various stages of development and in appreciable numbers both in the Trichinopoly and the Tanjore districts. This information was furnished by fishermen, fish-lessees, fish-vendors in Trichinopoly market and Secretaries and members of fishermen societies. They described the fish correctly and said that they never saw fish of such a kind in the river before. But unfortunately he could not secure a specimen, as the season was late. The fish go by the names of 'Kanavaikendai,' 'Emanerikendai' and 'Emaneri' at the Willingdon Reservoir. Catla has been stocked in the upper waters of the Cauvery, first below the Hoginkal falls and later at Mettūr above the dam. In addition to this, a few hundred fish have been released during the past few years in the Veeranam tank, which is directly connected with the Coleroon, through Vadavar, in the hope that the fish would eventually find their way into the Coleroon and the Cauvery. This has now actually happened. From the statements given to the Assistant Director (Inland) by members of Fishermen Co-operative Societies and others, it is found that Catla was caught in the Vadavar—the branch that supplies the Veeranam tank—in the Coleroon between the lower anicut and the upper anicut, and in the several branches of the Cauvery. The stocking of the Cauvery above the Mettūr Dam will, no doubt, improve the fishery of the huge reservoir, and ultimately benefit the upper section of the river. A more intensive stocking of the Veeranam tank will directly help to establish the fish in the lower reaches of the Cauvery.

169. *Mahseer*.—Though introduced into the Mopad reservoir, no fish has been caught yet. The experiments for determining

the growth rate of this fish which were abandoned in the Mopad fish-farm due to water scarcity last year will be resumed.

170. *Chanos culture*.—The problem of finding suitable material for the construction of a water-tight dam on the Island is proving insuperable for the establishment of the proposed chanos farm on Krusadai Island. The *Chanos* fingerlings introduced into the large natural pond at Thonithurai, Mandapam, as reported in my report of last year (paragraph 153) are thriving in spite of the fact that ideal conditions for their growth do not exist there. The majority of the fingerlings when they were introduced on 6th July 1933 measured from 2 inches to 2½ inches. The measurements taken on 19th September show that their size now ranges from 12 inches to 17 inches. The results are thus very encouraging. Further efforts will be made to start the scheme for *Chanos* farming on the Krusadai Island.

171. Mr. K. Biswas, Curator of the Herbarium, Royal Botanic Gardens, Calcutta, to whom samples of 'Lab-lab,' the food of chanos fry, from the chanos swamp on Krusadai Island were sent, has furnished the following tentative report:—

"My examination of the preserved material leads me to the discovery of three specimens of Algæ, viz., (1) *Phormidium fragile* (Meghene) Gom, (2) *Microcoleus Chthonoplastis* (Fl Dau) Thurat, and (3) *Lyngbya lutea* (Ag.) Gom.

Of these algæ it appears that *Phormidium fragile* at first forms on sandy beds a sort of slimy medium for the growth of the two other algæ *L. lutea* and *M. Chthonoplastes*. Of these *L. lutea* appears to be the dominant species forming an expanded pannose layer of reddish brown colour."

172. For the first time a successful attempt was made to transport 'chanos' (milk-fish) fingerlings from Krusadai Island, Pamban, to the Ippur farm. One hundred and sixty-one fingerlings were conditioned and sent from Pamban on 25th June 1934. The consignment reached the farm in good condition notwithstanding the long distance, the summer heat and the time occupied by the tedious journey, and were released in one of the ponds. A second consignment of 175 fingerlings were sent to Ippur on 16th July 1934 from Krusadai Island for culture. Further consignments will be obtained and a study of the culture of this species will be conducted. The brackish water at Ippur is particularly suitable for the fish.

173. The proposal to convert the channels between the Bahuda river and the Yegasingi in Sonapur, Ganjam district, into a fish-farm is pending the application of M.R.Ry. P. Narayanaswami Nayudu Garu, Proprietor of the Chandanavada Estate to the District Board, Ganjam, for the lease of the fisheries of the channels concerned. For this and the Pundi farm proposed by

M.R.Ry. V. Kameswara Rao Nayudu Garu, Zamindar of Pundi, Ganjam district, the availability of chanos in the vicinity is being investigated.

174. *Experiments in well-culture at Coimbatore.*—Nine irrigation wells in the Coimbatore Agricultural College grounds were stocked in 1928–1932 with *Etroplus*, Catla, and Carp, and as a result it has been proved that such fish grow in wells with a minimum of attention and expenditure. The Inspector of Fisheries, Nilgiris, has been asked to continue the experiments especially with species of Bhavani carp and cat-fish.

B. Administration.

175. (i) FISH FARMS—*Sunkesula.*—Gourami and *Etroplus*, the two varieties which are grown in this farm continued to thrive and multiply.

Gourami thrive and bred well during the year. Two hundred Gourami fingerlings bred in the farm were transferred to the Mopad farm for initiating the fish farm there. In addition, 100 young Gourami were sold to His Exalted Highness the Nizam's Government, and 12 to the Maharaja of Pithapuram for Rs. 117. Two hundred and seventy-four big Gourami weighing 437 lb. were sold to the public for Rs. 112–14–9.

176. *Etroplus* continued to breed very satisfactorily and the provincialized waters in the Ceded Districts were as usual stocked with young.

177. The loose stone wall round the farm has stopped the depredations of crocodiles.

178. *Præma fish farm.*—There was no dispute over the division of the water-supply to the fish farm and the ryots this year as there was heavy rainfall and an abundant supply of water. A conference was held at Præma in July 1933 by the Collector of Kurnool to which officers of the Public Works, Forest and Fisheries Departments and representatives of the ryots were invited. After full discussion it was decided by the Collector that during the non-cultivation season the discharge of water should be shared equally by the fish farm and the ryots, and during the cultivation season the ryots should get three-fourths share. To distribute the water according to the above settlement, the head sluice was remodelled by the Public Works Department at a cost of Rs. 113.

179. The experiment of placing small bundles of fibres of date palm in Gourami ponds to promote nest-building and breeding was very successful here. Since fish are breeding freely, the necessity for more ponds in the locality is being felt. The present discharge

of Bhiravanandi (Bairani) spring is insufficient to supply water to additional ponds and even the supply to the existing 4 ponds is always grudged by the ryots. During the inspection of the farm in January 1934 I undertook a survey of the neighbouring Reserve Forest and discovered an extensive swamp with permanent water holes. To test the quality and quantity of the water-supply for fish-farm purposes trial pits were dug in selected places by the Assistant Director. In a six-foot deep pit there was a depth of 41 inches of water after 24 hours. This quantity neither increased nor decreased through the summer. The water was clear and sweet and when tested by placing a few fish was found suitable. If big ponds could be dug in this swamp with the consent of the Forest Department, the farm operations could be considerably increased without further disputes with ryots over water-supply and without any cost other than that of digging the ponds. The matter is under correspondence with the Forest Department.

180. There is a great demand for Gourami at Nandyal and the supply from the farm at present is nowhere adequate to the demand. One hundred and thirty-one Gourami weighing 168½ lb. were sold for Rs. 42–1–0 to the public during the year.

181. The *Etroplus* in the two circular ponds continued to breed and the young were distributed among the provincialized waters in the neighbourhood.

182. *Ippur fish farm.*—The work of the farm continued on the usual lines. The Gourami transferred to the farm from Mopad continued to thrive but their growth and breeding is very unsatisfactory. Until the experiments in the two trial ponds are complete no remedy can be proposed for this problem. The *Etroplus* as usual did very well in the farm; their fry were stocked in the provincialized tanks of the neighbourhood. For the first time an experiment in *Chanos* culture was started, and the two consignment of 161 chanos and 175 fingerlings from Krusadai Island received on 26th June 1934 and 16th July 1934 in good condition were placed in a pond specially set apart for them.

183. *Powder factory fish farm.*—The normal work of the farm continued satisfactorily. The Chetput scheme for a central research farm not having materialized the farm continued in the old Gun Powder Factory, Perambur. The Gourami were prolific as in previous years.

184. *Vellore Fort-moat fish farm.*—The routine work of the farm continued on satisfactory lines. The moat was stocked with 563 catla-fingerlings from the Godavari river during the year. To keep the water level low, the storm water from the Nakkal kalva

was not diverted into the moat. The lease of the fishery, lotus leaves, grass, etc., fetched Rs. 1,250 during the year as against Rs. 1,000 in the previous year. The moat was kept free of mosquito larvæ by a good stock of larvicidal fish.

185. *Mopad fish farm*.—The reservoir received a supply of water during the last north-east monsoon. The farm which had to be closed in the previous year for want of water was reopened and three ponds were stocked with Gourami fingerlings. The remaining ponds will be filled after the hot weather.

186. *Chingleput Fort-moat fish farm*.—The low level of water in the Kolavoy tank due to failure of rains, together with the incessant demand of the Reformatory School authorities for the conversion of a section of the moat into a playground hampered the work of the farm. All the sections could not be stocked with fish. Two sections were stocked with 1,175 catla during the year, and a sum of Rs. 104 was realized by the sale of fish. Government having negatived the proposal of the Reformatory School to fill up an important section of the moat (G.O. Ms. No. 369, Development, dated 19th March 1934) arrangements will be made to stock this section and the one adjacent to it with Gourami. The moat is being kept clean and stocked with larvicidal fish to keep down mosquito nuisance.

187. (ii) *GANJAM TANK STOCKING SCHEME*.—In view of the proposal to constitute a new province of Orissa, which will absorb the northern portion of the Ganjam district, Government have ordered the postponement of the scheme till the formation of the new Province (G.O. Ms. No. 874, Development, dated 29th June 1934).

188. (iii) *METTUR PROJECT SCHEME*.—After a careful investigation in consultation with the Superintendent of Works, Cauvery-Mettur Project, a modest scheme for the establishment of a fish-farm at Mettur was drawn up and submitted to Government, but no funds were available owing to Financial stringency—Memorandum No. 2819-II/33-7, Development, dated 16th February 1934.

189. In the meantime the Superintendent of Works reported the prevalence of extensive poaching in the lake. Pending sanction of the fish-farm scheme the Government ordered the safeguarding of the lake fishery by the local Public Works Department staff. On a joint enquiry made by the Assistant Director (Inland) and the Superintendent this was found impossible. A proposal to appoint a preventive establishment consisting of an Assistant Inspector and staff of watchers in important villages bordering on the lake, assisted by a motor launch, is under the consideration of Government.

190. (iv) *PERIYAR PROJECT FISHERY*.—On a complaint received from the Travancore Government about the indiscriminate destruction of fish, more especially of Mahseer, in the Periyar lake, this Department was requested to investigate and report not only on the measures to be taken to prevent the alleged Mahseer destruction, but also on the advisability of provincializing and developing the lake fishery. On a preliminary inspection of the lake in June, it was found that the protection of the fisheries would require (1) adequate provision in the laws of the Travancore State for the punishment of poachers, (2) a registration of boats in use on the lake for the ready detection of illicit fishing and control of the activities of poachers, (3) the appointment of a preventive staff, and (4) the provision of facilities for the local Public Works Department staff to prosecute offenders in the State courts. For the development of the fisheries of the lake, a suitable site for a fish farm will have to be selected and the cost of its construction estimated. The fisheries and biological conditions of the lake will need a further examination when the lake is low in January or February. The development of the fishery of the lake will naturally lead to the question of the acquisition of the fishery rights of the irrigation tanks of the Madura district fed by the Periyar system. The nature of the fishery rights in them, their rentals, etc., have to be ascertained. Government were therefore asked for sufficient time to frame a report. Since the close of the year Government have ordered the submission of the report by April 1935.

191. (v) *PISCICULTURAL SURVEY—Perennial springs in the Chingleput and Chittoor districts*.—The Kambakkam spring referred to in last year's report (paragraph 164) was inspected and further investigated. A sufficient discharge of water even in the height of summer for the purpose of a fish farm was found. The spring at Satyavedu not having proved quite satisfactory a further search for a suitable pond or tank for the proposed breeding of catla has to be made.

192. (vi) *STOCKING OPERATIONS AND RESULTS*.—The failure of rains in the Chingleput district resulted in a partial supply of water in almost all the provincialized tanks of the district. The stocking operations were therefore very restricted.

193. *Catla*.—The following waters were stocked with catla fingerlings at a cost Rs. 693-2-9 :—

			Fingerlings.
(1) Vellore fore-moat farm	...	562	,,
(2) Cauvery above Mettur Dam	...	2,247	,,
(3) Veeranam tank	...	600	,,
(4) Chingleput fort-moat farm	...	1,175	,,
(5) Mopad reservoir	...	962	,,

Fingerlings.

(6) Attigunta tank, Nellore	...	300	..
(7) Chembarambakkam tank	...	300	..
(8) Dusimamandur	...	300	..

The Cauvery above the Mettur Dam was stocked with 2,247 catla against 2,083 in the previous year.

194. (vii) DISPOSAL OF FISHERIES BY PRIVATE TENDERS.—To combat local combination, Government sanctioned the disposal of the following fisheries by accepting private tenders:—

Name of tank.	Highest bid in auction or offer by tender.		Amount obtained by private tender (annual rental).		Annual compensation.	
	RS.	A. P.	RS.	A. P.	RS.	A. P.
Kurnool district—						
Kanala tank	Nil.		400	0 0	Not known.	
Nellore district—						
Kodanuthalle tank ..	11	0 0	* 30	0 0	25	0 0
Kovurpalle tank ..	11	0 0	20	0 0	34	0 0
Kodavaluru tank ..	..		61	0 0	58	0 0
Alluru large and Ramanna tank ..	..		750	0 0	1,412	0 0
Rajavolu tank ..	..		21	0 0	5	0 0
Pandipad tank ..	..		12	0 0	1	8 0
Chiramana big tank ..	6	0 0	40	0 0	9	4 0

* Per year for three years.

195. Owing to determined combination among the villagers, the Tinnanore tank fishery secured in public sale only Rs. 230. The tank was therefore fished departmentally and a sum of Rs. 560 was realized.

196. Ayyavarikodur tank under the Kurnool-Cuddapah canal was fished departmentally as its fishery fetched only Re. 1 by sale. A sum of Rs. 11 was realized.

197. (viii) DISPOSAL OF FISHERIES BY PUBLIC TENDERS.—In the Nellore district the system of leasing tanks by inviting closed tenders gave very good results. The system was introduced into the Chingleput district during the year, but being new the response was not encouraging. In the case of some big tanks the rentals obtained were good.

198. (ix) FISHERY SALES.—Drought in the Chingleput district and the continued economic depression felt more acutely this year than in any previous year, continued to lower fishery rentals from provincialized waters. The fall was very marked in the case of big fisheries, such as the Cauvery-Coleroon fisheries in the districts of South Arcot, Tanjore and Trichinopoly. In these districts the rentals in some cases went down nearly 50 per cent, the scarcity of money; the low purchasing power of the people, and the cheapness of foodstuffs, being the main causes. Unless financial and other conditions improve, there appears to be no chance of securing better rentals. The total income during the year was Rs. 91,299-6-3 against Rs. 1,02,367-7-2 in the previous year.

199. Hitherto the provincialized fisheries were auctioned by the local Public Works and Revenue Departments. The system was not satisfactory. To achieve uniformity of method and policy Government in G.O. No. 2214, Revenue, dated 6th December 1933, ordered that all fishery sales should be conducted in future by the Revenue Department and have specified the procedure to be adopted.

IV. CROWN MONOPOLIES (PEARL AND CHANK FISHERIES).

A. RESEARCH.

200. (i) CHANK MARKING EXPERIMENTS.—Five hundred and fifty-one young shells were marked and liberated during the season in the chank beds off Tuticorin in 9-10 fathoms. As in the previous year, the beds frequently resorted to by the divers were selected for releasing marked shells. The number of shells liberated in each bed are as follows:—

Name of the bed.	Depth.	Number of chank let out.	Number.
1 Melaonbathu Par	9½ fms.	C. 450—C. 565	116
		C. 901—C. 975	75
2 Vadaolipathu Par	9½ fms.	C. 566—C. 638	73
3 Athombathu Par	9 fms.	C. 639—C. 700	62
4 Janathu Par	10 fms.	C. 701—C. 900	200
		C. 976—C. 1,000	25
			551

Fifteen marked shells were refished during the current season. The rate of growth noted in the 15 shells is given below:—

Number of shell recovered.	Date of liberation and recovery.	Where liberated and recovered.	Length when liberated and recovered.	Diameter when liberated and recovered.
(1)	(2)	(3)	(4)	(5)
A. 81	5th May 1932; 18th November 1933. Interval—1 year 6 months 13 days.	Liberated—W. of Melaonbathu—9½ fms. Recovered—Melaonbathu Par—8½ fms. Distance travelled—½ mile.	81.5 mm. 103 mm. Difference. 21.5 mm.	45 mm. 55 mm. Difference. 10 mm.
A. 84	5th May 1932; 11th January 1934. Interval—1 year 8 months 6 days.	Liberated—W. of Melaonbathu—9½ fms. Recovered—Janathu Par—10 fms. Distance travelled—3 miles.	81.5 mm. 105 mm. 24 mm.	43½ mm. 54 mm. 10½ mm.
B. 18	29th December 1932; 19th February 1934. Interval—1 year 1 month 21 days.	Liberated—Vadaolipathu—9½ fms. Recovered—Melaonbathu—10 fms. Distance travelled—1 mile.	98 mm. 102 mm. 4 mm.	44 mm. 56 mm. 12 mm.
C. 67	11th February 1933; 11th January 1934. Interval—11 months.	Liberated—Vadaolipathu .. Recovered—Janathu Par .. Distance travelled—3½ miles.	102 mm. 103 mm. 1 mm.	46 mm. 52 mm. 6 mm.
C. 74	11th February 1933; 22nd December 1933. Interval—10 months 11 days.	Liberated—Vadaolipathu .. Recovered—Do. .. Distance travelled—½ mile.	100 mm. 101 mm. 1 mm.	50 mm. 52 mm. 2 mm.
C. 105	25th February 1933 .. 29th November 1933 .. Interval—9 months and 5 days.	Liberated—Vadaolipathu .. Recovered—Vadaolipathu .. Distance travelled—½ mile.	100 mm. 100 mm. 9 mm.	50 mm. 52 mm. 2 mm.
C. 148	30th March 1933 .. 12th December 1933 .. Interval—8 months and 29 days.	Liberated—Aluwar Par .. Recovered—Aluwar Par .. Distance travelled—½ mile.	104 mm. 114 mm. 10 mm.	50 mm. 55 mm. 5 mm.
C. 166	1st April 1933 .. 22nd November 1933 .. Interval—7 months and 21 days.	Liberated—Vadaolipathu .. Recovered—Melaonbathu .. Distance travelled—2 miles.	103 mm. 106 mm. 3 mm.	44 mm. 50 mm. 6 mm.
C. 168	1st April 1933 .. 18th November 1933 .. Interval—7 months and 17 days.	Liberated—Vadaolipathu .. Recovered—Melaonbathu .. Distance travelled—2 miles.	102 mm. 105 mm. 3 mm.	48 mm. 56 mm. 8 mm.

Number of shell recovered.	Date of liberation and recovery.	Where liberated and recovered.	Length when liberated and recovered.	Diameter when liberated and recovered.
	(2)	(3)	(4)	(5)
C. 195	5th April 1933 .. 18th November 1933 .. Interval—7 months and 13 days.	Liberated—Tholayiram Par .. Recovered—Melaonbathu .. Distance travelled—1½ miles ..	100 m.m. 102 m.m. 2 m.m.	46 m.m. 50 m.m. 4 m.m.
C. 208	5th April 1933 .. 20th February 1933 .. 9th February 1934 .. Interval—8 months and 15 days.	Liberated—Thomaliram Par .. Recovered—Janathu Par .. Again recovered—Melaonbathu .. Distance travelled—1½ miles ..	111 m.m. 114 m.m. 116 m.m. 3 & 2 m.m.	46 m.m. 54 m.m. 64 m.m. 8 & 10 m.m.
I.	Interval—1 month	Do. 1 mile ..	..	..
C. 327	15th April 1933 .. 28th December 1933 .. Interval—8 months and 13 days.	Liberated—Vadaolipathu .. Recovered—Saithonbathu .. Distance travelled—3 miles ..	103 m.m. 109 m.m. 6 m.m.	48 m.m. 52 m.m. 4 m.m.
C. 520	12th January 1934 .. 3rd April 1934 .. Interval—2 months and 21 days.	Liberated—Melaonbathu .. Recovered—Melaonbathu .. Distance travelled—¼ mile ..	98 m.m. 98 m.m. ..	52 m.m. 55 m.m. 3 m.m.
C. 562	12th January 1934 .. 3rd April 1934 .. Interval—2 months and 21 days.	Liberated—Melaonbathu .. Recovered—Melaonbathu .. Distance travelled—¼ mile ..	102 m.m. 106 m.m. 4 m.m.	54 m.m. 54 m.m. ..
C. 831	16th March 1934 .. 3rd April 1934 .. Interval—17 days	Liberated—Janathu Par .. Recovered—Melaonbathu .. Distance travelled—2 miles ..	103 m.m. 103 m.m. ..	55 m.m. 55 m.m. ..

From the above it is seen that a chank (C 831) has travelled 2 miles in 17 days. This works out to about 1 furlong a day which is a surprisingly fast rate of progression for a sluggish Mollusc that has to plough its way through sand or mud. The maximum rate of growth in length noted was in the chank (A 84) which has grown 24 mm. in length, in a period of 1 year 8 months and 6 days, i.e., 1.33 mm. per month. The maximum growth in diameter noted was in the chank C. 208 which is 1.8 mm. per month. After reaching a certain size the increase in girth evidently exceeds that in length in the case of chanks.

201. (ii) CHANK DREDGE.—The new dredge supplied by Messrs. A. R. Pawle and Company, Brightlingsea, was tried and a number of hauls were made. The dredge was not found suitable for collecting chanks. It is light and skims over the bottom and consequently misses the chanks that remain mostly buried underneath. It brought up fairly large quantities of bottom material including chank egg capsules, but only a few chanks. The destruction of the egg capsules and the poor catch of mature chanks are serious disadvantages, compared with diving. The dredge was also found to be too heavy for easy manipulation. It could be operated only from 'Lady Nicholson' and needed 6 men to haul it up even in fine weather.

202. (iii) DIVING EXPERIMENTS.—No experiments were carried out during the year for want of apparatus. The old mask had perished. A plaster cast was taken of the diver's face and a new face mask was ordered from Japan. In G.O. R. No. 100, Development, dated 28th March 1934, Government postponed the purchase of a new engine and two stage compressor and directed me

to resubmit the proposal in 1934–35 for sanction when the requisite amount for their purchase could be reappropriated.

B. Administration.

203. (i) INSPECTION OF PEARL BANKS.—The 19 banks in Palk Bay comprising the third or northern division of the Madras Pearl Banks last inspected in 1930–31, were inspected during the year.

All the banks examined were bare of oysters. There is no prospect of a pearl fishery for the next few years.

The inspection was commenced on the 8th March and concluded on the 20th March 1934 and was carried out in the usual manner with divers working in parallel lines in rectangular plots. As the weather was fine at the time, the actual time spent on inspection was only 13 days and it was possible to locate all the beds without difficulty. "Lady Nicholson" was commissioned for the work.

204. The Ceylon Fisheries Department with a view to economy conducted the inspection of the Ceylon banks this year on the other side of the Gulf of Manaar entirely by dredging. In India this method may not be economical, and it is doubtful if it is sufficiently efficient. The maximum wages paid to a full complement of divers is only Rs. 35 per day. In dredging the engines of the vessel will have to work the whole time. This would mean at an average Rs. 10 per hour and for a minimum of 5 hours work, it would cost at least Rs. 50 per day. A few divers will have to be entertained in any case for verifying the results obtained by the dredge.

205. *Tuticorin banks.*—As in previous years a cursory inspection was also made of the Tuticorin banks which have yielded all the recent fisheries at Tuticorin. A few oysters were found on these banks. The oysters collected were transported alive to the oyster park at Krusadai Island on board the "Lady Nicholson."

206. The Tuticorin banks, which are the most important of our banks, continue to be in the same condition as last year. Few oysters exist, mostly scattered, and of no fishable value. Other molluscs like *Modiola*, *Avicula*, etc., abound. The condition appears identical with that of the Ceylon banks as will be seen from the following extract from the Ceylon Report for 1933–34 published recently—

"The survey of the pearl banks made during March and April of this year revealed a promising sign of a repopulation of the banks; small branches of oysters (first year ones) were found scattered over most of the pair areas and in particular over the West Cheval, usually the first pair

to receive a spat fall after a long period of barrenness. These oysters are not in themselves of any fishable value, but they are important in that they may produce subsequent spat fall to repopulate the banks, other conditions being favourable."

During the inspection of the Rameswaram banks it was discovered that pearls found in a pearl oyster washed ashore at Dhanushkodi were disposed of by the finder to a Pamban merchant. The empty shell was recovered. It was found to be a fully grown one and had been probably brought by the current from the adjoining Ceylon banks or may be a stray oyster from the Indian beds. The matter was reported to the Police at Rameswaram for investigation. The Sub-Inspector of Police forwarded to the Assistant Director, Pearl and Chank Fisheries, a statement from the finder of the oyster that two pearls were found in them and that they were sold to Janab K. T. M. T. M. Abdul Kyoom Sahib, the Tuticorin chank fishery contractor, for a sum of Rs. 31-1-0. The latter admitted this and sent the pearls, to the Assistant Director. As the case is the first of its kind and Government exercise monopoly rights over pearl fisheries the matter was reported to Government, who ordered that the value of the pearls should be recovered from the finder and the pearls returned to the purchaser (G.O. Mis. No. 1116, Development, dated 4th August 1934 and Memorandum No. 3085-II/34-1, dated 6th September 1934).

207. (ii) TINNEVELLY CHANK FISHERY.—Four lakhs forty-one thousand five hundred and twenty shells were fished against 309,226 shells in the previous season. The catch would have been even greater had the fishery not been stopped for 11 days for want of funds.

208. *Advance to divers.*—At the beginning of the season an advance of Rs. 10-14-0 was outstanding with the divers. During the season an advance of Rs. 100 was issued, making the total advance as Rs. 110-14-0. Out of this, a sum of Rs. 107-6-0 was recovered.

209. *Boat loans to divers.*—There was a balance of Rs. 48 outstanding at the beginning of the season out of the sum of Rs. 100 sanctioned to diver Madaswami of Tuticorin in G.O. Mis. No. 935, Development, dated 11th July 1932. A sum of Rs. 42 was recovered from him with interest due. The balance of Rs. 6 will be recovered from him in due course. The grant of a loan of Rs. 75 to diver Katchu Muhammad of Tuticorin was sanctioned in G.O. Mis. No. 1495, Development, dated 7th December 1933. A sum of Rs. 14 has been repaid by him leaving a balance of Rs. 61.

210. *Recruitment of divers.*—The prevailing depression and scarcity of money prevented the Kilakarai divers from going to the Ceylon chank fisheries from February to April. The divers therefore sought work either at Tuticorin or Rameswaram. It was possible to enlist in all 177 foreign divers with 10 dhonis and 4 canoes, and 72 local divers with 14 canoes, for the fishery. The diving labour consisted of 184 foreign Muhammadan divers and 65 local divers.

211. *Quarters for divers.*—The foreign divers were housed in the old Police lines.

212. *Fishing operations.*—The fishery lasted for 187 days from 6th November 1933 to 11th May 1934 during which fishing was conducted for 132 days. Twenty-three days were lost on account of unfavourable weather, 11 days for want of funds, and the remaining 21 days were Sundays and holidays. The largest catch made by a diver on any one day was 180 chanks valued at Rs. 11-4-0, against 222 chanks valued at Rs. 13-14-0 in the previous season. The average earning per head per day during the working days was Rs. 1-14-1 and for the total period of the fishery was Rs. 1-5-3 against Rs. 1-14-11 in the last year.

213. The maximum daily catch on any one day was 8,910 chanks against 7,434 in the last season.

214. The fishery had to be stopped for a few days in March for want of funds just when the divers began to get good catches. Foreign divers got discouraged and most of them returned to their native places with their dhonies.

215. *Catches.*—Comparative statistics for the three years ending 1933-34 were as follows:—

	1933-34.	1932-33.	1931-32.
Full-sized	441,520	309,226	309,943
Under-sized	26,069	27,428	17,016
Wormed	79,010	39,971	62,716

Six chank beds were inspected and buoyed during the season. Fishing was confined to the beds in the vicinity of Tuticorin. The number of chanks fished according to the beds were:—

Melaonbathu	117,888
Janathu Par	71,002
Vadaolipathu	52,669
Thundan Pars	36,028
Soltan Par	34,322
Saithonbathu	33,274
Vadaombathu	28,531
Siluvai Par	8,453
Other banks off Tuticorin	59,353
Total	441,520

216. *Immature shells*.—Out of the 41,528 undersized chanks brought ashore inadvertently, 15,459 were returned alive to the sea.

217. *Valampuri shells*.—No Valampuri shell was obtained this year. The one obtained in the 1929-30 season was sold for Rs. 750.

218. *Idinthakarai chanks*.—Four hundred and ninety-two shells were collected in nets against 850 last season.

219. *Contract*.—Tenders were called for for the disposal of the 1932-33 season chanks. Only one offer was received and this was from Messrs. K. T. M. T. M. Abdul Kyoom Sahib Hussain Sahib for Rs. 201 for 1,000 full-sized chanks (Rs. 30 over the previous year's rate) and Rs. 10 for 1,000 under-sized and wormed shells. In making the offer, the firm applied for an extension of the time of payment for a period of 4 months from the date of intimation of acceptance as the market was dull. The Government in their Order Mis. No. 155, dated 1st February 1934, were pleased to sanction the sale at the above rates and grant the extension of time for payment.

Within the prescribed period the firm paid for and took delivery of only 170,000 shells and applied for another extension of time until 31st August 1934, which request was also granted—vide G.O. No. 815, Development, dated 19th June 1934. The contractors took delivery of 220,000 shells during the year under review, leaving a balance of 90,076 shells to be taken delivery of in 1934-35.

220. *Temperance*.—Tea and coffee stalls for divers were as usual permitted within the chank godown premises. This had a wholesome effect on the men and prevented them from resorting to drink.

221. (iii) *TANJORE CHANK FISHERY*.—For the lease of this fishery for one year from 1st July 1933 two offers were received, that of M. K. Shunsudeen Maricair of Pondicherry for Rs. 1,111 being the higher was accepted.

222. (iv) *SOUTH ARCOT CHANK FISHERY*.—The lease of this fishery was granted to Mr. M. K. Shumsudeen Maricair of Pondicherry for Rs. 201 for one year from 1st July 1933.

223. (v) *CHINGLEPUT AND NELLORE DISTRICTS CHANK FISHERIES*.—Of two tenders received, the offer of Mr. M. K. Shumsudeen Maricair of Pondicherry for Rs. 101 being higher was accepted for the year 1933-34. The rate though considerably lower than that of the previous year (Rs. 417) per 1,000 shells had to be accepted in the absence of any higher offer.

V. BIOLOGICAL SPECIMENS SUPPLY.

224. Circular notices describing the set of museum specimens for secondary schools were sent out to all important high schools all over India. The advertisement and the reduced price resulted in 10 more orders of which 6 were supplied up to the end of the year.

225. The value of specimens supplied during the year was Rs. 3,256-1-0 against Rs. 1,582-12-0 last year. As usual the colleges and the universities obtained their requirements of specimens for practical classes and research from the station.

226. A collection tour was made by the Research Assistant, Ennur, during April and May to Tuticorin and Pamban. Arrangements were made with the staff of Krusadai Island for the preservation of holothurians and other specimens required for supply work.

227. *Oyster Shell grit*.—During the year 4,060 lbs. of poultry grit were supplied to various customers throughout India for Rs. 225-10-0. Small factories for the supply of grit have sprung up in Bihar and Orissa and other places in Northern India following the example set by Ennur.

VI. ANTI-MALARIAL WORK.

228. The annual anti-malarial operations in the Nallamalais (Kurnool district) was carried on as usual and 56 permanent water holes were stocked with 19,000 fish.

229. The Conservator of Forests, Bellary, wanted to know whether the continued stocking of Nallamalai springs with larvicidal fish had abated in any appreciable way the incidence of malaria in that locality. The Assistant Director (Inland) did not find time to visit the Nallamalais and report on the question during the year.

230. A good stock of larvicidal fish was maintained in the Chingleput and Vellore fort moats to keep down mosquito nuisance.

The Principal, Voorhees College, Vellore, was supplied with 200 *Haplochilus*.

231. The cost of anti-malarial work done by this Department during the year was Rs. 132. One hundred and fifty *Barbus Vittatus* (a larvicide suitable for small fountains) were supplied to Mrs. Dodd of the Women's Christian College for Rs. 5.

VII. SOCIO-ECONOMIC WORK.

A. Education.

232. (i) WEST COAST—(a) *Fisheries Training Institute, Calicut.*—The Institute reopened after the midsummer vacation on 7th August 1933 and closed on 22nd June 1934.

233. *Students.*—The total number of pupil-teachers under training in the course of the year was 12. Of these 4 were men students who were admitted in 1931 and were completing the last year of their three years' course; 8 were trained women teachers who were admitted for the final year's course on 5th September 1933. All the men students belonged to the fishing community. Out of 8 women students, 2 belonged to the fishing community, 3 were Christians and 3 were Thiyyas. The rates of stipends given to the pupil teachers were revised, Rs. 11 being fixed for women and Rs. 9 for men. (G.O. Mis. No. 922, Development, dated 31st July 1933.) All the pupil-teachers were of the higher elementary grade. Twenty-three students sat for the final examination held in June 1934. Of these 12 were students who attended the Fisheries Training Institute in 1933-34, 3 were lower elementary grade students who were permitted to sit for the examination to raise their certificates to the higher elementary grade and 8 were students who had failed in previous years. Eleven out of 12 new students, 1 out of the 3 lower elementary teachers and 4 out of the 8 students who failed in the previous year, passed. There was also one student, a graduate, deputed by the Travancore State, who attended the Fisheries Training Institute for 6 months.

234. *Work at the Institute.*—The District Educational Officer inspected the Institute on 27th January 1934. The carpentry work was inspected by the Inspector of Industrial Schools on 15th June 1934. Practical work in canning, curing and smoking of fish and prawns was done in the Fisheries Training Institute. The students also cured fish in the model shed of the fish-curing yard. The students as usual visited Tanur and observed the manufacture of fish oil, guano and fish-meal on a commercial scale. A beginning was made in practical work on Pisciculture this year and *Etroplus suratensis* was stocked in the Fisheries Training Institute ponds. The men students went on excursion to the South Kanara coast in December 1933 to observe the fishing industry there. The lessons in Zoology were given as before by the Research Assistant, West Hill, and in navigation by the Inspector of Fisheries, Tuticorin, in January and February 1934. As the "Sutherland" was laid up for repairs, it was not used this year. A sailing boat was used instead for practical work. The School Co-operative Society worked successfully and some defects, which

had affected the society since 1930-31, were rectified. The school garden has been greatly improved. But the literary society, the games club and the scout troop could not do any work owing to the small number of men students. The hostel attached to the Institute was run in two rented buildings, one for men and the other for women. All the students of the Institute were inmates of the hostel.

235. (b) *Village schools.*—The number of schools remained the same as last year, viz., 36 day schools, including the model school attached to the Fisheries Training Institute and the Vellayil night school.

236. *Strength.*—The number of children attending the schools rose from 3,779 to 3,917. Of these 2,545 were boys and 1,372 girls.

237. There has been a remarkable increase in the strength (from 167 to 210) of the Madapalli school. There are six aided schools in the neighbourhood of this school and complaints are being received of unhealthy rivalry. Several fisher-children are attending the aided schools.

238. One great hardship to which the pupils of the Madapalli school are put is the want of a foot bridge to cross the canal east of the school. In summer when the canal mouth is blocked the water level rises to over 4 feet and children are unable to cross the canal without help. A proposal was submitted to put up a foot bridge but under instructions from Government the district board has been addressed. The Kuriyadi school is another school which suffers from competition from two schools close by. The Chaliyam school is showing progress. The daily attendance in Parappanagadi school was very irregular last year but during the year under review the attendance has much improved. The improvement is attributed to some changes made in the staff including the posting of a headmaster who takes interest in his work.

239. *New schools.*—The proposal of the department to take over the management of the private school at Cheruvattur was sanctioned by Government in G.O. No. 456, Development, dated 7th April 1934, but the management has not yet been transferred as the District Educational Officer, South Kanara, whom the Assistant Director (Coast) consulted, advised him to postpone the proposal till the Champion scheme is introduced.

240. A petition from the fisherfolk of Hejmady-Kodi praying for the opening of a Fisheries school in that village was received during the year. Pending the Champion scheme this also was postponed by the Assistant Director (Coast) at the suggestion of the District Educational Officer, South Kanara.

241. Likewise the opening of schools at Pallipuram and Vekkode sanctioned by Government has had to be postponed as the District Educational Officer was of opinion that under the proposed Champion scheme there is no need to open new schools in those villages.

242. The District Educational Council refused sanction for the retention of the VI standard in the South Nattika school on the recommendation of the District Educational Officer, Malabar, who considered that an ordinary higher elementary school in the neighbourhood will meet the requirements of the locality under the Champion scheme. The class was, however, continued under my orders but after the reopening in May pupils are absenting themselves from the VI standard as it has not yet been recognized. The Government have since the close of the year ordered that the educational authorities be addressed for the retention of the standard and for raising of the school to the higher elementary grade.

243. *The Champion scheme.*—The above are but a few of the ways in which the progress of fisheries schools was seriously hindered by the misapprehension of the Assistant Director (Coast) and the District Educational Officers of Malabar and South Kanara as to the scope of the Champion scheme. It is obvious that the scheme of special education approved and financed by Government as necessary in the present state of development of the country for the social uplift of the backward fisher classes would come to a speedy end if the general principles of the Champion scheme intended for ordinary elementary schools were to be applied to fisheries schools. The expenditure on building, equipment and staff to throw open these small special schools to the children of all classes would be considerable, while all attempts to give the necessary fisheries bias to the education of fisher children would have to be abandoned. Since the close of the year however Government in G.O. Mis. No. 1288, Development, dated 10th September 1934, have ordered the exclusion of fisheries schools from the operation of the Champion scheme.

244. The fishermen at Puduponnani petitioned for the opening of a school in their village, but owing to the existence of an aided school, which, however, is working very badly, the school was not opened. The District Educational Officer, Malabar, has stated that efforts are being made by the management to improve its working, and that if it did not show improvement the school would be closed. The aided school, however, does not seem to show progress and it is proposed to move the educational authorities again.

245. *Syllabus of studies.*—The difficulties experienced by the headmaster, Fisheries Training Institute, as well as by the teachers

of elementary schools in teaching fisheries subjects without text-books and illustrations continued to receive attention. Portions from general text-books on Nature Study and General Science have been recommended for adoption. On exclusive fisheries subjects such as fish-curing, etc., lessons will have to be specially drafted. A course of lessons in Pisciculture is in preparation.

246. (ii) EAST COAST—*Fisheries Training Institute, Tuticorin.*—Proposals for the establishment of a Fisheries Training Institute at Tuticorin (vide paragraph 228 of last year's report) were submitted to Government. The Bharatha community promised to contribute Rs. 10,000 towards a suitable building for the location of the Institute and offered to construct it according to the plans and specifications of the Public Works Department and make over the building as the absolute property of Government. In G.O. Mis. No. 107, Development, dated 24th January 1934, Government however, regretted their inability to accept the proposal for the opening of a Fisheries Training Institute at Tuticorin and considered that for the present it would be sufficient if the Director could arrange to train the village teachers for a short period not exceeding one year in fishery subjects, navigation, etc., at the Fisheries Training Institute, Calicut, after they had finished their training in an ordinary Normal school. They also agreed to the employment at the Fisheries Training Institute, Calicut, of a Tamil translator if that was necessary. Government have asked for a report on the success or failure of the suggested arrangement after it had worked for a year or two. In accordance with the suggestion of Government the Committee who proposed the Tuticorin Fisheries Training Institute agreed to depute six trained teachers in 1934 as an experiment for the third year's training at the Fisheries Training Institute, Calicut, but recommended an enhanced stipend of Rs. 12 per mensem to each of the teachers so deputed instead of the usual stipend of Rs. 9 and the payment of travelling allowance to and fro not only for joining and leaving the Institute but also for visiting their homes during the Christmas vacation. As Mulla teachers and the Kanarese students are to be admitted into the Fisheries Training Institute, Calicut, in 1934 Government have ordered the admission of the East Coast students in 1935 but have not agreed to the payment of stipends at rates higher than Rs. 9 per mensem sanctioned for students from Malabar or South Kanara nor to the payment of any travelling allowance. The Government have also sanctioned the employment temporarily for a period of seven months in 1935-36 of a Tamil Interpreter on a pay not exceeding Rs. 30 per mensem—vide G.O. Ms. No. 1066, Development, dated 28th July 1934.

247. (iii) MARINE AQUARIUM.—The aquarium as usual attracted a large number of visitors. The number of foreign tourists and mufassal visitors however was unusually small this year for several reasons such as the earthquake disasters in Bihar, floods in various places, and the economic depression which was more acutely felt this year than in any year before. The Aquarium was flooded during the heavy rains in December and had to be closed to the public for four days. Consequently the gate collections were less than in the previous year.

248. The number of visitors was 80,127 as against 84,590 in the previous year. The record attendance was on 'Kannu Pongal' day when 3,546 people came to the Aquarium as against 3,597 in the previous year. The daily average attendance for the year was 219 as against 229 in the previous year. Thirteen batches of school children visited the aquarium accompanied by their teachers during the year at concessional rates and 81 corporation school children were allowed free for Nature study classes. The aquarium was twice reserved for zenana parties. Among the several distinguished visitors were His Highness the Maharaja of Bijawar, Sir Z. Saharwady, President of the Railway Advisory Committee, the Hon'ble Margaret Grevelle, Lady and Miss Eyres Monsell and a few parties from the Government House.

249. The gate collections amounted to Rs. 6,143-3-0 against Rs. 6,564-10-6 last year. The sale of aquarium guides and picture post cards including miscellaneous receipts amounted to Rs. 166-14-0. A sum of Rs. 600 was realized as rent for the Aquarium restaurant. Thus the total receipts amounted to Rs. 6,910-1-0 against Rs. 7,381-6-6 in the previous year.

250. The attempt to make colour transparencies from photographs of the brightly coloured specimens selected from the Aquarium tanks proved a far more delicate and difficult task than anticipated. The intricate and as yet imperfectly understood technique of colour photography itself which had to be mastered since no professional photographer undertakes the work in Madras was not the most difficult problem confronted. The task of getting the live fish to pose for the camera under the extremely artificial conditions created by flash light or powerful electric light and the cramped space in the small glass aquarium in which they had to be isolated proved most difficult especially as fish differ enormously in their temperament. In an extreme case *Epinephelus flavo-ceruleus* (lacep), a Rock cod, the fish, normally of a bright blue body with yellow fins, developed a pattern of irregular white blotches on a black body by the excitement caused, and its usual

colours could not therefore be photographed. In the majority of cases however patient waiting and practice enabled the fish to be photographed in its most natural posture and normal hues. Except for two plates all the other photographs have turned out a great success and have amply repaid the time, trouble and expense involved.

B. Co-operative Societies.

251. (i) WEST COAST.—There were 14 fishermen societies in the South Kanara district at the beginning of the year. All the societies are thrift and credit societies, five of them for Mukkuvas, one for Pudu Islams, two for Bovis and six for Mogers. The Pudu Islam and Mukkuva fisherfolk depend entirely on fishing. In spite of the scarcity of fish that prevailed during the previous years and the low prices that prevailed during the year under report, Pudu Islam and Mukkuva fishermen do not seek other avocations to earn their livelihood. The fish merchants, to whom they are indebted and who have advanced large amounts to them, take away in many places their catches of fish for prices to be fixed at the end of the season. At present, due to the prevailing economic depression and low prices coupled with the uncertainty of fish-catches, it will not be possible to redeem them from the clutches of these fish merchants. The more enterprising Bovis and Mogers though economically better off, resort to other avocations and even go to Bombay and other places during the off-season and earn money. They are also not indebted to capitalists. In these 14 societies there were at the end of the year, 696 members with a paid-up share capital of Rs. 14,453 against 682 members and Rs. 14,698-4-0 paid-up share capital at the end of the previous year. During the year Rs. 276-12-0 was collected towards share capital and Rs. 522 paid off. Seven societies are indebted to the financing banks. During the year Rs. 1,255 was borrowed and Rs. 2,563 paid off, against Rs. 1,375 and Rs. 1,986 borrowed and repaid respectively last year. The amount outstanding at the end of the year was Rs. 9,268. Of this amount Rs. 8,550 was overdue. Interest overdue was Rs. 58-8-0 against Rs. 575-0-9 at the end of the previous year. Of the overdue interest Rs. 50-8-0 has been since paid by two societies. The Utchil Bovis Co-operative Society is the only society that has borrowed from the financing bank and is not a defaulter. Out of Rs. 115 fixed deposit in this society at the beginning of the year, Rs. 100 was paid off leaving Rs. 15 at the end of the year. This is the best society in the district. Rupees 37,455-1-0 was the total outstanding as loans against members at the beginning of the year. Rupees 3,080 was issued as loans and Rs. 4,724-12-0 was collected during the year,

leaving Rs. 35,810-5-0 outstanding at the end of the year. Of this amount Rs. 24,544-9-0 is overdue. The heavy overdues are the result of the scarcity of fish during the last few years. Many of the overdue loans are covered by decrees and arbitration references. Executions have also been filed against recalcitrant defaulters. The total interest collected during the year was Rs. 2,650-10-0. The members of the Kizhur and Kasargod Fishermen Co-operative Societies who are almost all boat-owners were made to surrender the catches of one day in the week to their respective societies towards their dues. This required constant visits to these two societies. The results were very satisfactory. The opposition of the middlemen was got over to a great extent by personal contact with them. Thus in the Kizhur Fishermen Co-operative Society fish valued Rs. 607 and in the Kasargod Fishermen Co-operative Society fish worth Rs. 250 was collected. There was considerable difficulty in making arrangements for the sale of the fish so collected. The members who supplied fish were issued cash receipts by the societies for the estimated value of fish. The fish merchants, to whom the members of these two societies had supplied fish, did not pay in cash but adjusted the sale-proceeds towards old dues. If such an arrangement had not been adopted there would have been very little collection in these two societies. At the end of the year ten societies had Rs. 434 as share capital in the financing banks and seven societies had Rs. 609-5-0 as deposits in the savings and current accounts, against Rs. 390 and Rs. 617-2-0, respectively, at the end of the previous year. The Udayavar Mogers' Co-operative Society had since deposited Rs. 100 in the savings bank account in July 1934 out of a cash balance of Rs. 102. The total reserve fund of the societies is Rs. 7,627-2-0. Of this amount Rs. 2,581-6-0 has been separately invested and Rs. 5,045-12-0 is pending investment. This amount has been partly combined with the working capital of the respective societies.

252. In Malabar there were 37 societies at the beginning of the year. During the year two societies, viz., the Palapatty and the Perinhanam were liquidated. Hence at the end of the year there were only 35 societies; 5 for Mogers, 22 for Mukkuvas, 5 for Munnillakara, 2 for Pudu Islams and 1 non-credited society at Blangad. The number of members at the beginning of the year was 1,607, and at the end of the year 1,589. The paid-up share capital in all the societies together amounted to Rupees 29,635-12-0 against Rs. 31,269-15-8 at the beginning of the year. During the year Rs. 506-4-0 has been collected towards share money and Rs. 1,027-8-0 has been refunded. No loan has been

taken by any of the societies from the Central Bank. Thirteen out of the 35 societies have borrowings from the Central Bank. The amount outstanding to the bank by these societies at the end of the year was Rs. 5,658-13-0 against Rs. 6,037-8-0 at the end of last year. During the year only Rs. 378-11-0 could be repaid to the bank. Rupees 5,298-13-0 out of the outstanding amount is overdue. The Korapuzha society alone asked for a loan from the bank. But the condition of that society was not satisfactory and therefore the loan could not be recommended. Out of Rupees 378-11-0 paid to the bank during the year the Velur Mogers' society alone contributed Rs. 234-5-0 and the balance of Rupees 144-6-0 was paid by seven other societies together. The interest paid to the bank during the year in all is Rs. 389-4-0 and the overdue interest at the end of the year from these 13 societies amounted to Rs. 444-3-0. The amount of loans outstanding against members in all the 35 societies together at the end of the year was Rs. 57,438-12-0 against Rs. 57,646-5-0 at the end of last year. During the year Rs. 4,925-9-0 has been collected in these societies and Rs. 4,718 has been issued as loans. Out of the outstanding amount of Rs. 57,438-12-0 due from members Rs. 49,324-7-0 is overdue. During the year Rs. 3,060-2-0 has been collected towards interest on loans. Many of the overdues are covered by decrees and arbitration references. The total Reserve Fund standing to the credit of these societies was Rupees 21,149-14-0 at the end of the year. Out of this Rs. 3,193-8-0 has been invested in the Central Bank. The amount pending investment is Rs. 17,975-11-0. The amount which has yet to be invested by these societies is mixed up with the working capital, but attempts are being made to see that this amount also is invested in the District Bank by the societies. These societies had on the whole a paid-up share capital of Rs. 1,420 in the District Bank at the end of the year. In most of the societies Post Office Savings Bank accounts have been opened and at the close of the year Rs. 449-6-0 remained in the Post Office Savings Bank to the credit of ten societies.

253. During the year monthly visits were paid to the societies. Some of the societies were visited several times. Assistance was given to the office bearers in collection work. Loans were secured and the panchayats were reconstituted with better personnel. Every attempt was made to put the societies in working order. The overdues in the societies could not be reduced as the borrowers had no money and could not make payments.

254. The Blangod Boat and Net Society which is a non-credit institution has worked fairly satisfactorily during the year.

1,384½ maunds of fish has been caught by the society during the year against 308 maunds in the year 1932-33 and the society's share of the sale-proceeds of fish, according to the provision in the by-laws amounted to Rs. 179-11-0. The society's share during the year 1932-33 was only Rs. 42-15-0. Rupees 654-13-0 has been distributed to the members of the crew as living wages. Out of the total sale-proceeds amounting to Rs. 1,014-3-0, the balance of Rs. 179-11-0 was also distributed to members.

255. The fishing season began well with sardines, the mainstay of the fisherfolk, which had not appeared during the previous seven or eight years. Fishermen bought boats and nets borrowing money for the purpose in the hope of getting good catches. For want of demand during the early part of the season when sardines were abundant fish had to be sold for Re. 0-12-0 to Rs. 2 per 'Kalli' while the price that prevailed last year was Rs. 3 to Rs. 10. The guano factory owners, who purchased sardines, also suffered loss as there was no demand for oil or guano. Other varieties of fish both small and big, such as Mackerels, Mullan, Chala, Kora, and Cat-fish, were scarce. The Colombo market for dried fish was very dull and hence the dried fish also fetched very low prices.

256. (ii) EAST COAST—*Co-operation among Inland fishermen.*—With the continued economic depression, the affairs of the societies became worse. The Trichinopoly societies (Hindu and Muhammadan), which were revived came to grief during the year. They suffered heavy loss and defaulted payment of rentals. The question of granting remission to the societies is under correspondence. In the Tanjore district only the Karunthattangudi society is functioning and others have been wound up. In the South Arcot district the Vallampadugai fishermen society was closed. The societies in the other districts such as Kurnool, Nellore, etc., are functioning. In the Chingleput district arrangements have been made to start a new society for the fishermen of Ponnammallee while in the Kurnool district arrangements have been made to start a society for the fishermen of Kanala village near Nandyal. Tank and river fisheries were leased out during the year to seven fishermen co-operative societies.

257. *Co-operation among sea-fishermen.*—The co-operative society established at Lawson's Bay for the benefit of the curers with the peon in charge as its ex-officio Secretary and Treasurer is working satisfactorily. It has been affiliated to the Co-operative Union, Vizagapatam. To help the members in the purchase of wood, etc., for rafts and new materials for nets a loan of Rs. 690 was taken from the Central Bank, Vizianagaram, last season, of

which Rs. 490 has since been repaid, in spite of the poor fishing season. On the advice of the Deputy Registrar of Co-operative Societies, Vizagapatam, membership has now been raised from 13 to 33, and recently a loan of Rs. 1,600 was granted to the members to repair boats and nets for the ensuing fishing season.

C. Other Socio-economic Work.

258. (i) WEST COAST.—The prevailing financial stringency and general trade depression very much hampered the progress of socio-economic work. The various organizations started by fishermen to ameliorate their condition continued to do their work but under difficulties. The Bovi fishermen of South Kanara have now an organization of their own to better their economic condition. They run a separate grant-in-aid school at Uthil and this is largely attended by Bovi fishermen.

259. A new reading room and a night school were started at Puthenkadapuram by the local people with the aid of the staff of the fisheries school. The officers of the department are in touch with fishermen and render them help and advice whenever required.

260. (ii) EAST COAST.—The erosion of the sea in and around Uppada dislodged many fishermen from their houses and forced them to migrate to the interior. In view of the difficulty they experienced in getting suitable house-sites the Deputy Tahsildar, Pithapuram, was requested to examine the possibility of acquiring a suitable site now in possession of a private party. The existence of tombs in a portion and the high compensation demanded for the great number of mature and immature palmyra trees on the site are difficulties in the way.

261. The long-standing dispute between the Alivi owners of Jaggarajupeta, hamlet of Uppada, and an Alivi owner of Subbampetta over the right of fishing in the sea off Komaragiri in the vicinity of the two villages was settled with the help of the Deputy Tahsildar of Pithapuram.

262. At Pukillipetta, the attempt to acquire the open spaces around the fish-curing yard ordinarily used as the drying ground for nets, etc., by the fishermen of the surrounding villages, for conversion into casuarina topes, was successfully stopped in time by a representation to the revenue authorities concerned who declined to confirm the grant of the land.

263. Fishermen have of late begun to realize the importance of education and attempts are being made by the educated members of the fishing community to see that fishermen's schools are started on the lines of those on the West Coast or the Board's

schools transferred to the management of the Fisheries department. The Agnikulakshatriya Sangam which held its conference at Vizagapatam in the Christmas week (1933) emphasized the need of education. The affairs of the Malladi Sathyalingam charities are reported to be rather unsatisfactory, otherwise arrangements for the opening of a Fisheries Training Institute on the East Coast may be easy with the ready co-operation of the Secretary of Agnikulakshatriya Sangam, M.R.Ry. P. V. Narayana.

264. (iii) PROVISION OF MARKETING FACILITIES FOR CURERS.—The fisheries statistics compiled annually by the department, though of great value for administrative and scientific purposes in assessing the prosperity or decline of fisheries, and useful to the educated and large scale industrialists in providing reliable statistical data of production and value of the different fisheries along the coast, have not been of direct use to the large body of petty curers and traders who are ignorant of the English language and need immediate information concerning the fluctuations in local market prices day by day or at least week by week. Their investment is so small, their production so limited and their range of marketing activities so circumscribed that unless they find an immediate sale for their goods they cannot carry on their trade. Through ignorance of the range of prices even in markets adjoining their own, they fall an easy prey to shrewd middlemen who exploit them. The hardships thus suffered by the ignorant curer and trader reached a climax during the year under review with the unprecedented fall in prices of fish in common with other commodities caused by the worldwide economic depression. The complaint of fishermen and curer everywhere was that even the production cost was not covered by the sale price of his produce. Some direct assistance in marketing by the department to the sufferers therefore became urgent. In the endeavour to render the statistical work of the department directly useful to the small scale curer and trader a survey of the ruling prices of cured fish in selected markets of the Presidency was undertaken.

265. Even a casual study of the range of prices of the different classes of cured fish prevailing simultaneously in the important markets of the Presidency showed wide variations. The enquiry showed that curers often suffer loss or obtain only inadequate returns for their products owing to their complete ignorance of the ruling prices outside their locality. The fishing seasons on the two coasts of the Presidency alternate according to the monsoon and it was found that when fish were scarce and dear on the East Coast they were abundant and cheap on the West Coast and vice versa. To mention only two common fish, in October cured seer

being abundant at Tanur was selling at 6-6 pies a pound while it was scarce at Dowlaishweram and the market price there on 22nd October 1933 was as high as 3 annas 8 pies per pound. Likewise black pomfret cured was selling in November at 1 anna per pound at Tanur while its price at Dowlaishweram market on 19th November 1933 was 4 annas 8 pies per pound. Such information if made available would help the curers to find a ready sale at remunerative prices for their products. Even if they are unable to reach the actual markets in the present unorganized and undeveloped state of the trade, such knowledge would help them to bargain for an adequate price for their fish with wholesale dealers and fish merchants. In the conferences held the curers on both the coasts unanimously welcomed the proposal that the department should ascertain and publish week by week the ruling prices in the important markets of the Presidency.

266. The wholesale markets for cured fish were found to be few in number. For the whole of the Northern Circars the most important market is the Dowlaishweram shandy held every Sunday when thousands of rupees worth of goods from various fish-curing centres change hands and no credit sales are allowed. Madras monopolises the trade in cured fish produced along the coast from Guntur to South Arcot and even further afield. Further south up to Cape Comorin the most important markets are Orattanad, Paramakudi and Singikulam. For the entire West Coast the only large market is the one at Changanacherry. The Assistant Directors and the Inspector of Fisheries, Vizagapatam, who are in charge of sections of the coast were therefore requested to consider the possibility of deputing the nearest fishery officer to the important wholesale markets within their jurisdiction once a week for ascertaining the ruling wholesale prices of different classes of cured fish.

267. The great diversity of weights and measures in use in the different dry fish markets makes a comparison of the ruling prices difficult if not impossible. An investigation into weights and measures had therefore to be made in the wholesale markets and their exact equivalent value in pounds as well as in fish-curing yard maunds and seers had to be first ascertained.

268. During the initial enquiries no useful or accurate results could be obtained regarding market prices. The usual difficulties such as dread of possible taxation, the ignorant fear of enquiries by Government agencies of the volume of trade or profits and even the cupidity of merchants generally who aspired to make inordinate profit by quoting inflated prices combined to vitiate the results.

Information given by even leading merchants was found therefore to be incorrect and unreliable. The only successful method was for the officer deputed to attend the market throughout the business hours as a disinterested observer and note down the kinds, quantities and prices of dry fish *actually sold*, and as far as possible the names of merchants who sold and of those who bought, etc., and not to make any enquiries at all. Such actual observation of transactions would not only help to ascertain the real prices of various classes of goods free of doubt but would enable the department to provide the curer whenever necessary with the only indisputable evidence possible of the ruling prices in any market with which he may decide to deal. In the absence of such information interested purchasers and middlemen may dispute the correctness of the prices quoted in the Departmental Bulletin. In fact the records the curers produced at the conference showed that not only middlemen and dealers traded on the ignorance of the curers but even the paid agents of the curers stationed in the different markets cheated them by false reports. It was felt that if the range of prices prevailing in the few wholesale markets in the Presidency could be ascertained and published week by week in the different fish-curing yards that should provide the intelligence which the trade badly needed. The Assistant Directors and Inspector of Fisheries, Vizagapatam, have been requested to report on the feasibility of the scheme. The weekly reports when arranged will be forwarded to the Research Assistant, Tanur, for compilation and circulation to the yards, the provision of marketing facilities being a legitimate duty of that station.

VIII. PROPAGANDA.

A. Rural Pisciculture.

269. As last year propaganda in favour of rural pisciculture was conducted by private agencies, the Health Officer, Tiruvallur Rural Development Scheme, and the Superintendents of some of the Government Agricultural Farms. Mr. deValois, Superintendent in charge of the American Arcot Mission Agricultural station near Katpadi, North Arcot district, and Mr. Clutterbuck, Methodist Missionary Society, Ikkadu (Tiruvallur), Chingleput district, conducted demonstrations for popularizing fish culture in rural areas adjoining their respective stations.

The wells in the compound of the Church of Scotland Agricultural School, Melrosapuram, were inspected and the Superintendent was advised to stock them with catla as he desired to demonstrate to students the profits to be obtained from well and tank culture.

270. The Reserve Health Officer, Tiruvallur Rural Development scheme, asked for information on the possibilities of stocking certain tanks in Tirur village with fish. Certain improvements to the ponds have been suggested by the Assistant Director (Inland) and the villagers have agreed to carry out the suggestions. When the ponds are prepared arrangements will be made to stock them.

271. The Superintendent, Agricultural Research Station, Aduturai, evinced a keen interest in fish culture in paddy fields and desired assistance and advice for his experiments. As far as possible literature on the subject as well as instructions were given. He reports that his experiments show that there is a possibility of rearing fish in the paddy fields during the paddy season by the provision of narrow trenches where fish can take shelter whenever the field is drained.

272. The Pioneer Agricultural Farm, Gannavaram, was supplied with information on tank and pond culture.

273. Mr. Hamid Khan, Fisheries Research Officer, the Punjab, was furnished with information on the cultural work done in the departmental fish farms.

274. The manager of the Ghaziabad Nurseries and the District Health Officer, East Godavari, were supplied with pamphlets on the value of fish as natural enemies of mosquitoes in combating malaria.

275. Thirteen young etroplus were supplied to Mr. Golla Nariah of Nandyal for breeding in a well.

276. The following were supplied with catla, etroplus and gourami during the year :—

	Catla.
1 Rev. J. J. deValois of Katpadi	12
2 Superintendent, Government Cattle Farm, Hosur	50
3 Manager, Siddapuram Settlement, for stocking Siddapuram tank	300
4 Coimbatore Agricultural College	100
5 Mr. B. Clutterbuck of Methodist Missionary Society, Tiruvallur	25
6 Mr. Mohamud Sheriff Marakayar	25
7 Superintendent, Agricultural Mission School, Melrosapuram	26
8 The Mysore Government	1,000

	Etroplus.
1 His Exalted Highness the Nizam's Government..	100
2 Mr. T. K. Vijayaraghavalu Nayudu of Negapatam	50
3 Senior Assistant to the Oil Specialist, Agricultural Research Station, Palakuppam and Tindivanam	100
4 Gollah Nariah of Nandyal	13
5 Paddy Specialist, Coimbatore	200
6 Superintendent, Rural Development Centre, Patancheru, Hyderabad (Deccan)	100
	Gourami.
1 His Exalted Highness the Nizam's Government..	100
2 The Maharaja of Pithapuram	12
3 Superintendent, Rural Development Centre, Patancheru, Hyderabad (Deccan)	96

277. The tank water at Gudlavalleru did not become foul this year. So the further investigation into the causes of the periodic fouling could not be made. The plants in the tank were collected and identified and the president, panchayat board, was furnished with information about stocking the pond with useful fish and the cost; the tank fishery was leased out for Rs. 500 by the board.

278. The Rev. W. T. Simeon, B.A., of Gudivada, desired information and help in stocking with fish a ringwell in the C.M.S. Compound in Gudivada. The water was very brackish. A sample was sent to the King Institute, Guindy, and on analysis it was found to be practically half sea-water with very little dissolved oxygen. The question of improving the water for growing suitable fish is under investigation.

279. The Pioneer Agricultural Farm, Gannavaram, the Directors of which take a great interest, among other things, in pisciculture, applied for advice and help to take storage ponds of the municipal water-works, Masulipatam, on lease and develop the fisheries. The municipal authorities after consulting the Sanitary Engineer, however, have refused to lease the fishery to the Pioneer Agricultural Farm.

B. Exhibitions.

280. The products of the Tanur station were exhibited by the motor exhibition vans run by the Agricultural department and at the annual Park Fair Exhibition at Madras. Sets of Biological and Museum specimens and oyster grit from the Ennur station were also exhibited at the Park Fair Exhibition.

281. In February 1934, the set of zoological specimens for secondary schools and a show case of invertebrates were sent to

the exhibition held in the Pachaiyappa's College hall under the auspices of the Mathematics and Science Association of that college.

C. Miscellaneous.

282. There was a large number of enquiries about fish culture—

(i) Mr. Silendra Mohan Guha of Baharghat (Bengal) was furnished with information on the culture of catla, etroplus, gourami and other fresh-water fish.

(ii) The Director of the King Institute, Guindy, was supplied with information on the culture of 'gambusia,' an American larvicide.

(iii) Mr. Rajendra Lal Paul of Bejgaon (Bengal) asked for information on the culture of fish and he was furnished with the necessary instructions for the stocking of his waters with catla.

(iv) The Co-operative Inspector, Gannavaram, was given detailed information about catla growing in ponds and tanks.

IX. FISHERY LEGISLATION.

283. *Licences for fixed engines at sea.*—Sixty-nine free licences were issued to the fishermen for fishing with 288 submerged trees in the Palk Bay under section 6 (3) of the Indian Fisheries Act.

284. *Mathikolli vala.*—A section of fishermen on the North Malabar coast is clamouring for the prohibition of the use of Kolli vala, which according to them is scaring away sardines from this coast to deep water. The French Government at Mahe have been persuaded by the fishermen of that locality to prohibit the use of Kolli vala. At Badagara and other places in British India adjoining Mahe, the police at the instance of the administrator of Mahe, have warned the fishermen not to use this net. The clamour for prohibition comes from those who do not command the necessary gear for this method of fishing.

285. *Stake nets for prawns.*—During the year the Government framed rules to regulate the use of stake nets in certain rivers of the West Coast. Many petitions have been received from Valans of Palayangadi, Mattool, Azhikkal, and other places who engage in this type of fishing for licences to use stake nets in the Valarpatnam and Taliparamba rivers pending the issue of licences under the rules. Valans are natives of Cochin and Travancore and most of them migrated from their native place and settled on the banks of these rivers some 15 years ago.

286. *Nilgiri fishing rules.*—The three years for which the Nilgiri fishing rules were sanctioned in G.O. No. 1619, Development, dated 26th August 1930, expired on 25th August 1933.

287. In proposing the republication of the rules for the next three years radical changes were recommended by the Association. The important innovations proposed by the Nilgiri Game Association were (1) the transfer of the upper reaches of the Bhavani and the Moyar now conserved by the department to their exclusive control, (2) the deletion of the rule empowering the Director of Fisheries to fish their waters when necessary. They proposed accordingly to split the existing rules into two parts, one for the waters to be controlled by the Nilgiri Game Association and the other for the lower section of the Bhavani and the Moyar leased by the Fisheries Department. The proposals of the Nilgiri Game Association could not be recommended to Government for the following reasons: (1) the conservancy of the upper waters of the Bhavani and the Moyar was undertaken in the interests of the fisheries of the Bhavani and the Cauvery below more than for sport, (2) the rentals realized by the department from the fisheries of these rivers were considerable compared with Rs. 100 or less the Nilgiri Game Association might get by coarse fishing licences, and (3) the Director as the head of an expert technical department must exercise control so as to be in a position to advise Government on the administration of the fisheries.

288. The Government accordingly decided in G.O. No. 193, Development, dated 13th February 1934, that the management and control of fisheries in those waters which were vested in the Director should continue to remain under his control and that rule 4 empowering the Director to fish the waters under the control of the Nilgiri Game Association should be retained. They further directed that the Association should send copies of annual reports to the Director and consult him, as the head of the technical department, whenever the Association undertook important technical operations affecting the routine working of the fisheries entrusted to its management, such as the supervision work of the hatchery, the fixation of the size limit of fish which can be killed, the appointment of a competent person as Superintendent of Fisheries, etc.

289. The revised rules for the control and protection of waters controlled by the Nilgiri Game Association alone as defined above were accepted by Government and the rules were issued in Notification No. 97, published in Part I of the *Fort St. George Gazette*, dated 13th March 1934. Separate rules to regulate fishing in the

waters controlled by the Director of Fisheries have been issued in draft form and are awaiting final revision and publication.

290. *Fishing at anicuts.*—Concessions granted for the lessees to fish up to the anicuts and other irrigation works in G.O. No. 917 I., dated 24th April 1933, relate only to waters in the Tanjore district—vide paragraph 256 of last year's report. The extension of the concession to the waters in the Trichinopoly district is under consideration.

X. PUBLICATIONS.

291. *Fish statistics.*—The nine statements of fish statistics for each of the years 1928–29, 1929–30 and 1930–31 for the West Coast compiled in previous years were scrutinized and are now ready for publication. A census of fishermen, boats and nets was published in the Fish Statistics for 1927–28 in three statements. The census returns received from yards for the years 1928–29 and 1929–30 showed irreconcilable discrepancies which were discovered only when the work was resumed this year. As it is too late to correct them now it has been decided not to publish them. To help the fish-curing yard staff in the preparation of the census an accurate list of fishing villages on the West Coast in geographical order was prepared and printed. The census statements for the year 1930–31 have been prepared according to this revised list and is under scrutiny.

292. It is hoped to publish shortly the yearly nine statements of fish statistics for the years 1928–29 to 1930–31 along with the census statements for the year 1930–31.

293. *Trawler's report.*—The third and the final report of the systematic survey of deep-sea fishing grounds by S.T. "Lady Goschen" prepared by the Assistant Biologist has been received, and will be sent to the press for publication after scrutiny.

294. *Bulletin on marketable fishes.*—During the year the collection and identification of specimens from various localities was continued. Owing to the absence of proper assistance at headquarters progress has been very slow. Twenty-one more drawings of fish to illustrate the bulletin were made.

295. *The library.*—Sixty-five new institutions were added to the exchange list of the department for the supply of separate technical reports and 24 for the supply of both bound volumes and separate reports. (G.O. No. 893, Development, dated 30th June 1934.) The number of persons and institutions receiving separate reports is now 212, those receiving bound volumes 64,

and those receiving administration reports alone 241. Many institutions with whom exchange has been newly arranged have sent to the department their publications, both old and recent, and have asked for copies of all the bulletins of this department in return. On account of the limited number of copies in stock with the press their request could not be complied with. Several of the publications received are very rare and valuable and are not available in any of the local libraries.

296. In the absence of a whole-time clerk for library work it has fallen into heavy arrears. Neither a catalogue of books nor a classified list of books, periodicals and papers according to subjects for facility of reference exists. It has not been possible to watch the issue of books of their return. With the considerable additions now received from institutions on the exchange list and the constant demand for literature from the Research section the need for a library staff is keenly felt. Proposals for the appointment of a clerk for the library submitted last year were postponed by Government (G.O. R. No. 51, Development, dated 20th February 1934). If the library is to be put in order and publications from different institutions all over the world watched, scheduled, circulated and thus made useful to Research Officers as well as to others who are doing similar work, the appointment of a clerk for the library is absolutely essential. The proposal will be revived.

PART II.

FINANCE.

297. *Summary of Financial Results.*—The total receipts for the year amounted to Rs. 4,34,521 as against Rs. 3,86,410 in the previous year. The increase was chiefly from pearl and chank fisheries and fish-curing yards, the former due to the larger number of chanks fished and consequent increase in the closing stock and the latter due to increase in the quantity of salt consumed in the yards. The inland fisheries, brought in a revenue of Rs. 91,299 against Rs. 1,02,367 in the previous year. The fall under this item is attributed to economic depression especially in the three districts of Trichinopoly, Tanjore and South Arcot, and to the continued drought in the Chingleput district resulting in a scanty supply of water in almost all the provincialized tanks of the district. The receipts from fish-curing yards were Rs. 2,43,503 against Rs. 2,02,836 in the previous year. The transactions in the year excluding indirect charges resulted in a profit of Rs. 678 as against a profit of Rs. 7,155 in the previous year.

298. The total expenditure of the department for the year was Rs. 6,04,339 as against Rs. 5,47,341 in the previous year. The reasons for the increase are—

- (1) Increased expenditure under Tanur station as the result of a favourable fishing season;
- (2) an increase of 130,974 chanks over the number fished in the previous year, which cost Rs. 8,186;
- (3) contribution of Rs. 6,100 to the Nilgiri Game Association during the year against receipts from fishing licences credited to this department; and
- (4) an increase in the prime cost of salt from 7 annas 5 pies a maund in the previous year to 10 annas 2 pies a maund in the year under report on account of the expensive rail transport and the high purchase price of salt in 1932–33 which enhanced the value of the closing balance of salt of that year to Rs. 1,10,402 against Rs. 84,603 in 1931–32.

299. The Government in their order Ms. No. 535, Finance, dated 30th September 1932, directed the discontinuance of the audit of the Tanur station and Chaliyam cannery. The audits were discontinued from 1933–34.

300. In G.O. Ms. No. 347, Development, dated 14th March 1934, the Government sanctioned the writing off of a sum of Rs. 25,465–14–0 being the net financial loss incurred on account of the liquidation of the Cannery, Chaliyam.

301. The usual statement showing the total expenditure and revenue of the department is appended to the report. The rest of the statements are submitted in manuscript.

PART III.

STAFF AND EQUIPMENT.

I. BIOLOGICAL.

A. Assistant Biologist.

302. The sanction contained in G.O. Ms. No. 544, Development, dated 8th May 1933, for the retention of the post of the Assistant Biologist and staff expired on 31st March 1934, and Government were addressed for the continuance of the posts. Dr. M. Ramaswami Nayudu continued to act as Assistant Biologist till 3rd January 1934 when Dr. D. W. Devanesan returned from leave and resumed charge.

B. Research Stations.

303. (i) WEST HILL STATION.—Mr. V. John, B.A., continued to be the Research Assistant at West Hill throughout the year.

304. (ii) KRUSADAI STATION.—Mr. E. K. Madhavan, B.A., who was the Research Assistant at Krusadai station till 14th January 1934 was transferred as Inspector of Fisheries, Nilgiris; M.R.Ry. S. Varadarajan, M.A., acted as Research Assistant from 15th January 1934 to 14th May 1934 when his services were terminated, and Mr. Peter Devadas, B.A., appointed as acting Research Assistant, took charge on 22nd May 1934.

305. *Equipment*.—The thatched roof of the front veranda was substituted by a ferro-concrete roof during the year.

306. (iii) ENNUR STATION.—M.R.Ry. S. Ramaswami Ayyangar continued as Research Assistant throughout the year. He undertook a collection tour to Tuticorin and Pamban in April and May.

II. TECHNOLOGICAL.

A. Tanur Experimental Station.

307. Consequent on the transfer of Mr. K. Ambady to the Inland section M.R.Ry. M. Jayaram Nayudu was posted to the Tanur station. The junior maistri having resigned his place on 15th October 1933 owing to reduction of pay his place was taken on 29th January 1934 by N. Kunharan a Mogeya fisherman who has passed the Intermediate Examination in Arts.

308. *Travellers' bungalow*.—The bungalow rent amounted to Rs. 59-6-0 against Rs. 59-14-0 last year. The Government ordered that no provision need be made towards the erection of a fence round the bungalow as they consider that a green fence should suffice. A live-fence will, however, take time to grow and the dry thorn fence will be retained till a live-fence is grown.

309. The Inspector of Factories and Steam Boilers visited the station during the year. The cocoanut garden was inspected periodically by the Agricultural Demonstrator, Ponnani, and his instructions for improving the yield of the trees were adopted. The Collector of Malabar and the Sub-Collector, Palghat, also visited the station.

B. Chaliyam Cannery.

310. Mr. T. P. Baratan, Inspector of Fisheries, Calicut, continued to be in charge of the Cannery till 31st October 1933 when the concern was handed over to the purchasers, the Western India Tin Manufacturing Company of Ernakulam. The net financial loss incurred by the sale of the concern as reported by the Accountant-General, Madras, is Rs. 25,465-14-0 which was written off in G.O. Ms. No. 347, Development, dated 14th March 1934.

III. EDUCATIONAL.

311. (i) FISHERIES TRAINING INSTITUTE, CALICUT.—M.R.Ry. E. Raman Menon, B.A., L.T., continued to be the headmaster of the institute during the year. There were two classes in the Fisheries Training Institute, one for Kanarese students and the other for Malabar women students. The number of assistants was therefore temporarily reduced from 3 to 2, and one of the assistants transferred to the model school as headmaster. There was no teaching of drill in the early half of the year, and in the later half drawing and drill was taught by the new drawing and drill instructor of the model school sanctioned by Government (G.O. No. 911, Development, dated 28th July 1934).

312. *Equipment*.—The "Sutherland" was beached at Beypore and its copper sheath was repaired. Two of the fishing canoes which had become unseaworthy were replaced by new ones. Small additions were made to the library and museum and the canning room was furnished with working tables.

313. (ii) VILLAGE SCHOOLS.—There were 143 teachers employed in the village elementary schools for fishermen at the close of the year, which was the same number as last year. Eleven of these teachers are of the secondary grade, nine of whom have been trained in the Fisheries Training Institute. One hundred and nine are higher elementary grade teachers, of whom 92 are teachers who passed out of the Fisheries Training Institute. Fifteen are lower elementary grade trained teachers of the Fisheries Training Institute and three are ordinary lower elementary teachers. Five teachers are untrained of whom one is of the higher elementary grade.

314. Two additional teachers, one for Kirimanjeshwar and the other for Tarapathi (Byndoor) were appointed during the year but the sanction for the additional teacher for the Kirimanjeshwar school was subsequently withdrawn for want of sufficient strength in the school. The V standards in the Kaup and Uppur schools were given up owing to the inadequacy of the staff in these schools and uneconomical strength. The appointment of women teachers at Korapuzha, Kuriyadi, Quilandy and Pudiappa is much appreciated by the villagers. The girls are now taught needle-work, knitting, etc. The abolition of a teacher's post at Chaliyam and Prappanangadi is felt as a hardship by the staff as the strength in these schools has since improved. The appointment of additional teachers is also necessary at Kuriyadi and Pudiappa to meet the growing needs of the schools. The number of teachers at Velian-gode and Talikulam was reduced by one in each school and the

employment of two additional teachers, one at Kadavanad and one at Puthenkadapuram, was sanctioned. The work at Talikulam is handicapped owing to the inadequacy of the staff. At the Nattika school the staff was reduced by one teacher. The Kaipamangalam school shows considerable progress and the appointment of an additional teacher of the secondary grade is an urgent necessity. Blangad is another school which shows an increase of strength both of boys and of girls. The need for a woman teacher at the school is felt. The Palapatty school is another school where the need for an additional teacher is keenly felt.

315. *Accommodation.*—The construction of a semi-permanent building for the Navunda Fisheries school has been sanctioned and the work of construction will be taken in hand when the monsoon is over. The Kavvayi, Madapalli, Korapuzha and Kadalundi schools are housed in private rented buildings. Madapalli is badly in need of a playground. A proposal was submitted to acquire the present building. This was sanctioned by Government in December 1933 at a cost of Rs. 4,750 but as funds have not been provided no action has been possible. A proposal to acquire a plot of ground and to put up a semi-permanent shed for the Korapuzha school has also been sanctioned by Government. This also has to wait for funds. The acquisition of land for the Kadalundi school has been sanctioned and acquisition proceedings are in progress. Owing to the insufficiency of accommodation in the Pudiappa school building, proposals were submitted to acquire a site and put up a new building but the Government have ordered that as the immediate necessity is only for a playground, that alone need be acquired, the estimated cost of acquisition being Rs. 250. Proposals for acquiring the site on which the present Naduvattam school building stands have been submitted to Government. The Government have also sanctioned the acquisition of land and the construction of a building for a new school to be opened at Tanur, but at the request of the Educational department the opening of the school is being delayed.

IV. NAUTICAL.

(i) "Lady Nicholson."

316. The vessel was as usual employed in the inspection of pearl banks. The full complement of the crew was engaged for a period of one month only. During the rest of the year the crew were reduced to the minimum prescribed in G.O. No. 498, Development, dated 10th March 1930. The charges for her maintenance during the year amounted to Rs. 6,391-9-1 against Rs. 7,212-7-2 in the previous year.

(ii) "Sea Scout."

317. The vessel was employed both in the pearl and chank fisheries. The full complement of the crew sanctioned in G.O. Ms. No. 1093, Development, dated 27th May 1930, from October to March was not engaged as a measure of economy. Her maintenance charges came to Rs. 2,538-6-4 against Rs. 2,617-10-5 last year.

(iii) "Leverett."

318. She was solely engaged in the Tuticorin chank fishery. The cost of her maintenance came to Rs. 2,772-12-7 against Rs. 3,443-15-4 last year.

(iv) "Pearl."

319. She was out of commission as her engine was disabled. Her cost of upkeep came to Rs. 664-12-5 against Rs. 474-13-4 last year. The increase in expenditure was due to the cost of repairs done to her hull and copper sheath.

V. ADMINISTRATIVE.

A. Director's Office.

320. *Director.*—There was no change.

321. *Personal Assistant.*—M.R.Ry. C. R. Natesa Pillai continued as Personal Assistant till 1st January 1934 when Dr. M. Ramaswami Nayudu reverted as Personal Assistant.

322. *Inland Fisheries.*—M.R.Ry. T. R. Lakshmana Ayyar, the permanent Inspector of Fisheries, Nilgiris, retired from service on attaining the age of 55 on 15th January 1934, and M.R.Ry. E. K. Madhavan was posted as Inspector in his place.

B. East Coast (North).

323. *Inspector.*—Mr. S. T. Moses continued as Inspector of Fisheries, Vizagapatam.

324. *Office.*—There was no change. Difficulty experienced in posting men for short leave vacancies for want of reserves (vide paragraph 297 of last year's report) still exists.

C. East Coast (Central).

325. *Assistant Director.*—M.R.Ry. C. G. Chakrapani Ayyangar Avargal, B.A., continued to be Assistant Director throughout the year.

326. *Staff.*—Mr. D. D. Peter Devadas who was acting as Inspector of Fisheries was transferred on 16th September 1933 and

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in his place Mr. S. Varadarajan was appointed. He was subsequently relieved by Mr. Ambadi who joined duty on 15th December 1933.

D. East Coast (South).

327. *Assistant Director*.—M.R.Ry. Rao Bahadur J. A. Fernandez Avargal continued as Assistant Director throughout the year.

328. *Staff*.—Government in their order Ms. No. 181, Development, dated 7th February 1934, were pleased to sanction the retention of the Inspector, Pearl and Chank Fisheries, and clerk for a further period of one year from 1st April 1934. M.R.Ry. A. Somayaji continued as the Inspector of Fisheries throughout the year.

E. West Coast.

329. *Assistant Director*.—M.R.Ry. U. Karunakara Menon Avargal, B.A., continued as Assistant Director during the year.

330. *Staff*.—There was no change in the personnel of the three Inspectors. The Manager of the Assistant Director (Coast)'s office was on leave for a month in April-May 1934 and no substitute was appointed in his place. A reorganization of the fish-curing yard staff has been sanctioned since the close of the year (G.O. Ms. No. 1046, Development, dated 25th July 1934).

I have the honour to be,

Sir,

Your most obedient servant,

B. SUNDARA RAJ,
Director of Fisheries.

APPENDIX.

Expenditure and Revenue of the Fisheries Department for the fisheries year, 1933-1934.

Sections.	Expenditure.			Revenue.			Difference.			
	RS.	A.	P.	RS.	A.	P.	RS.	A.	P.	
A. Direction	39,124	1	9	13	10	0	—	39,110	7	9
B. Pearl and Chank Fish- eries	62,202	9	10	* 74,241	5	5	+	12,038	11	7
C. Assistant Director (Coast)	12,604	1	2	141	13	3	—	12,462	3	11
D. Tanur station	9,465	2	7	6,020	0	7	—	3,445	2	0
F. Training Institute	14,659	7	8	112	4	3	—	14,547	3	5
G. Fisheries schools	66,870	4	6	126	7	1	—	66,743	13	5
H. Assistant Director (Inland)— The Nilgiri Fish- eries	1,04,656	5	4	91,299	6	3	—	13,356	15	1
J. Oyster Farm	12,199	3	0	6,046	12	0	—	6,152	7	0
K. 1. Marine Biological section— Zoological Supply Section, Ennur. Research Station, West Hill Research Station, Krusadai.	1,663	5	0	2,141	5	0	+	478	0	0
	6,104	9	11	3,549	9	0	—	2,555	0	11
	12,795	3	9	25	7	0	—	12,769	12	9
	5,324	9	11	310	0	0	—	5,014	9	11
K. 2. Aquarium	7,108	6	7	6,910	1	0	—	198	5	7
L. Fish-curing yards— Voted	2,49,065	15	4	2,43,499	2	11	—	5,566	12	5
Fish-curing yards— Agathi Island— Non-voted	495	12	9	83	6	6	—	412	6	3
Total	6,04,339	3	1	4,34,520	10	3	—	1,69,818	8	10

* Includes Rs. 1,086 receipts from Salt Factory channels in the Ganjam district.