

KEMENTERIAN PERTANIAN DAN SHARIKAT KERHASAMA

(Ministry of Agriculture and Co-operatives)

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FISHERIES OF FEDERATION OF MALAYA

General

The fishing industry of the Federation of Malaya has made rapid strides and may no longer be described as a backward peasant industry. Mechanisation and industrialisation have proceeded apace to an extent where developments may compare, albeit in a small way, with those of the bigger nations.

The principal fishing grounds exploited by local fishermen extend from inshore waters and comprise a belt of not more than thirty-five miles of water round the Peninsula. Traditionally the inshore waters, especially those in the Straits of Malacca, have been fished intensively with a great variety of gears including fishing-stakes, beach-seines, boat-seines and drift nets. In the offshore waters there is an equal array of proven and productive gears, amongst which may be mentioned the purse-seine and sunken long-lines on the West Coast and the traditional Malay lift-net (pukat tangkol) and boat seine (pukat payang) on the East Coast.

There has not been any major type of new gear introduced into Malaya, but there have been modifications of existing gears to adjust them to the use of motor driven craft. The most productive of these is the purse-seine which is now used for catching the Malayan shad, or ikan terubok, and the Malayan chub mackerel, or ikan kembong. A modified form of this net has also been used since 1956 on the East Coast (Trengganu and Pahang) for catching the Malayan anchovy, the ikan bilis. This modified purse-seine is gaining popularity as it enables operation on the anchovy shoals well out to sea, instead of having to wait for the shoals to come inshore, as is necessary in the case of beach-seines, or pukat tarek which are hauled in from the beach. In addition, mechanised craft have been used with increasing success for the Malay lift-net, the pukat tangkol, the Malay boat-seine, the pukat payang and the Chinese beach-seine, the pukat tuabang or pukat kenka. Until recent years the fishing fleet never fished more than 35 miles from the coast, except on the rarest occasions. But to-day fishing craft are found fishing regularly 65 to 75 miles away from their base. Mechanisation at sea is being followed up with similar developments ashore. Such developments as the use of mechanical ice-crushers at fish packing plants, the use of derricks and hoists for bringing fish ashore, the use of refrigeration and chilled ice-water storage for holding fish from periods of glut to periods of shortage, and the canning of fish in multi-purpose canneries all point to a healthy process of evolution. While the use of outboard motors on traditional craft is still wide-spread, the development of healthy inboard diesel-engined craft is gaining momentum and at the end of 1957 there were 1,494 such craft licensed and operating as compared with 996 in 1956.

Weather conditions for the year under review have followed the normal pattern. On the East Coast, particularly in Kelantan and Trengganu, fishing activities were very limited during January and February because of the monsoon. However, conditions improved considerably from then onwards with the result that fish landings for the whole of the East Coast from Kelantan to East Johore were higher than that for 1956. On the North-West coast, it was reported that the continued presence of jelly fish had spelled the failure of the bag net fishery. This coupled with a period of stormy weather due to the South-West monsoon, caused an appreciable fall in landings compared with previous years. In the South-West zone however, fishing conditions were satisfactory throughout the year, particularly with the drift-net fleet of Malacca and Pulau Ketam; the latter were in fact reported to have doubled their catches as compared

with previous year. The Malayan shad or ikan terubok again failed to appear this year and this together with the poor catches of Malayan chub mackerel or ikan kembong, led to a great financial distress among operators of the purse-seine fleet at Pangkor and Kuala Kedah. Indeed, it was anticipated that many nets would be laid up in 1958 if the poor fishing conditions, which began in 1956 and were attributed to clear water and changes in direction of currents, were to continue into 1958. The North-East monsoon set in early in November followed by strong winds and heavy seas, with the result that most of the fishing stakes off Southern Pahang and Johore were vacated very early by the fishing-operators on these stakes. It will be remembered that similar exceptional bad weather conditions swept these coasts in November 1956 causing the loss of 53 lives among the operators of fishing stakes. As a result of this disaster a regulation has been introduced which requires the operating staff of fishing stakes off Johore and Pahang to vacate them before 10th November. This was a normal precaution which had worked well. Some relaxation of this ban, however, is required in the case of fishing stakes lying to the lee of islands off the Pahang and Johore coasts and steps were in hand to cope with these.

The average retail prices of the higher grades of fish remained fairly constant throughout the year whilst the lower grades showed a small downward trend in June, July and August, which coincided with heavy landings of the Malayan chub mackerel (ikan kembong) at Pangkor. This downward trend however was not maintained and prices for the lower grades thereafter rose to a slightly higher level compared with prices for 1956. It is thus clear that heavy landings of the lower grades of fish can only affect prices within those grades and that for the higher grades of fish, there is always a consumer-demand which will depend again on the supply position of these grades, rather than on the availability of fish supply in general. This factor of consumer-preference has always been one of great significance in Malaya where the population is diverse and types of fish available are so varied.

Ice was available throughout the country at an average price of \$30 per ton to the industry. In places where transportation was difficult, the charges were generally higher. The opening of the East Coast Railway stimulated the export of high grade fish from Tumpat to Singapore. Similarly, the opening of the Maran Road connecting the East Coast with Kuala Lumpur by a short route has stimulated the fisheries of North Pahang and Trengganu and lorries loaded with fish in ice are a regular feature on this road when the fishing season is open. Further, the improvement of road communication between Kuala Trengganu and Kota Bahru has also greatly stimulated the export of fresh fish from Besut and Kuala Trengganu to Kota Bahru.

The total landings for the year were 110,863 tons against 111,000 tons for 1956, the lower landings recorded for the West Coast being compensated for by increased landings for the East Coast.

Structure of the Industry

The basic structure of the industry has changed little, but there is now a growing awareness of the value of co-operative effort, a direct result no doubt of the new Government policy of encouraging the formation of co-operatives in all primary industries. On the whole it may be said that fishermen operate with borrowed money and the man who provides capital has control of the fish. He in turn, distributes the fish to the major consuming centres and the rural districts through consignment

agents. There are a large number of registered companies owning boats and gears and employing their fishermen on a share basis; there are also considerable numbers of private boat-owners and small gear operators who sell their catch to purchasing agents ashore, often closely linked with an advance payment system. On the North-West Coast, a "secret auction" or system of whispering tender prevails. On the East Coast there is a system of open bidding at the landing points on the beaches. At the major urban centres of Alor Star, Ipoh, Kuala Lumpur, Malacca and Singapore, there are wholesalers who, by a system of daily telephone calls to their consignment agents, maintain a balance in the distribution phase of the trade. It is a common fallacy to describe the wholesale agents as forming a monopolistic fish ring. This could not be further from the truth, for the handling and distribution of fish in Malaya where it is a highly perishable commodity, is a most competitive business. However, the physical handling and distribution is far from up to date

The salt Fish Industry

The salt fish industry on the East Coast continued to find ready markets during the year, the bulk of exports being sent by sea from Kuala Trengganu and Kuantan to Singapore. Considerable quantities too were sent by lorry transport to Kuala Lumpur for eventual distribution to the urban centres on the West Coast. On the West Coast, the production of the Malayan chub mackerel (ikan kembong) was not sufficient to meet local demand for fresh and boiled kembong, hence there was little surplus for preparation of salted kembong. Boiled kembong continued to be in great demand and with the expansion of refrigeration and cold room facilities on the West Coast, the product was being marketed in all the inland towns and new villages.

Utilisation

An analysis of the utilisation, import of fish from other territories and the export to other territories shows that the Federation of Malaya had a net available supply of 903,888 piculs out of a total production in the Federation of 1,862,503 piculs. Of the total domestic production, 348,449 piculs were processed to make salted and dried fish. Another 193,796 piculs were utilised as agricultural fertiliser or as pig and duck food. 90,238 piculs of small shrimps were processed to make blachan, and 197,500 piculs were utilised for making dried prawns. This gives a total of 829,983 piculs of wet fish taken from the total production for normal processed products. Fresh fish was imported from a number of places. Higher grades were imported from Singapore to the extent of 34,144 piculs. Into Malacca and Port Swettenham and some of the nearby smaller towns a total of 22,909 piculs was imported from Sumatra, the bulk of this fish consisting of the Spanish mackerel "ikan tenggiri" and "ikan terubok." Other sources including present shipments brought in by sea and lorry shipments from South Thailand accounted for 52,592 piculs. The total imports of fresh fish were therefore 109,645 piculs. Exports were mainly to Singapore and this amounted to 237,950 piculs, the bulk this fish was of the middle and lower grades, and is utilised largely by the labouring population of the Colony. Fish exported to other destinations outside the Federation of Malaya was 329 piculs. The relevant statistics table is attached.

Mechanisation

Whilst the structure of the industry has not changed to any great extent, in so far as the financing of the industry and ownership of craft and gear are concerned, the increase

in the number of powered boats has continued as is shown in the following table:

	<u>Landings</u> <u>Tons</u>	<u>Number of</u> <u>Fishermen</u>	<u>Number of</u> <u>Gears</u>	<u>Powered</u> <u>Boats</u>	<u>Non-Powered</u> <u>Boats</u>
1949	104,880	71,403	21,139	327	21,793
1954	109,934	49,532	18,654	4,052	17,789
1955	109,422	61,212	17,606	4,550	18,879
1956	111,083	50,690	19,427	5,641	17,730
1957	110,863	49,443	21,276	6,283	17,541

It will be noticed that there was a continued reduction in the number of non-powered boats and the number of fishermen, followed by an increase in the number of gears. This indicates that the efforts of the Department to diversify the fishing effort of the fishermen is slowly bearing fruit. In the past there has been too much reliance upon a single gear to provide fishermen with their livelihood, but during the past two years an attempt has been made, with some success, to persuade fishermen to own a series of gears, so that they may adapt their effort to the changing seasons. The number of powered boats is about 27 per cent of the total registered number of boats, but it must be noted that quite a number of the registered boats consist of very small craft operating in estuarine and very shallow inshore waters, or which are engaged only in part-time fishing and these do not offer a potential for mechanisation.

General features of mechanisation in the different zones

In the North-east zone which comprises Kelantan and Trengganu the most notable feature was the rate of mechanisation which continued unabated. Bigger boats are being built and engines with higher H.P. are being installed. Outboards have practically given way to inboard diesels in Kelantan, Besut and Kuala Trengganu areas. They are, however, still being used in the Kemaman/Dungun area particularly at those villages which lack safe anchorages for the bigger types of engined boats. Of the types of diesel-engines in use the most popular is the Japanese Yanmar diesel of 4 H.P. to 24 H.P. Of the British engines, Lister of 20-30 H.P., are popular.

Mechanisation came rather late to Pahang, in the South-east zone, but even here the number of diesel-engined boats increased from 17 in 1956 to 37 in 1957. Similar increases were recorded for East Johore. The number of outboard engined boats remained static.

On the West Coast, there was a general increase in powered-boats in Kedah, Penang, Perak, Selangor and West Johore. In Selangor there was an increase of 21 per cent over the number in 1956. Malacca and Negri Sembilan totals showed a slower rate of mechanisation whilst the large increase in Selangor was due to rapid conversion of the Tanjong Sepat and Pulo Ketam drift-net fleet to power.

As a result of the degree of mechanisation achieved there is now a great tendency for fishermen to move round the coasts following the seasons. Two purse-seine (pukat jeroot) boats, one from Kedah and the other from Port Swettenham fished off Trengganu during the year, one condition being that the boats should operate in waters beyond the twenty fathom and fish for moving shoals of the Malayan chub mackerel, the ikan kembong. Both boats failed miserably, the reason given being that the fish were in loose shoals. Fishing with the use of lures (tuas) to aggregate fish shoals appear still to be the only successful method in dealing with most of the pelagic

species on the East Coast. It might be mentioned that these lures are widely used by Polynesian fishermen in the East Indian Archipelago. Similarly twenty-one bubu and handline diesel-engined boats moved to the North-west zone from Besut and Kuala Trengganu before the monsoon broke on the East Coast in October. These boats based themselves in Penang and Kuala Muda and were able to exploit the well known red-snapper (ikan merah) grounds to the West and North-west of Pulau Perak. These grounds have for years been the fishing grounds of Chinese long-line fishermen from Penang, but are at present under-exploited because of a shortage of fishing crew. The present development of bubu-fishing with Malay crew from the East Coast is therefore noteworthy and indeed timely and deserves close study, especially as it is known that the grounds are also being fished during the North East Monsoon by long-liners based at Singapore. A powered sekochi from Kuala Trengganu operated fish traps (bubu-fishing) from Kuala Selangor during the year.

The rapid mechanisation of fishing boats poses a number of problems particularly on the East Coast. There is a need for expert guidance to be given boat builders in the design of the hull and the installation of engines in order that full beneficial results may accrue to the industry. There is also an urgent need to evolve a suitable type of beach-landing craft for fishing villages on the exposed coasts. This latter question is important if the fishermen in these villages are to derive benefits from mechanisation with diesel-engines. They have for the time being to fall on the ubiquitous outboard engine with its enhanced cost of operation. It is understood that a request under United Nations Technical Aid has already been submitted by R.I.D.A. for the services of a naval architect to assist in the design of suitable types of boats for the R.I.D.A. dockyard in Trengganu. On the question of suitable beach-landing craft, this department is currently in communication with the F.A.O. naval architect Mr. Olaf-Traung who has similar problems on hand for Ceylon, India and Pakistan. Another pressing problem is the need for shore facilities which must develop quickly. In many of the fishing villages there is also an urgent need to build suitable jetties and other facilities to service these powered boats.

Fishermen's Co-operative Societies.

The Federal Fisheries Committee whose report was accepted by the Federal Legislative Council in 1956, made two major recommendations. Firstly, that co-operation was to be promoted throughout the country in all phases of the industry and trade, in order to stimulate thrift and capital improvement. Secondly, that a fund should be available to the Ministry of Agriculture to provide capital assistance to co-operative societies. A sum of \$3 million has been made available for this purpose and a part of it was used for the training of Assistants to guide in the education of fishermen in co-operative principles and in the organisation and running of co-operative societies.

A direct result of these recommendations was that great effort was made to promote the formation of fishermen's co-operative societies during the year under review. It was decided because of similarities in the methods of fishing employed and in the capital structure of the industry that a firm start be made in the North-east zone to include North Pahang up to Kuantan. Accordingly after a month's preparatory training at the Petaling Jaya Co-operative College, the field staff in the North-east zone were fully committed to assisting staff of the Department of Co-operative Development in encouraging firstly the formation of fishermen's co-operative societies, one in each of the fishing villages, and latterly in helping the assessment of the value of various gears which were then pooled in as capital

assets of the societies. Thirty-one Fishermen's Co-operative Credit and Marketing Societies have now been registered on the North-east coast. These societies have formed themselves into the East Coast Fishermen's Co-operative Transport and Marketing Union with Headquarters in Kuala Trengganu and in November and December this Union started a pilot scheme for the joint marketing of fish from the Kuantan area to the inland towns of Temerloh and Mentakab. Eventually Kuala Lumpur will be the main objective. Owing to various difficulties the Union did not begin paying out loans under the Scheme of Assistance to fishermen through co-operative societies until about September. By December 31st the Union had paid out \$229,909 to 74 groups with a total of 377 fishermen. Distribution of this payment by co-operative societies is summarised below:

<u>Name of Society</u>	<u>No of group</u>	<u>Number of members</u>	<u>Amount of loans granted</u>
Tanjong Lumpur	11	33	\$34,980
Mengabang Telipot F.C.S.	7	53	31,500
Telaga Nanas F.C.S.	3	25	35,000
Kijang F.C.S.	2	32	30,700
Ayer Tawar F.C.S.	5	15	12,370
Sebrang Takir F.C.S.	7	63	28,800
Telong F.C.S.	3	24	9,430
Sungai Ular F.C.S.	28	76	22,537
Kerteh F.C.S.	3	23	12,722
Dalam Rhu F.C.S.	1	8	11,300
Kampung Sabak F.C.S.	1	8	10,000
Kuala Besut F.C.S.	3	17	26,600
Grand Total	74	377	\$229,909

Whilst full attention on the formation of fishermen's co-operatives was focussed on the North-east coast, a few fishermen's co-operative societies on the West Coast which were in existence before the acceptance of the Federal Fisheries Committee's Report, continued to function. These societies have not as yet received aid under the \$3 million Scheme due to a shortage of the necessary trained staff to supervise the Scheme. The Fishermen's Co-operative Society at Kuala Muda continued to function but incurred a loss in 1957. The Malay Co-operative Society at Kampong Panchor, Perak, which was formed specifically for the farming of cockles reported satisfactory progress. Its venture into boat-seine fishing (pukat payang) has not however met with the success anticipated. In Selangor the Sementa Co-operative Society, the only Fishermen's Society in the State, continued to make modest but steady progress. The society was established in 1952 expressly for the preparation and marketing of shrimp paste. It has a small manufactory and has been extremely successful in obtaining good prices for its product in the Kuala Lumpur markets. The two Fishermen's Co-operative Societies in Negri Sembilan namely that at Pasir Panjang and Telok Kemang continued to market their members' catches at fish-stalls in the Port Dickson market. At Malacca excellent progress was made by the Hengwha fishermen's (Chinese) Co-operative Credit and Marketing Society Ltd. The Society operated a fishing materials purchase scheme for the direct purchase of hemp twine from Italian manufacturers through a commission agent. This was estimated to save the Society some \$10,000 a year. The Society also operated a fuel purchase scheme during the year, a contract having been signed with the Shell Company to supply the Society with 80,000 gallons of diesoline per annum at the wholesale price of 58 cents per gallon against the retail price of 62 cents per gallon. Similarly the Society has successfully negotiated with the

Malayan agent for Japanese "Yanmar" engines and the agent for "Petter" Engines for substantial discounts which will be passed to the members. The largest single expenditure incurred by the Hengwha fishing fleet is the purchase of ice which totals some \$7,000 per month. The Society is now looking into the question of building its own ten-ton ice-plant. A suitable piece of State Land has, it is understood, been obtained for the purpose. The estimated cost of plant equipment and installation is \$90,000 to which must be added \$30-\$40,000 for building and land.

Fishermen's Training

The Fishermen's Training Course in care and maintenance of engines and in helmsmanship which was started in 1953 with Rural and Industrial Development Authority funds and continued in 1956 with departmental funds, was maintained during the year. The course which was previously held at the Junior Technical Trade School, Penang, and the premises of the Local Masters & Gunners' Institute, Penang, was transferred to the departmental workshop in Glugor in 1957. 42 Federation fishermen participated in two courses. Of these 16 obtained the Helmsmanship Certificate of Competency and 38 the Engine Repair and Maintenance Certificate. The small number of passes in the Helmsmanship Certificate Examination was due to some of the trainees being under-age for the examination. A few were debarred either because of lack of the required sea-time or because of failure in the stringent eye test which necessarily includes that for colour vision.

In addition to the above trainees, two members of the staff of Government Departments, one from the Marine Department and one from the Telecommunications Department were accepted for training in engine maintenance and repairs. Both passed the examination.

Kelantan Fish Marketing Scheme

The Kelantan Fish Marketing Scheme at Bachok which was originally financed with a grant of \$194,200 from the Colonial Development and Welfare Fund, but since taken over by the Department and run with Federal funds from the middle of 1956 continued during the year under the Deputy Manager who was directly responsible to the Director of Fisheries. The amount of fish handled was 1,176 piculs compared with 1,016 piculs for 1956. The Scheme however continued to meet with strong opposition from middlemen during the course of the year. Whilst the Scheme cannot be said to be a financial success, one of the chief aims of the Scheme, that of influencing fish prices so that fishermen in the Bachok area may obtain a fair price for their fish has been achieved. The Scheme branched out during the year into preparation of salt-fish, belachan (shrimp paste), budu (a local fermented fish paste) and "bilis sauce" in anticipation of good sales during the monsoon months. However, owing to continued landings of fresh fish in good quantities throughout the monsoon months from fishermen based at Pulau Redang, the sale of budu and salt-fish was poor. Similarly, although the shrimp paste produced was of high quality and its preparation was based on the same method as that used by the best manufacturers in Penang, sale was disappointing as the local Kelantan people preferred the less expensive, albeit lower grade, local product. Suitable markets will therefore have to be found for this shrimp paste on the West Coast.

The Scheme has now been in existence for two and half years, and although it cannot be considered a success, it has provided much insight into the intricate problems of fish marketing in Kelantan. It is the intention that the building and other facilities afforded by the Scheme be eventually taken over by the East Coast Fishermen's Co-operative Transport and Marketing Union when this is firmly established.

Relationship with R.I.D.A.

One of the recommendations of the Federal Fisheries Committee was that R.I.D.A. should gradually cease to provide capital loan to the fishing industry and that this should be taken over by the \$3 million Aid Scheme. There has consequently been a tailing off in R.I.D.A. aid which was called upon only in those areas where the \$3 million Aid Scheme had not commenced operations. Thus R.I.D.A. aid was given only in Pahang, Johore, Kedah, Penang and Malacca, during the year. In Negri Sembilan R.I.D.A. aid was continued particularly in fish-ponds, and eleven new applications were dealt with. At the same time an intensive follow-up investigation made by the Department has shown that in the past R.I.D.A. projects have had varied success. Of 42 ponds listed, 14 were reported successful, 15 abandoned and 13 either not operated commercially or had been disposed of by sale or rental. Thus it may be stated that approximately one-third of R.I.D.A. pond projects have proved successful, one-third have totally failed and one-third maintained below the level of commercial intensity. Of the Malay pond projects the two main factors responsible for failure was the lack of attention to predator-control and insufficiency of fertiliser treatment. Out of a sample of 20 Malay projects no less than nine were found to be abandoned and only two claimed success. The Chinese carp projects however invariably combine with pig breeding and they concentrate on the culture of Chinese carp. They all met with general success. Out of nine ponds, seven obtained success and one had grossed \$4,000 or three times his loan amount.

In view of the varied success attained, no doubt a result of the lack of fundamental knowledge on the technical aspects of pond culture among the Malay raayat, the Department continued with the pond culture course it started in 1956. In 1957 a course on pond culture was held in Ampangan (Negri Sembilan) on 10th and 11th December and was attended by 10 pond owners.

Brackish-water Fisheries; Prawn-ponds and Cockle Culture

The entire coastline in the North-west region particularly that of Penang, Kedah and Province Wellesley has been surveyed during the year in an endeavour to find a suitable site for an experimental prawn-pond. In general the mangrove swamps in this region appear to be too high for the purpose. As prawn-pond construction involves heavy costs of bunding, it is unlikely that private enterprise will invest in the industry until it can be shown to be an economic proposition.

Prawn-ponds are, however, an important feature of Singapore fisheries, and it has been estimated that something like 230 tons of prawns and fish are produced annually from 1,300 acres of ponds constructed from mangrove swamps round the islands.

It is therefore clear that there is tremendous potential for development of prawn-ponds in the Federation, particularly in the mangrove belts of Southern Johore, Selangor and Perak. With the improvement in Emergency conditions, it is believed that there is keen interest among prawn-pond operators in Singapore to extend operations into South Johore. If this is true it should be welcome as it will help to initiate what has become an important industry in neighbouring countries like Indonesia and the Philippines where thousands of acres of mangrove swamps have been converted into ponds for the culture of prawns and fish.

The department has under its Development Plan a project for the setting up of a brackish-water fish culture station in Johore. This should help in accelerating the development of prawn-ponds in the Federation.

An important postwar development in Malayan fisheries has been the culture of *Anadara granosa*, the Malayan cockle. It was round about 1948, that the headman of Bagan Panchor, a fishing village off Kuala Jarum Mas, first experimented in the sowing of seed cockles obtained from the natural cockle bed at Kuala Jarum Mas, on to a patch of muddy foreshore in front of his village. The experiment was a great success as the young cockles registered phenomenal growth rates in the newly laid out areas compared with those in the natural bed. Since that time the culture of cockles spread rapidly throughout the mangrove areas of the West Coast, with the encouragement and advice of the Fisheries Department. The progress recorded in past years has continued.

In Perak there are now some 2,000 acres of muddy foreshore under cultivation and the bulk of the cockles consumed in Malaya are produced here. The cultivation of cockles has made an almost unbelievable difference to the general standard of living in the villages along the mangrove fringes over the past ten years. The people employed as collectors earn a better living than most fishermen and although the work is hard the income is regular. The estimated production for Perak for the last six years is as follows:

Production of cockle in Perak (mainly from culture beds)

		<u>Piculs</u>
1952	..	27,030
1953	..	36,300
1954	..	32,670
1955	..	44,750
1956	..	78,309
1957	..	88,711

The areas under cultivation are the mud-flats of Gula, Larut and Matang. For 1958, there is every indication that production will show further increases. In Penang too cockle culture spread rapidly from 1950 onwards, first with imported seed cockles from Kuala Selangor and Kuala Jarum Mas and later with supplies from the natural beds of Kuala Jalan Bahru and Sungei Pinang on the West Coast of the island. To date, temporary occupation licences have been issued for all available suitable sites on Penang Island and the culture has now spread to Pulau Aman and to the Province Wellesley coast. The total area under cultivation in Penang is estimated at 600-700 acres with an annual production for 1957 of 20,000 piculs. Apart from these there is also a small production from the natural grounds off Selangor, particularly Beting Gopal. Thus the total production of cockles for the Federation for 1957 is estimated at some 110,000 piculs, a figure more than twice that recorded for 1938 (last published data available before the War), which stood at 43,000 piculs. The bulk of this production was consumed in the major towns of the West Coast and in Singapore. A small quantity was exported to the East Coast via Kuantan. In 1956, the recorded export of shell fish, which consisted mainly of cockles, to Singapore was 2,973 tons valued at \$502,425 wholesale. The corresponding figure for 1957 is expected to be some 3,700 tons. As a direct result of this increased production, the canning of cockles in soya-sauce which was demonstrated by the Department at Kuala Kurau before the War, was taken up by two canneries, one in Penang and the other in Singapore. The Singapore cannery drew its supplies of cockles in the form of cooked cockle-meat packed in ice, from Kuala Kurau.

... The extension of cockle culture to other States has received attention, both at policy level and on the ground. In the North-west region four trials were carried out, namely at Kuala Kedah, off Tanjong Dawai, at Kuala Perlis and at Kuah, on Pulau Langkawi. It was found that seed cockles grew at a phenomenal rate at Kuala Kedah but the area for cultivation was limited. Further trials will now be made on the exposed sea-shore to see whether wave action during the South-west monsoon will allow of this development here or not. Tanjong Dawai was a failure as few live cockles were recovered and they were generally in poor condition.

Kuala Perlis was suitable but again the sheltered area available is limited. The problem here is the same as in Kedah, i.e. trials will need to be made to see if the exposed fore-shore along the coasts can be utilised. Kuah registered a failure as few live cockles were recovered.

In the South-west zone, seed cockles were sent out late in the year from Penang to Sementa off Selangor; but it is too early as yet to say if the experiment will register success. Two attempts were made to send seed cockles to Johore during the year. Both met with failure as the seed cockles died on the way.

In the South-east zone, two experiments were started off Tanjong Lumpur near Kuantan. In the first, the seed cockles sent from Penang were destroyed by rays as a lot of crushed shells were recovered. In the second, the seed cockles showed good growth until the onset of the monsoon bringing with it a huge influx of flood waters. The cockles were discovered to have been killed by this influx of fresh water. It is clear therefore that in the case of the Kuantan estuary and other similar locations on the East Coast, cockle culture can only be successful in the period between the monsoons. This raises the problem of having to import seed cockles every year from the West Coast. However, since cockles are marketed at 30 cents a katty in Kuantan against 10-15 cents a katty on the West Coast, it may yet be an economic proposition to start a cockle industry on the East Coast basing on regular imports of seed cockles from the West Coast.

Freshwater Fisheries

The additional staff recruited for Freshwater Fisheries in 1956 enabled a much more extensive programme of work to be carried out in 1957 than was previously possible. Of the additional staff, one junior fisheries assistant was posted to Malacca, and two were posted to each of the States of Trengganu, Pahang and Negri Sembilan to undertake advisory and survey work and the stocking of open waters in those States. This work has produced a clearer picture of the possibilities and limitations of fish-culture work in rural areas and has resulted in renewed interest in the rearing of fish. The remaining freshwater staff continued to operate from the Headquarters at Penang where they have continued with survey and extension work in North-west Malaya and have carried out further work on stocking ponds, irrigation schemes and dams. The first indications of success in these experiments appeared during the year as Sepat siam (*Trichogaster pectoralis*) appears to have established itself in the Kubang Pasu canal systems in the North-west, whilst in the South-west *Tilapia mossambica* has established itself in Gedang Tebat near Sri Menanti, a natural swamp adjoining padi-fields. It is reported that *Tilapia* are now regularly seen in these fields. In addition Sepat siam has been successfully introduced into Sungei Balang Dua Sawaks in Johore. In all a total of 12,025 Sepat siam (*Trichogaster pectoralis*), 15,648 *Tilapia*

mossambica, 90 Kalui (*Osphronemus goramy*), 4,270 Lampam Jawa or Tawes (*Puntius javanicus*), 50 Ketutu (*Oxyeleotris marmoratus*) 100 Chow Hu (*Ctenopharyngodon idellus*) and 1,280 Lee koh (*Cyprinus carpio*) were distributed during the year, several more varieties than had been distributed in 1956. The numbers of Lampam Jawa or Tawes and of Lee koh which were distributed are of particular significance as the breeding of these two types of fish was carried out at the Tapah Federal Fry Breeding Station for the first time. The department also sent 380 Sepat siam and 32 Kalui to New Guinea at the request of the Australian Government in order to help in the establishment of fish culture there. Similarly 200 Sepat siam were sent to the Central Fisheries Department Ministry of Food and Agriculture, Government of Pakistan on 10th July 1957 at the request of I.C.A. through the U.S. Consul in Penang.

Further importation totalling 10,000 Catla Catla fry were made during 1957 in order to continue with observation studies on this fast growing fish. In addition to the above in the latter part of the year a start was made on the clearing and re-stocking of abandoned mining pools with fast growing fishes. This work involves the elimination of all predatory fishes from the pools, which are potentially a very promising source of freshwater fishes for the rural population in the tin-mining areas. A newly recruited Fisheries Officer (Research) carried out a series of experiments to test the efficacy of various insecticides, namely "Shell" Endrex, "Shell" Dieldrex and "Shell" Aldrex in clearing ponds of fishes and laboratory results were successfully applied in the field. Eight mining pools in kaki Bukit (Perlis), Taiping and Batu Gajah, of a total area of 8½ acres were cleared of predatory fishes and subsequently stocked with Tilapia and *Puntius javanicus*.

As part of the Department's policy to expand the services available to persons who are interested in fish-culture, land has been acquired near Kuala Kangsar for building a Regional Fry breeding Station from which fry will be distributed and at which experiments can be carried out on the spawning and rearing of local fish from the nearby Perak River. The Federal Fish breeding Station at Tapah has been extended and goats and Sindhi crossed calves have been introduced as a source of fertiliser for the ponds.

Survey of fish ponds, mining pools

A survey of existing fish ponds and mining pools in the district of Larut and Matang, Kuala Kampar, Temoh, Tapah, Bidor and Mambang Di-Awan was made during the year.

Fish Breeding

The techniques of spawning the Common Carp and *Puntius javanicus* acquired by the four Junior Fisheries Assistants in Indonesia, where they were sent to undergo a fish-culture course, were demonstrated successfully at the Tapah Fish Breeding Station to other Fisheries Assistants who had not gone overseas. At the Bayan Lepas farm, Penang, local pond-keepers were introduced to the Indonesian method of breeding the common carp.

The breeding of *Puntius javanicus* was carried out successfully during the year for the first time at the Tapah Fish Station. One male and three females were employed and a total of 29,300 fry was successfully reared to 2 inches - 3 inches for distribution to pond-owners.

Course on Prawn-Pond operations

All the Fisheries Assistants (Freshwater) were given a course on prawn-pond operations in Singapore from 21st-27th June 1957 by Dr. Tham Ah kow, Chief Fisheries Officer, Singapore.

Culture of Udang Galah (*Macrobrachium carcinus*)

The Department has during the year carried out experiments on the culture of Udang Galah, a freshwater prawn known scientifically as *Macrobrachium carcinus*. This much sought after prawn is found in most of the rivers and swamps of Malaya and fetches very high prices in the local market. The experiments have not been a success and will be continued in 1958.

Assistance to ex-Special Constables and others

The Department assisted a group of ex-Special Constables at Kampong Sahom, Kampar, in reconditioning old fish-ponds which were excellently laid out by the previous owners. Labour was diverted from the Fish Station at Tapah for the work. On completion, the ponds were stocked with *Tilapia mossambica*, kalui, common carp, *Puntius javanicus* and Chinese grass carp and were then handed back to the ex-Special Constables to look after. Staff from the department continued to visit the ponds and to advise on the management.

Field staff of the department also rendered assistance to a pond owner at Baling to rid his ponds of predatory fish and to restock it with *Puntius javanicus*, common carp and kalui.

Experimental work carried out during the year

(a) Fishing experiments

During 1957 all the Departmental vessels were fully engaged to the limits of the financial allocation made for operating them. Besides routine survey and inspection work a varied programme of experimental work was carried out. In the North-east zone m.v. Tenak, prior to being transferred to Penang, was engaged in exploratory drift-net fishing experiments in deeper waters than fished by local fishermen. The vessel was also used to encourage long-lining among Malay fishermen in the waters beyond Pulau Perhentian, with considerable success. Following its transfer to the North-west zone, m.v. Tenak was used for investigations into the possibilities of using chemicals as a means of driving dolphins away from areas where pukat jeroot was being operated as dolphins cause considerable damage to the nets when they attack the catch.

M.V. Tongkol continued the work on bubu-fishing in waters 40-50 miles from land. This work started in 1956. The difficulties in finding suitable floats and markers for traps were finally overcome and the necessary work preliminary to carrying out comparative experiments between traditional and modified bubu (fish-pots) with a view to improving the efficiency of traditional traps has been completed.

In the North-west zone comparative experiments to determine the advantages of nylon fishing nets over the traditional cotton and ramie nets in drift-net fishing were carried out and will be continued in 1958.

(b) Dolphin meal

During the year a total of twelve small dolphins (average body weight just over 30 katties each) were received from Kedah where they were caught by pukat jeroot. These were

in weight between the time of landing and the retail sale since very little fish is more than 36 hours out of the sea when retailed.

Administration of fishing-stakes

Fishing-stake is one of our most important gears in the North-west, South-west and South-east regions. Its operation, however, leads to many disputes with net fishermen, as derelict poles are left on the sea-bed and these foul the nets. The settling of disputes between these two groups of fishermen has therefore been a perennial problem to the Department. In conformity with a recommendation of the Federal Fisheries Committee, steps have been taken by several States during the year, with the advice of the Department to improve legislation on the licensing of fishing stakes. In general there is now a limitation to the number of licences issued and an increase in the amount of deposit held against a licence for removal of derelict poles.

In the South-west zone, particularly off Selangor, there is an acute shortage of mangrove poles for fishing-stakes and this problem is likely to spread to other areas. The Department has consequently approved the experimental trial of the Japanese set-net (Otoshi-ami). One of these will be operated by private interests off Selangor and one off Kedah. It is felt that should this net prove successful it will pave the way for the gradual elimination of fishing stakes and all their concomitant administrative problems.

Training Staff

Staff of the Department have been sent for training locally and overseas. A number of Fisheries Assistants underwent a course on co-operative development at the Co-operative College in Petaling Jaya. Four were sent overseas for a fish-culture course in Indonesia. The Deputy Manager of the Kelantan Fish Marketing Scheme attended an FAO/ETAP course of training on Fishery Co-operatives and Administration in Australia. Those Fisheries Assistants having to deal with administration were sent to the Police College at Kuala Kubu Bharu to undergo a course in Court Procedure and the Criminal Procedure Code. Canadian Colombo Plan Aid was secured for sending a trainee for gear technology to be eventually posted as Principal of the Marine Fisheries School, and for sending two Fisheries Assistants for a course on Fisheries Co-operatives and administration in Canada. These trainees are expected to leave for training in early 1958.

Prevention of Loss of Life at Sea

A scheme for the rescue of fishing boats was introduced immediately before the outbreak of the monsoon in October. Under this scheme fishermen were asked immediately to notify the Police of cases of boats capsizing or missing at sea. Further, fishermen were notified over the radio of impending strong winds. The scheme has been successful in so far as the relaying of news by the Police was concerned. Because of the heavy surf at river mouths, exits of motor boats on rescue had not always been possible. One life was reported to have been lost as a result of the monsoon. This happened to a pukat tangkol boat which capsized off Kuala Pahang.

Development of Offshore Fishing Bases.

The rapid development of mechanisation in Kelantan and Trengganu has enabled fishermen to fish during a great part of the monsoon months. There is now an urgent need to

develop offshore bases from which they can operate. The Pulau Kedang group of islands have long been frequented by fishermen from Kelantan and Trengganu during the monsoon months and as many as 500 fishermen and their families have recently been over. To cope with this development two long-houses were constructed during the year under the supervision of the Fisheries Officer, North-east, on Pulau Pinang in the Pulau Kedang group. The project was financed with State and Federal funds. Further development in the form of a jetty, ice and fuel store, and net and fish-drying racks is required and this has been provided for in the 1956-60 Development Plan. Apart from Pulau Kedang, another island fishing base which should soon be developed to serve Pahang and East Johore is Pulau Tioman. The Department is currently making investigations into requirements on this island.

Colombo Plan Aid

Canadian Colombo Plan Aid has been enlisted for the supply of refrigeration equipment for five ice-factories on the North-east coast. These factories will be established at a number of centres to serve fishermen's co-operatives and will eventually be taken over and run by the Co-operative Marketing and Transport Union, which has already been established. Supplies of cheap ice should go a long way towards furthering the objective of economic disposal of East Coast fish in the urban markets on the West Coast.

Visits Overseas

The Director of Fisheries accompanied the Minister of Agriculture on his official visit to Japan in September, as the guests of the Japanese Government. They were shown various aspects of the Japanese fisheries but concentrated attention chiefly on tuna-fisheries and fisheries education in general. A direct result of this visit is a plan to introduce tuna fishing into the Federation of Malaya. Negotiations are in hand for establishing the necessary facilities on Penang Island.

Research

The Government of the Federation contributed to the Singapore Regional Fisheries Research Station up to 31st March 1957 when the Station was closed down owing to lack of financial support from the participating territories.

The Fish Culture Research Institute at Malacca was completed during the year and was officially opened on 21st August 1957 by the High Commissioner, Sir Donald MacGillivray. It is a regional station to serve all British territories as well as the Federation of Malaya and these territories will be asked to contribute towards the recurrent costs, the capital costs for the buildings and the ponds which amount to £250,000 having been met from Colonial Welfare and Development Fund. Since the date of independence, administration of the affairs of the Institute has been transferred directly to the Secretary of State for the Colonies, Dr. C.F. Hickling, Fisheries Adviser to the Secretary of State arrived in Malacca in November and is now the Acting Director of the Institute.

The research section of the Headquarters of the Department which was kept in abeyance pending development of the Singapore Regional Fisheries Research Station and the Fish Culture Research Institute was resuscitated at the close of the year by the filling of three Division I posts with locally born

Honours graduates in Science from the University of Malaya and London University. At the same time the Division I post of Distribution and Marketing Officer was filled by an Asian who is an Honours graduate in Economics of the University of Malaya.

Cockle Research

During the year the temporary Research Development Officer appointed in late 1956 continued with his study in Penang on problems associated with the cockle industry. He has made population studies, both at the culture beds and the natural beds and taken physical and chemical observations such as temperature and salinity. Biological observations on growth, gonad development, spatfall and toleration to salinity ranges have also been made. Drift bottle experiments have been conducted to determine the pattern of the tidal drifts in order to prove or disprove the assumption that the natural beds on the West Coast of Penang derive their spawn from the culture beds on the East Coast. The Officer has since been appointed to one of the permanent research posts on the Headquarters establishment.

Research on Piscicides

The extensive programme which the department initiated for the stocking of disused mining pools with desirable types of food fishes poses the problem of eradication of predatory fish such as aruan (*Ophiocephalus* sp) and keli (*Clarias batrachus*) both of which are natural fauna of these pools. Experiments were therefore conducted to find a cheap and efficient piscicide. The Chinese pond keepers make use of tea-seed cake and derris root (tuba) for the purpose. However both are expensive. A cheap and effective piscicide has now been found in "Shell" Endrex at a concentration of 0.007 p.p. million. This is now extensively used by the Department for the purpose, and is most economical.

Items of General Interest

During the course of the year, there was a significant reduction in the number of boats operating from Port Swettenham and Malacca on the fresh fish barter trade with Sumatra. This is particularly so with operations from Port Swettenham.

Nylon fibre or a mixture of nylon and other synthetic fibre is now used exclusively by drift-net fishermen from Pulau Ketam. Their catches have more than doubled previous years' landing and they attribute it to the new Japanese synthetic drift-nets.

A conference of Division I officers of the headquarters staff and the Chief Fisheries Officer, Singapore was held in December. The Conference was opened by the Minister of Agriculture and was held to discuss the implementation of a programme for the study of the *Kastrelliger* (kembong) fishery based on that put forward by the Indo-Pacific Fisheries Council.

The Director of Fisheries attended the IX Pacific Science Congress held in Bangkok in November-December.

During the year the Department took part in a number of civics courses and members of the staff visited all parts of the country to give advice and demonstration on all aspects of the Department's work.

The Kedah Fish Committee appointed by the State Government consisting of Government Officials and Representatives of the Fishing Industry completed its report on the present stage of the fishing industry in Kedah with recommendations for improving conditions, and this report has been submitted to the Kedah Government.

Mr. M.L. Parry, Fisheries Officer, Federation of Malaya, spent six months on a survey of the Johore fishing industry before his retirement under the Malayanisation Scheme. His report is now under consideration by the Johore Government.

Malayanisation

Three senior officers of the Department including the Director retired during the year under the Malayanisation Scheme. Four local officers with Honours degrees in Natural Science and Economics have been recruited to fill vacancies on the Headquarters establishment.

Financial Provision

The total cost to the Federation of Malaya for annually recurrent expenditure and personal emoluments of the Pan-Malayan Department of Fisheries was \$645,752. The amount voted for the Regional Marine Research Station as the share of the Federation of Malaya was \$73,371, making a total of Federal of \$719,123. There was no State expenditure. The revenue collected in respect of fishing, fishing gear and boats etc. was \$288,247.

Statistics

The following tables give a summary of the statistics of the industry:

- I. Statement of Fresh Fish Production - 1957.
- II. Fishing Gears - 1957.
- III. Quantity and Values of Fish Production - 1957.
- IV. Statement of Imports and Exports of Wet Fish - 1957.
- V. Statement of Fresh Fish Supplies - 1957.
- VI. Fishermen - 1957 and Fishing Boats - 1957.