WESTERN AUSTRALIA

MONTHLY SERVICE BULLETIN

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## STAFF NOTES

Mr. H. B. Shugg, Acting Senior Clerk, has been in Royal Perth Hospital for some weeks with a "slipped disc". It is not expected that he will return to duty much before the New Year.

Inspector A. J. Bateman of Fremantle returned to duty during November following $3\frac{1}{2}$ months' long service and annual leave. Mr. Bateman has assumed command of m.v. "Silver Gull" and will in future be responsible for patrolling the sea fisheries of the Fremantle area, i.e., from Yanchep to Long Point, and including Rottnest and Garden Islands.

Miss Carol Paramor has been appointed to Head Office staff in place of Miss Davidson, resigned.

Inspector F. A. L. Connell, accompanied by Cadet Inspector B. A. Carmichael, sailed for Cervantes Island in m.v. "Kooruldhoo" on November 28, and Cadet Inspectors N. E. McLaughlan and M. J. Simpson sailed for Lancelin Island in m.v. "Garbo" on the following day.

During November, the Superintendent paid visits to Geraldton with the Fishermen's Advisory Committee, to Serpentine to attend a special meeting of the Serpentine-Jarrahdale Trout Acclimatisation Society, and to Rottnest Island to inspect the buildings recently taken over as a Field Station and Laboratory for use jointly by the Department, the C.S.I.R.O. Division of Fisheries and the Department of Zoology of the University of Western Australia.

In command of Captain H. C. W. Piesse, m.v. "Lancelin" returned to Fremantle in November after several months' absence in northern waters. Her crew comprised Inspector R. M. Crawford and Assistant Inspector J. C. Thair. Mr. K. Godfrey, Technical Officer of the C.S.I.R.O. Division of Fisheries, was also on board.

Mr. J. Traynor, Fauna Warden, has left for the Nyabing district to commence duck banding operations for the current season.

Inspector G. C. Jeffery of Albany, is on annual leave. Inspector A. K. Melsom is relieving him.

## PRESENTATION TO MR. E. J. BROWNFIELD.

Opportunity was taken at a social gathering following the 11th Annual Inspectors' Conference to say farewell to Mr. E. J. Brownfield, formerly Clerk-in-Charge, who was recently transferred to another Department, and to make a presentation in token of the esteem in which he was held by departmental officers. In the course of his remarks the Superintendent (Mr. Fraser), said that Mr. Brownfield had been with the Department in an executive capacity for almost 13 years, and had seen it grow up. He said Mr. Brownfield had always had a keen interest in the fishing industry and had made a very close study of all factors connected with it. For 18 months during the war, when he (Mr. Fraser) was on loan to the Commonwealth Government, Mr. Brownfield had with considerable satisfaction to the Government carried out the duties of Chief Inspector, and taking into consideration his experience in the Department and his knowledge of the industry, the Department could ill afford to lose his services. He wished him success and happiness in his new Department. Mr. B. R. Saville supported the Superintendent's remarks and said that the administrative staff of the Department were exceedingly sorry that Mr. Brownfield had left. On their behalf he wished him a successful and happy future. On behalf of the inspectors, the Supervising Inspector (Mr. Bramley) said that during Mr. Brownfield's association with the office, he had been a real friend to every member of the field staff, and they were deeply grateful to him for his kindness and considerateness. The Minister for Fisheries (Mr. Kelly)

then presented Mr. Brownfield with a surf rod and reel and said that he was very sorry that the Public Service was such that a man very frequently had to leave the department in which he was most interested, and his services most valuable, before he could secure promotion. He wished him every success in his new Department.

In response, Mr. Brownfield said that the years he had spent in the Fisheries Department were perhaps the happiest of his whole official career. He thought that the Department, although it had already achieved much, had bigger things ahead of it, and he was sure that with the sympathy of the present Minister, more would be achieved. He thanked all members of the staff for what he described as a beautiful present, and said that he would make very good use of it.

## ANNUAL INSPECTORS' CONFERENCE

The 11th Annual Conference of Inspectors of the Fisheries Department was opened on November 17 by the Minister of Fisheries, the Hon. L.F. Kelly, M.L.A.

In opening the conference, the Minister said -

"Mr. Fraser and gentlemen; I can assure you that it gives me a tremendous amount of pleasure to have the opportunity of meeting so many of you here at the one time. As Mr. Fraser has remarked, I have met quite a few of you in your individual centres. Many of you I have missed, and some of you I knew before coming to the Department at all. I realise that a gathering such as this must have a very great bearing on the current and future activities of the Department. You people are the eyes and ears of the Department, and it is largely from your activities and the degree of interest you take in your job that we are able to obtain and keep a clear picture of movements within the industry. I appreciate very fully the importance of the work that you as individual inspectors are doing, and I think it is absolutely essential that accuracy be regarded as the essence of your reports. I feel that there is no

room in the fishing industry for haphazard thinking and reporting on the part of the fisheries inspectors. If there are some details you are not certain about, I think our position would be enhanced if those details were not submitted, rather than that you submit some that could not be substantiated. The work you do is reflected in the decisions of the head of the Department, and so it does not, to my mind, leave room for anything haphazard. I would also make the point that, seeing that your reports are destined to become very important to the Department, they must be very thorough.

"I have had the opportunity of reading through the report of the last annual conference and I found a tremendous amount of interest, and got a lot of satisfaction, out of some of your deliberations. This conference, I notice by the agenda, you are going to deal with some very important matters. I notice too that among the subjects you dealt with at your last conference there were some in respect of which decisions were deferred for further consideration on this occasion. I see you are going to deal with matters connected with the Abrolhos Islands crayfishery, and with the difficult problem of white crayfish. These are two very important items, and our decision in regard to both will have a tremendously far-reaching effect on the industry. I feel that you as officers of the Fisheries Department are very fortunate in that you are associated with an expanding industry. What you and the Department have done in the past years, combined with what you are planning to do in the future, can have a very real effect on the economy of this State. I am very happy to have had the opportunity of coming here today and I am looking forward to receiving the report of this conference. I wish you every success in the coming deliberations. I hope that you will have a very successful week. I take this opportunity of wishing you success in your jobs. I congratulate you on this type of conference, because I feel it is an excellent opportunity for the younger inspectors particularly to meet men of more seasoned experience. It must have a very beneficial effect on those younger men. I thank you for the opportunity of coming here this morning and it is a very pleasing duty that I perform in officially opening your conference."

A vote of thanks to the Minister moved by Mr. A. J. Bateman was carried by acclamation.

It is not proposed to report here the discussions which took place at the Conference, as they will be published separately at a later date. Mention should, however, be made of the films shown by Mr. W. Moore of the Nor'-West Whaling Co. Pty. Ltd., of his firm's whaling operations at Point Cloates over a number of years. The films were watched with considerable interest by all Inspectors and visitors and were most instructive to those officers who had never had an opportunity of visiting the Point Cloates Whaling Station. Following the screening, Mr. K. Godfrey, of C.S.I.R.O., showed a number of "stills" depicting the operations of m.v. "Lancelin" this year.

On Friday afternoon, November 20, a cricket match between officers of the C.S.I.R.O. Division of Fisheries and the Fisheries Department took place at Hardy Park, Belmont. The captain of the Department's team, Mr. J. E. Munro, won the toss from Mr. R. S. Spencer, C.S.I.R.O. captain, and sent Mr.Spencer's team in to bat. Each side batted 15 men and every member of both teams bowled at least one over. C.S.I.R.O. were dismissed for 90 runs, the bowling average being secured by J. E. Munro. The Fisheries Department then batted and amassed a total of 136 runs, the highest scorer being I. Bartholomew with 16 (retired). K. Godfrey took the C.S.I.R.O. bowling average. Included in the Department's team was the Minister for Fisheries, Mr. Kelly.

That same evening, at the Como residence of Mr. L. G. Smith, Technical Officer, a social evening was held at which the Inspectors and their wives, C.S.I.R.O. officers and their wives and office staff and their friends were present. A most enjoyable evening was had by all who attended.

## FISHERMEN'S ADVISORY COMMITTEE

The Fishermen's Advisory Committee, consisting of Messrs. A. J. Fraser (Chairman), O. J. Benson, N.K. Swarbrick and J. C. J. Gregory (fishermen's representatives) and Roland Smith, representing non-professional fishermen, held a series of meetings at Geraldton between November 10 and 12.

In the absence of Mr. H. B. Shugg, Acting Secretary, Mr. B. K. Bowen of Head Office accompanied the Committee and undertook the secretarial duties. Also present by invitation were Mr. K. Sheard, C.S.I.R.O. Division of Fisheries, and Inspectors S. W. Bowler and R. J. Baird. Evidence was given by Messrs. R. Miragliotta, E. A. Davies, J. Lansdell, L. Mott, W. Bradley, T. Grego, C. Johnson, R. Carlberg and J. Riggs, fishermen of Geraldton, concerning their views on the management programme for the Abrolhos for the 1954 season.

The general consensus of opinion was that the opening and closing dates fixed for 1953 (March 15 and August 15 respectively) were the most advantageous from every point of view, and the majority of the witnesses recommended that these dates be adopted for the 1954 season. Considerable opposition was expressed by the witnesses to fishermen who started fishing at the Abrolhos at the beginning of each season, and then after about 6 to 8 weeks, when the "cream" had been removed, returned to Geraldton and started fishing in onshore waters. They considered a fisherman should be required to determine for himself whether he would go to the Abrolhos, or whether he would fish in Geraldton onshore waters. If he elected to go to the Abrolhos, then his license should be endorsed to the effect that he would not be permitted to engage in crayfishing elsewhere during the Abrolhos open season, and if he elected to remain in Geraldton, then an endorsement on his license should provide that he would not be permitted to engage in crayfishing elsewhere during the period of that open season. All witnesses strongly recommended that a different method of measuring crayfish should be adopted. It was suggested that there should be instituted a measurement of 3" from a point immediately in front of the horns to the end of the carapace instead of $2\frac{3}{4}$" from the rear of the horns to the end of the carapace.

The Committee concluded its deliberations before leaving Geraldton, and a report and recommendations were subsequently submitted to the Minister for his consideration. The Superintendent indicated before leaving the district that as soon as the Minister's decision was made known, he would pay a flying visit to Geraldton to explain the new provisions to a meeting of the Fishermen's Association.

## M.V. "LANCELIN'S" TROPICAL INVESTIGATIONS

To continue preliminary prawn trawling experiments, initiated in Exmouth Gulf and Shark Bay in 1952, m.v. "Lancelin" sailed from Fremantle on August 17, 1953. The investigation was a joint project of the Fisheries Department and C.S.I.R.O. Division of Fisheries. The personnel of the vessel comprised Captain H. C. W. Piesse (Master), Inspector R. M. Crawford and Assistant Inspector J. C. Thair of the Fisheries Department, and Mr. K. Godfrey, Technical Officer of the Division of Fisheries, C.S.I.R.O. The following is a summary of a report submitted to the Department.

"Lancelin" is a wooden vessel of 45 ft. in length with a draft of 6'6", powered with a G.M. Series 71 diesel engine of 165 h.p., her equipment consisting of a 5 h.p. Petters diesel auxiliary engine, a "Raymond" hydraulic winch and a Kelvin-Hughes Mark 22C echo sounder with a range of 0 to 60 fathoms. Trawling gear carried included 1 pair of otter trawl doors 60" x 27", 1 pair of otter trawl doors 40" x 20", and towing warps of $2\frac{1}{2}$" hard laid sisal rope. In addition, two 18' trawl-nest for use with small doors, two 6-fm. Californian type with pocket $1\frac{1}{2}$" mesh, one 50' box type trawl-net with pocket of $1\frac{1}{4}$" mesh, and one rough testing net of heavy seine twine.

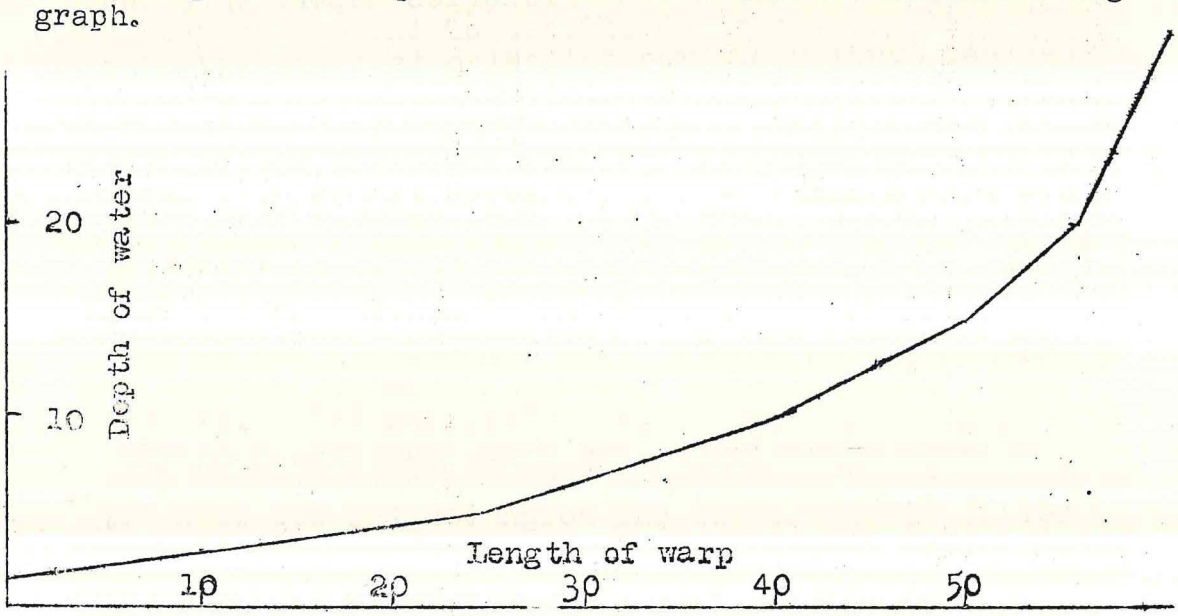
The main programme was a detailed survey of the Exmouth Gulf area with emphasis on the environmental aspects and fishing technicalities that may produce catch variants, and spot-testing of the Shark Bay area.

It was proposed that the fishing technicalities to be decided were - (a) various types of nets; (b) length of towing warps; (c) rigging of nets and gear; (d) towing speeds; (e) duration of trawls; (f) various depths.

The environmental aspects to be determined were - (a) diurnal fluctuations of abundance; (b) tidal influence; (c) weather conditions; (d) bottom sediments.

In addition, other investigations such as trolling for spanish mackerel and other surface fish; continuous recording of water temperatures; observations on fish, sea-bird and whale occurrences; surveying islands, reefs and bottoms, and collection of marine specimens.

generally, were contemplated. Various types of nets and combinations of rigs were tried, and after much trial and error, it was found that the most suitable rig was the Californian type shrimp trawl-net with a 6-fm. head rope and a pocket of 1½" mesh, the wings being 2½" to 3" mesh. Rope "legs" 3 fathoms each in length were fitted to the wings, and canvas "aprons" were fitted to the underside of the net to prevent undue chafing. Warps of 2½" hard laid sisal rope were used, the length varying according to the depth of water as shown in the following graph.




Sea trials were made on August 15 with the Minister for Fisheries (Mr. Kelly) and the Superintendent (Mr. Fraser) on board. During these trials, the echo sounder and the new hydraulic winch, which had only just been installed, were tested and found satisfactory.

On August 17, "Lancelin" sailed for Geraldton where final preparations were made. The vessel arrived in Shark Bay on August 22, and after the trawling gear had been rigged, preliminary tests were carried out to permit adjustment of the trawl warps and doors. Spot-testing in the Bay was then carried out until August 28, but during the tests only one sample of prawns was taken, consisting of 8 tiger prawns caught off Cape Lesueur. However, good catches of saucer scallops were made off the Outer Beacon - a total of 400 lb. being trawled in 90 minutes.

After refuelling at Carnarvon, some trawling was done to the east of Bernier Island, where the "Rip" had trawled in 1904. This ground, however, proved too rough for "Lancelin's" light gear, although good catches of small fish were made.

Exmouth Gulf was reached on September 1, and a few days were spent in trolling off Muiron, Long, Round and Flat Islands, and in re-rigging the trawling gear. On September 5, trawling was commenced in the Gulf and continued until October 9. During that period, most of the area in the Gulf suitable for trawling was fished over and the following conclusions reached -

1. Towing Speeds. Speeds from 1 to 4 knots were tried under varying conditions. At very slow speeds the net was inclined to dig into the bottom and fill with mud, whereas at high speeds the net would lift off the bottom. The speed of 2 to 3 knots was finally found to be the most suitable, allowing for direction and speed of tide.

2. Duration of hauls. It was found that a maximum of 60 minutes for each haul was sufficient, because beyond that time the weight of material in the net, i.e., fish, mud, coral, weed, sponges, etc., caused too great a strain on the net and warps.

3. Depths. The deepest part of Exmouth Gulf which can be trawled is 13 fathoms. In shallow water, 5 fathoms appeared to be the limit, as it appears that an outcrop of reef extends in most places from the shore to the 5-fathom line.

4. Diurnal Fluctuations. The trawls were shot at all times of the day and night. It was found that night fishing in this area was virtually impossible owing to the enormous quantity of small crabs present. These literally filled the nets and mutilated beyond recognition any prawns that might be present. However, there appeared to be no significant difference in the catches at different times of the day and night.

5. Tidal influence. This appears to be one of the most important factors in prawn-trawling operations. All conditions and states of the tide were met with. On the springs the water became murky and the catch of prawns and fish rose accordingly. On the neaps,

the water cleared and the catch dropped appreciably. Trawling was done with, against and across the tide at both high and low water, and with the tide both on the ebb and flood. It would appear that the best combination for fishing is against or across the tide just before or after slack water.

7. Weather conditions. Trawling operations with light gear, such as was carried by "Lancelin", are governed to a large extent by weather conditions, but the sheltered waters of Exmouth Gulf provided more or less ideal conditions during the whole of the period. In other areas a wind of force 5 or over with a moderate sea hampered operations, especially when trawling down-wind.

8. Bottom Sediments. The bottoms encountered were coral, weed, silt, sand, gravel and mud. Prawns were taken on all these bottoms, but silt and mud produced the best results.

On October 10, "Lancelin" sailed from Exmouth Gulf and proceeded southwards. En route one haul was made with the trawl at Stanley Pool (Maud Landing), but no prawns resulted.

The Shark Bay area was once more spot-tested, but the presence of wire weed and ribbon weed in most of the areas tested necessitated abandonment of the operations after a few hauls.

Certain conclusions have been reached by Mr. Godfrey and Captain Piesse as a result of the current year's work at Exmouth Gulf, although unfortunately little can be said about the Shark Bay area in view of the limited amount of work done there. These conclusions may be summarised as follows -

The trawlable area at Exmouth Gulf has now been fairly extensively worked at all times between July and November during the years 1952 and 1953, although not all in either year. Both Mr. Godfrey and Captain Piesse consider the results most encouraging. There are three main types of prawns, viz., tiger prawns, "pink" prawns and king prawns existing in most areas of the Gulf. Catches of up to 30 lb. per haul of 60 minutes were made. The prawns measured 6 inches in average length and weighed

from 1-1/7 to 1-3/5 oz. They are of excellent quality and compare very favourably in flavour and texture with prawns taken from similar trawling grounds in New South Wales and Queensland. The best results in cooking were obtained from immersing the prawns in boiling salt water (sea water plus salt) and allowing them to simmer for 20 minutes. One sample of cooked prawns was pickled in a liquid consisting of 5 parts brine and 2 parts vinegar with a small amount of sugar added. The prawns thus treated were found to be quite wholesome at the end of two months. A few specimens of other types of prawns were taken, the main one being the greasy-back.

Trolling possibilities are excellent, as the following table showing "Lancelin's" results will indicate -

| | Species | No. Taken |
|---|---|---|
| 1. | Large-scale tunny (Grammatorycnus bicarinatus) | 115 |
| 2. | Southern bluefin tuna (Thunnus maccoyii) | 1 |
| 3. | Northern bluefin tuna (Kishinoella tonggol) | 1 |
| 4. | Mackerel tuna (Euthynnus alletteratus) | 6 |
| 5. | Narrow-barred spanish mackerel (Cybium commerson) | 19 |
| 6. | Broad-barred spanish mackerel (Cybium sp.) | 1 |
| 7. | Spotted spanish mackerel (Cybium queenslandicum) | 6 |
| 8. | Grey mackerel (Indocybium semifasciatum) | 1 |
| 9. | Wahoo (Acanthocybium solandri) | 1 |
| 10. | Torpedo or mackerel scad (Megalaspis cordyla)* | 2 |
| 11. | Samson fish (Seriola hippos) | 1 |
| 12. | Sea kingfish (Seriola grandis) | 3 |
| 13. | Speckled cod (Epinephelus laurina) | 7 |
| 14. | Leatherskin (Scomberoides sanctipetri) | 2 |
| 15. | Whitefish (Chorinemus lysan) | 18 |
| 16. | Turrum (Turrum emburyi) | 2 |
| | Total: | 186 fish |

Total weight: 2,463 lb.

* First record for Western Australia.

The Muiron and Long Island areas provide very good catches of surface fish. The trolling experiments were made with luminous aluminium jigs as well as standard jigs.

Several schools of pelagic fish were sighted during the cruise, principally tuna. Mackerel tuna were observed in fair schools in Exmouth Gulf. Invariably, the tuna were feeding on shoals of small herring and pilchard-like fish.

Large numbers of muttonbirds and terns were observed in the vicinity of North-West Cape, and scattered occurrences of other sea-birds, including muttonbirds, terns, albatross and Wilson's stormy petrels, were observed at all parts of the coast between Fremantle and Onslow. Greenback turtles appeared to be fairly numerous in the North-West Cape area. A total of 120 was counted along a 1-mile stretch of beach at Long Island in October. Most of the females were carrying well-advanced eggs. These turtles were sighted also on different islands and in the water.

## SCHOOLS FOR FISHERMEN

In the August, 1953, issue of the Bulletin was published an extract from the South African Shipping News and Fishing Industry Review concerning the establishment, as from the beginning of 1954, of a fishermen's training school at Saldanha Bay Naval Gymnasium. Subsequently, the Premier of Western Australia addressed a letter to the Prime Minister of the Commonwealth enclosing a copy of the extract and pointing out that several approaches had been made to the W.A. Government for the setting up of another training school based on the C.R.T.S. School held at Cronulla, N.S.W. in the immediate post-war years. Mr. Hawke pointed out that in view of the relatively small number of people who might be interested in this State, it was felt that consideration might be given to the re-establishment of the Cronulla school by the Commonwealth Government.

A reply has now been received from Mr. Menzies as follows -

"I refer to your letter of 3rd September con-
"cerning the question of the establishment of a Common-
"wealth Fisheries Training School.

"This matter has been given careful consideration,
"but as the development and extension of industries is
"primarily a matter for State Governments, it is regretted
"that the Commonwealth is unable to make a special grant
"for this purpose."

## WHALE OIL EXPORTS

Exports of whale oil from Western Australia in 1952-53 amounted to 2,558,697 gallons worth £936,473. This was an increase of 378,526 gallons on 1951-52. However, the drop in world prices reduced the return by £423,769 compared with the previous year. Germany was the principal buyer, taking 1,150,821 gallons, followed by the Netherlands (927,063 gallons), and Italy (169,949 gallons).

## FISHERY FILMS

It will be remembered that at the inspectors' conference it was promised that a list of films on fishery subjects in the library of the Visual Education Division of the Education Department would be published in the Bulletin. Such list appears below.

If any inspector desires to arrange for a party of fishermen or anglers to view any of these films, he must first contact the headmaster of the local State School for the use of the school projector and the services of an approved operator. The headmaster himself may then ask for selected films (all are 16 m.m. with sound tracks) direct from the Superintendent of Visual Education, or the inspector may approach the Fisheries Department, whichever is the more convenient.

One point on which the Visual Education people are adamant is that the operator projecting their films must be fully certificated, otherwise the films will not be made available.

| No. | Title | Length | Synopsis |
|---|---|---|---|
| AC54 | Antarctic Whale Hunt | 22 mins | Shows equipping of a British whaling fleet; the search for whales in the antarctic, catching the whales and work on the factory ship. |
| AC65 | Caller Herrin' | 20 mins | Herring fisheries. Shows what happens from time the trawlers put out to sea until catch reaches the family table. |
| AC66 | Atlantic Trawler | 20 mins | English fishing industry. Life aboard a West Coast trawler under conditions of war. |
| AC94 | Purse Seining (Colour) | 21 mins | Refers to and shows some aerial and sea surveys of pelagic fish resources off the Australian Coast. In detail it describes the use and application of the purse seine net in catching mackerel off Tasmanian coast. |
| AX10 | Fighting Fish | 11 mins | Catching and landing big fish on the light line is the art of the game. Scenes off Queensland and N.S.W. coasts. |
| AX45 | Fishing Thrills | 11 mins | Thrills of deep sea and river fishing. |
| CS14 | Salmon Industry, British Columbia | 11 mins | Map of the 4 main fishing grounds of world and waters of British Columbia are selected to show the large scale salmon fishing industry 5 yr. cycle of sockeye salmon is shown in animation. |

| No. | Title | Length | Synopsis |
|---|---|---|---|
| CS43 | Fishing Grounds of the World | 11 mins | Shows four main fishing fishing areas of the world; breeding of fish; sights and sounds of unloading at Hull and the marketing at Billingsgate. |
| CS46 | Shell Fishing | 11 mins | Work of fishermen who gain a living by gathering lobsters, crabs, clams and oysters for markets of the world. Depicts the catching, canning, packing and marketing of these shellfish. Illustrates in detail the preparation of oyster beds, dredging for mature oysters, luring crabs to nets with baited lines, digging for clams, and catching lobsters in baited traps. |
| CS63 | Whaling | 13 mins | A straightforward account of a modern whaling fleet at work in the Antarctic Sea. By animated maps we follow the factory ship from Southampton to Capetown, where she picks up her vessels. |
| CS85 | Hunting the Humpback | 11 mins | A detailed survey of the Whaling industry of W.A. centred in the Carnarvon area. A brief historical account introduces the procedure of the search, the kill, inflation and hauling of carcases and treatment at the station. |
| ES116 | The Salmon Story (Colour) | | Salmon Breeding. |

# THE RESOURCES OF THE SEA - (ii) THE AUSTRALIAN FISHERIES

(the second of a series recently broadcast by the A.B.C.)

by KEITH SHEARD

Why is it, in spite of the enormous length of the Australian coastline, that our fish production is low? So low that its total amount is just about equal to the catch of the plaice, one of the flat-fishes of the North Sea.

Why is it, that the Australian consumption of fish per head from our own waters, is one of the lowest of any sea-bordered land?

Why is it that we import quite large quantities of fish?

Or that our chief fisheries are confined to fairly restricted areas of the coastline?

Are there so few fishes in Australian waters?

Are our seas so rough and treacherous?

Is life so easy on shore that there is no need to fight the sea?

Or are our methods of transport and storage, and so of distribution and marketing, so poor?

Or are our fish just poor quality to begin with?

It's easy to ask questions - harder to find answers; perhaps it is even harder to ask the right questions. Leaving these aside, it is true that Australia's production and consumption of fish are lower than we really expect. Perhaps it's worthwhile asking, what makes a fishery?

Fish! Of course! Fishermen! Yes! Demand, markets, at home or overseas! Yes! Markets and all that goes with the marketing of a perishable product, careful processing, reliable storage, and fast, efficient, transport.

Very well - have we the fish? I think the general answer is yes - not fish on the astronomical scale of some of the cold waters of the northern hemisphere, but certainly our warmer waters contain fish beyond the present use we make of them; fish enough to increase our national wealth considerably.

It's no accident that the tremendous numbers of fish belonging to only a few species develop in cold sea - living conditions that are just harsh enough to select out only a few kinds, but those which occur are beautifully adapted to take advantage of the best features of those waters. So the numbers of individuals of those few kinds flourish beyond belief. Some, like the herring, swarm on the often brief flowerings of the marine plants and small crustaceans, and store the richness of their fats and oils against the harder times. Others, like the cod, prey on the herring, and so on. In the end a food chain is developed with each of the species present in very large numbers.

In an old play one fisherman says - "Master, I marvel how the fishes live in the sea", and the other answers - "Why, as men do a-land, the great ones eat up the little ones".

In the North Atlantic and in the North Pacific there are enough little ones to support enough great ones for man to gobble them up, and live richly.

Our land lies in warmer waters, in the sub-tropical oceans; and in many ways living is easier for the fishes. There's not so much food at any one time, but there is always some and in great variety. Temperature is not such a selective force, and the overall result is that many kinds of fishes can exist. Instead of a fierce competition between species of fishes, competition is more a matter between individuals, so that in our waters we have many species, but not so many individuals of each. That makes problems for the fishermen; it's difficult to develop a specialised fishery, or for that matter specialised methods of processing. There are a few exceptions like Australian salmon and crayfish, but generally all the fisherman and the processors have to be jacks-of-all-trades. Costs too are higher.

There's another very important difference between the two areas - and that's the very much smaller amount of coastal shelf in Australian waters.

Shallow seas are the most productive. In the Northern Hemisphere, areas of that kind are very large; in our waters the coastal shelf is for the most part a narrow ribbon, extending around an enormous coastline broadening out chiefly in far-distant northern waters. It is difficult to appreciate the great problems that that brings - not only does it mean that local areas are often fairly easily fished out (for a while) so that the fishermen have to travel further afield, up or down a narrow strip of shelf; but it means that many of our fish migrate over very long distances.

For example, we have just been finding out some very interesting things about the Tommy Ruff, the Western Australian Sea Herring (no relation to the North Sea and Atlantic Herring of course).

About 1,200 of these fish were tagged by Mr. Bruce Malcolm of the Division of Fisheries at Ceduna and Kangaroo Island, in South Australia, in June of last year. Small, numbered, plastic strips were inserted in the body cavity, and these appeared to do no harm to the fish. At any rate, by February of this year one was caught at Esperance, a distance of about 600 miles; then they were taken further west, and by June and July, several were caught off Fremantle, 1,100 miles from where they were tagged. Good swimming! 1,100 miles in less than 12 months! But the best of all was one small fish which was tagged at Kangaroo Island at the end of November and which was caught at Rottnest - 1,100 miles away - only five months later. Others of the Australian fishes - mullet, shark, salmon, and flathead - also travel quite considerable distances.

All this raises difficult fishing problems, and makes fisheries management not quite so easy. It doesn't make transport and distribution easy either, particularly when one place can be having a glut of fish and another some hundreds of miles away a dearth.

If you add to the fact that our fishes occupy this long ribbon of shelf waters in this rather irregular manner another one that good fishing boat harbours are not very common and another that the bulk of the human

population is concentrated in a few great cities, you will not wonder that fish are often scarce and dear, particularly when the resources of even the Australian coastal shelf as a whole are not fully used, or, for that matter, fully appreciated.

The areas within reasonable transport distance of the great cities are well known and in some cases over-worked. Farther afield it is rather another story, but that is no blame to the fishermen. There is little use painstakingly learning an area and making good hauls only to find that it can't be got to the market in a reasonable condition, or that the costs of getting it there are far too high anyway.

We have some very good fishermen in Australia, but they don't see any point in using their time that way, and in any case they haven't the capital to fit out enough of the type of small ship that is required, or of transport vessels either.

Once upon a time it was a simpler matter. Living conditions generally were poor, and it was quite sufficient to dry, or to rough-salt your fish, and there was a sale for it, although even that method demanded pretty large concentrations of fish to make it pay.

But nowadays, fish compete with many other foodstuffs, and the housewife wants it fresh, or else attractively canned. What's more she wants it attractively displayed. Overseas markets are perhaps even more difficult to satisfy, but all this attractiveness costs money.

I think the first answer to our questions is that we have fish reserves which can increase our production several times. The work of the Division of Fisheries and the enterprise of private individuals have shown us that! We have also learnt that the slope waters, the area where the coastal shelf slopes to the ocean depths, are well worth exploring. We have learnt a considerable amount about the habits and migrations of the fishes even in far distant places; we know something about their kinds and their numbers and about the techniques of catching them; we know we have fish of quite good quality, not only jewfish, mullet, whiting, snapper, but many others; we know something about their various processing requirements, although there is a tremendous amount of work to be done on that yet.

But the apparently simple problem of storage and transport is our stumbling block.

What is the answer to that? Is there one which will satisfy modern demand? Actually there are several. One is the erection of small canneries and land-based filleting and freezing works, but the catch here is that these must be near enough to an established and fairly constant supply of fish. Another is the use of faster vessels, or the building of coastal roads so that the fish can be transported rapidly to processing works, or to distribution centres. These methods are being used, but even so we are only tapping the nearer fishing grounds or dealing with seasonal runs of fish.

The difficult problem is that of dealing with catches far distant from the population centres.

Even here an answer is emerging and that is based on the use of refrigerated vessels, either small ones catching and quick-freezing a holdful and then transporting the fish back to the markets, or else a somewhat larger vessel acting as a mother ship to smaller ones, and filleting, packaging and quick-freezing the catch on board, mobile enough to work over large areas and yet cheap enough to make it worthwhile.

Each of the various States is tackling the problem in its own fashion, some by developing centralised marketing and distribution machinery of one kind or another, others by other means.

Western Australia with its enormous coastline - about a third of Australia - has its special problems; but there is enterprise here that is steadily overcoming them. Quite difficult problems have been met in others of the Australian States.

Tasmania has met its problem of rough and difficult seas by developing fishing vessels and men that can withstand them, and for transport they use aeroplanes to carry the choicer kinds of fish to their natural market, Melbourne.

Quite early in South Australia's fishing history a method of shipping whiting to Melbourne was developed. This depended on co-operation between the

rail systems of the two States whereby specially designed boxes containing the gutted whiting were iced at intervals along their journey.

In New South Wales, where some of the trawling grounds were somewhat broken by reefs so that the big trawlers could not work, another method of trawling was adapted from Denmark. This is called Danish seining and does not involve dragging a trawl over the sea-bottom for some miles. Instead, the trawl itself is more or less stationary, but the fish are guided into it by long ropes a half a mile or mile long laid on the sea bottom with each shot of the net. In that way much smaller trawling grounds can be worked, and much smaller ships can be used.

Queensland has its fisheries problems something like those of Western Australia - rather restricted fishing grounds near its capital city, and with transport from its northern areas very difficult. Likewise, as in our own case, some of their most prolific fishing grounds occur in regions where the air temperatures are high and fish spoil easily, so that refrigeration and good transport are very necessary. Areas like the Gulf of Carpentaria certainly contain quite useful stocks of fish; and off-shore there are Spanish mackerels and tunas - very tasty fish these - but so far those northern waters have been exploited in only a limited fashion.

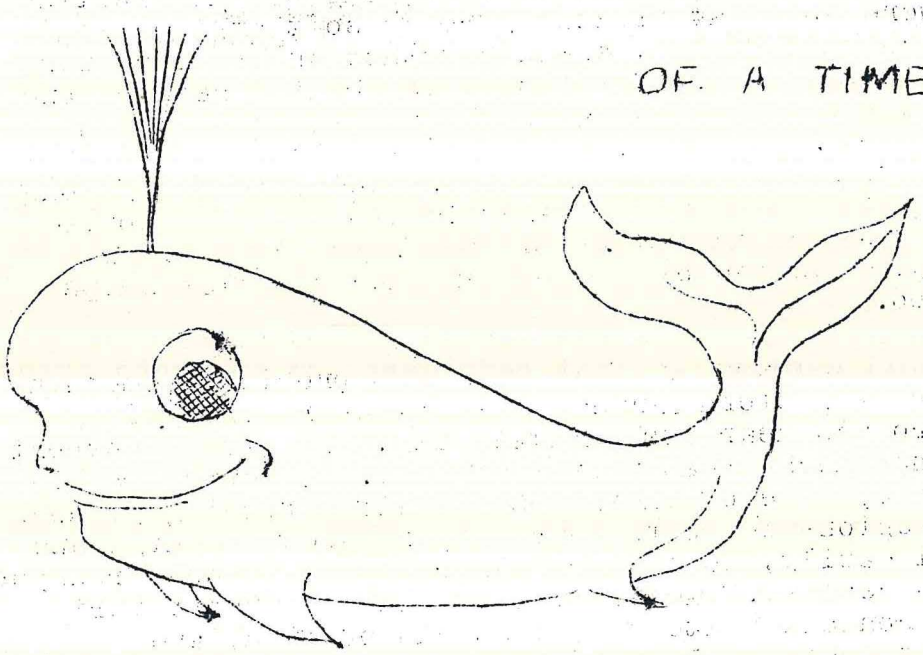
The answer seems to be the use of small refrigerated ships, and of refrigerated mother ships, a method which Western Australia can be proud of having pioneered in quite a large way. Even so there are many refinements possible in this method. One is that of filleting and packaging the fish on board with a saving in the amount of wasted storage space, perhaps in combination with air transport.

But that is still in the future!

WE WISH OUR STAFF A

# WHALE

OF A TIME



AT

XMAS AND NEW YEAR

# THE WESTERN AUSTRALIAN CRAYFISH FISHERY

by E. J. Brownfield*

## INTRODUCTORY AND HISTORICAL

Although the earliest colonists must have been aware of and availed themselves of the crayfish occurring in the waters of Cockburn Sound and around the adjacent islands (Rottnest, Garden and Carnac), there is no record of any commercial exploitation of the resource prior to the mid-nineties of last century. It is on record that some years after the foundation of the colony in 1829crayfish were captured at the entrance to Fremantle harbour, but we can find in contemporary literature no estimates of the abundance of fish.

Early departmental files contain some very interesting information concerning not only the administration of the crayfishery, but also the efforts of the Department to establish the species in waters in which they had not previously been known to occur.

Just before the turn of the century a number of crayfish taken in the vicinity of Rottnest Island were liberated in Koombana Bay (Bunbury) by Lindsay Thompson, at that time Chief Inspector of Fisheries. Whether this transplantation was successful or not we have no way of knowing, but it seems that in March, 1900, a diver working on the Bunbury jetty secured several large crayfish, and in addition some thirty fish were picked up in the vicinity after blasting operations had taken place. It cannot of course be proved whether these were some of those liberated earlier or their progeny, or whether they were fish naturally occurring in the area concerned. At all events a proclamation was issued immediately prohibiting the taking of crayfish in Koombana Bay. Two years later a report of the occurrence of crayfish in that Bay was received from the Bunbury harbour administration.

Efforts were made as well to acclimatise the species in the Swan River. Early in January, 1901, Fisheries Inspector A. Abjornsson liberated 51 female

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* Formerly Deputy Chief Inspector, Fisheries Dept., W.A.

and 21 male crayfish in Freshwater Bay between Doughboy Point and Osborne, in what is now known as Mosman's Bay. These were caught at Rottnest by fisherman A. Francis. A week later 24 females and 12 males were released in Blackwall Reach and Freshwater Bay. On January 16 a proclamation issued prohibiting the catching of crayfish in the Swan River and Cockburn Sound within half-a-mile radius of the western extremity of the North Mole, Fremantle, and a press paragraph enlisted the support and co-operation of the public in making the transplantation a success *

## EARLY CONSERVATION MEASURES

In March, 1897, pursuant to the Fishery Act, 1889, a minimum weight of 8 oz. was prescribed for crayfish, and a close season during January, February and March in each year was proclaimed. This action followed a report dated December 7, 1896, that "enormous numbers" were being caught, "nearly all in spawn". Inspector Abjornsson, in a report dated August 29, 1898, claimed that the weight of 8 oz. was too low. He said, "As it is impracticable to weigh live crayfish, I would suggest measurement. An 8-oz. cray measures 6 ins. from the eyes to the tip of the tail, an 11-oz. cray measures 7½ ins. and a 16-oz. cray 10 ins. I suggest 8 ins. be the regulation size." Because under the Act a minimum weight only, and not a minimum length, could be prescribed, Abjornsson's recommendation was not adopted, but the legal weight was in September of the same year increased to 12 oz. + At the same time the close season was extended by adding the month of November in each year. A penalty of up to £20 and forfeiture of all implements used and crayfish taken was prescribed for a breach of the law.

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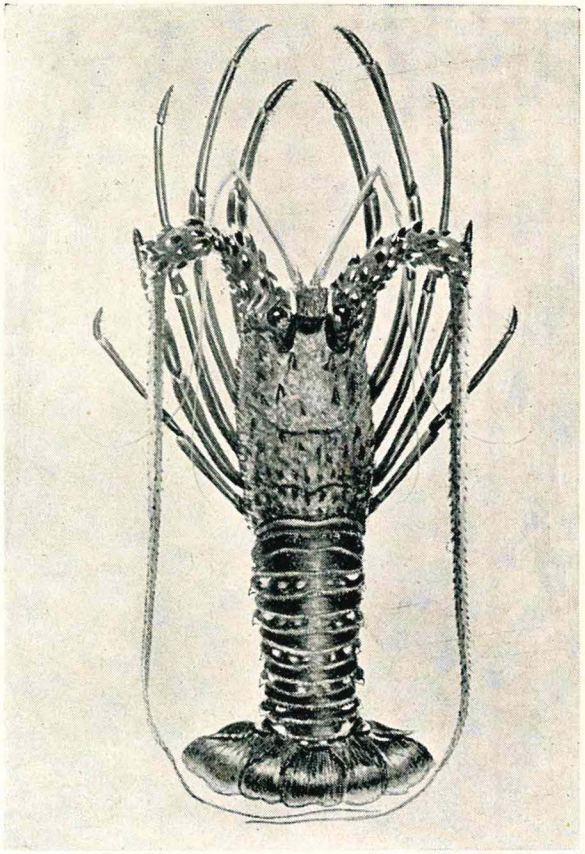
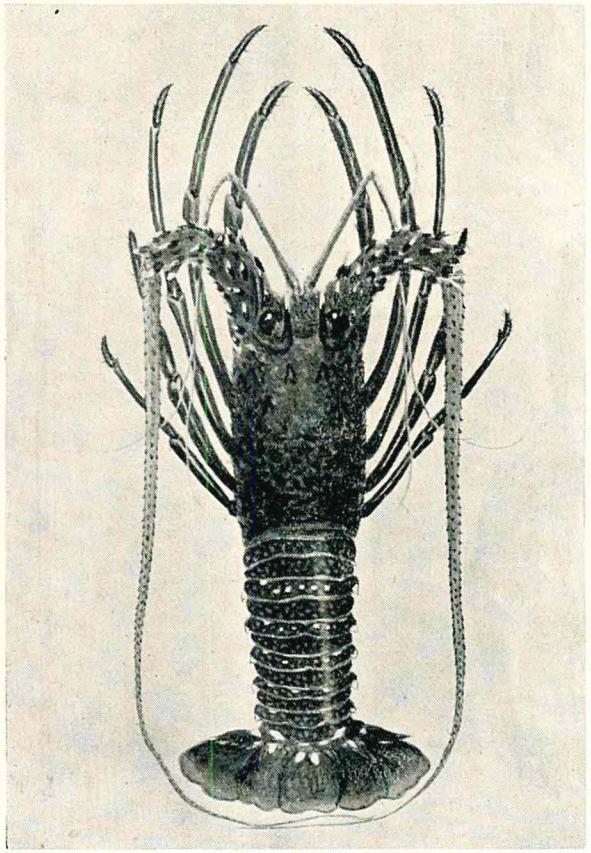
* It is of interest to note in passing that as recently as April, 1949, fisherman Roy Smith, of Mosman's, reported having seen seven crayfish in shallow water in Blackwall Reach. A few days later two were caught. These were undoubtedly "strays", as no record exists of the capture of any quantity of fish following the transplantations in 1901.

+ 12 oz. remained the legal minimum until 1940, when a minimum length of 2¾ ins., measured from the rear end of the base of the rostral horns to the end of the carapace, was substituted.

# WESTRALIAN CRAYFISH (Panulirus longipes)



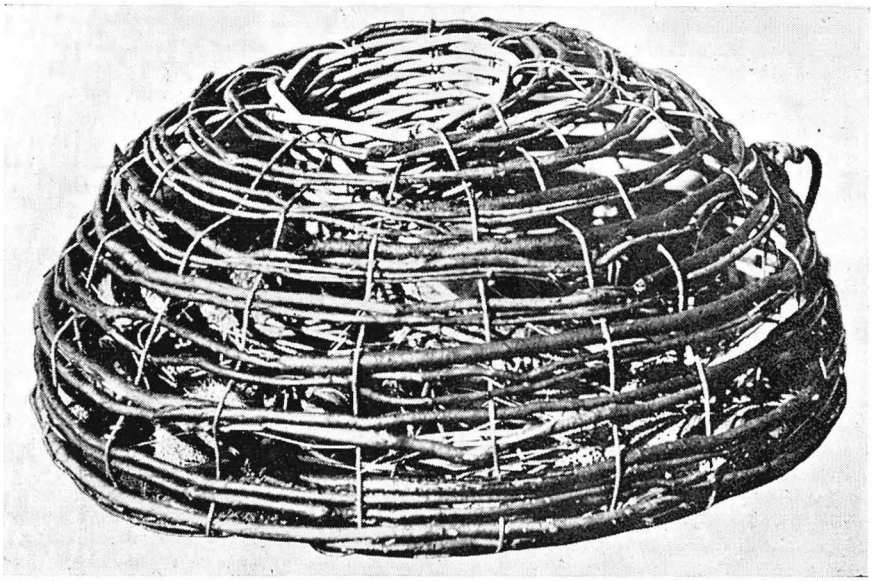
MALE



FEMALE

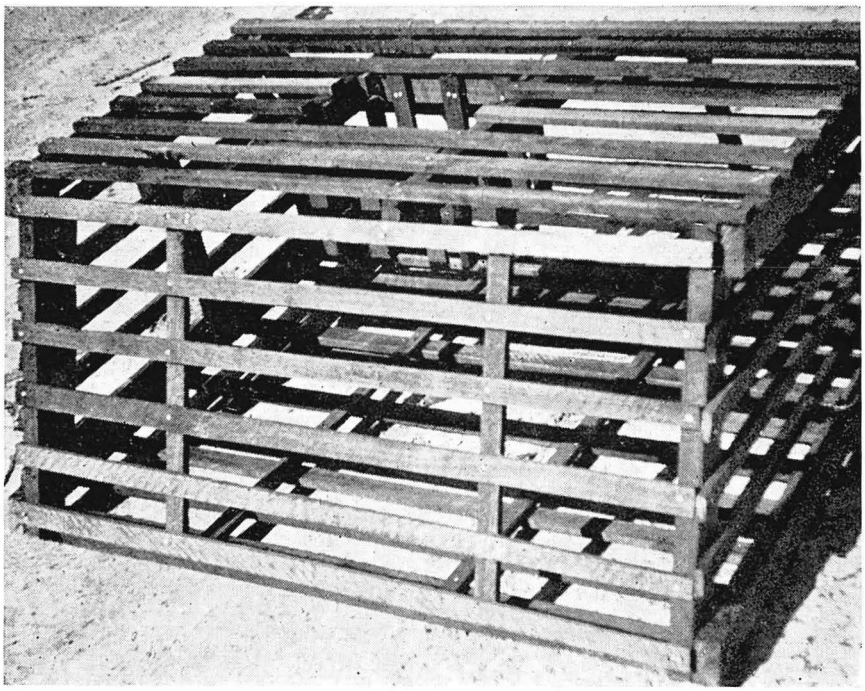
(K. Sheard del.)

# TYPICAL CRAYFISH POTS



"Beehive" pot used in deeper waters. Constructed of spearwood with cane entrance.

(Photo Brown & Brade)



Batten pot for use in shallower waters. Constructed of jarrah laths.

(Photo N. E. McLaughlan)

67980/8/53—300

These measures brought strong protests from the public, and it was decided to seek the advice of Lindsay Thompson, who by this time had returned to New South Wales. He was asked whether the close season proclamation could be made to apply only to female fish, and if so, whether adequate protection would thus be afforded. Thompson in his reply pointed out that his earlier recommendations had applied only to specified areas, and gave it as his opinion that in any case the proclamation was ultra vires in that crayfish were not fish within the meaning of the Act. He considered that it would be impracticable to apply a close season to female fish alone.

A new proclamation was now gazetted to include in the closed area all the waters within a line drawn from Rous Head to the Five-Fathom Bank, thence to Coventry Reef, and thence due east to the mainland. This, however, did not suit the West Australian Anglers' Club, who protested that the closure was useless because the main fishery was at Rottnest and that "in every basket coming in now there is a large proportion of female fish in full spawning". The Department decided it must investigate the position and Inspector Abjornsson was sent to Rottnest Island for the purpose.[*] Abjornsson's subsequent report (February 10, 1899) was as follows -

> "The 8th instant I visited the crayfishery "around Rottnest Island. At present there is three "boats engaged crayfishing. The boat I was in "lifted 15 pots from 1 to 15 fish in each pot, in "all 10 dozen fair size crayfish. Out of that lot "was ½ dozen she fish, but no spawn. These pots "were lifted and set about a mile and a mile and a "half from the land. It appears the she fish "chiefly spawn inside the line of reefs that "surround the Island. I have noticed the boat that "is fishing inside the reefs gets more she fish than "anything else. Although most of the fish have "spawned by the end of January yet there is a few "to be found inside the reefs with spawn.
>
> "For the protection of crayfish I would suggest "a closed area around Rottnest Island say ½ mile "from land out to sea, and further, to prohibit the

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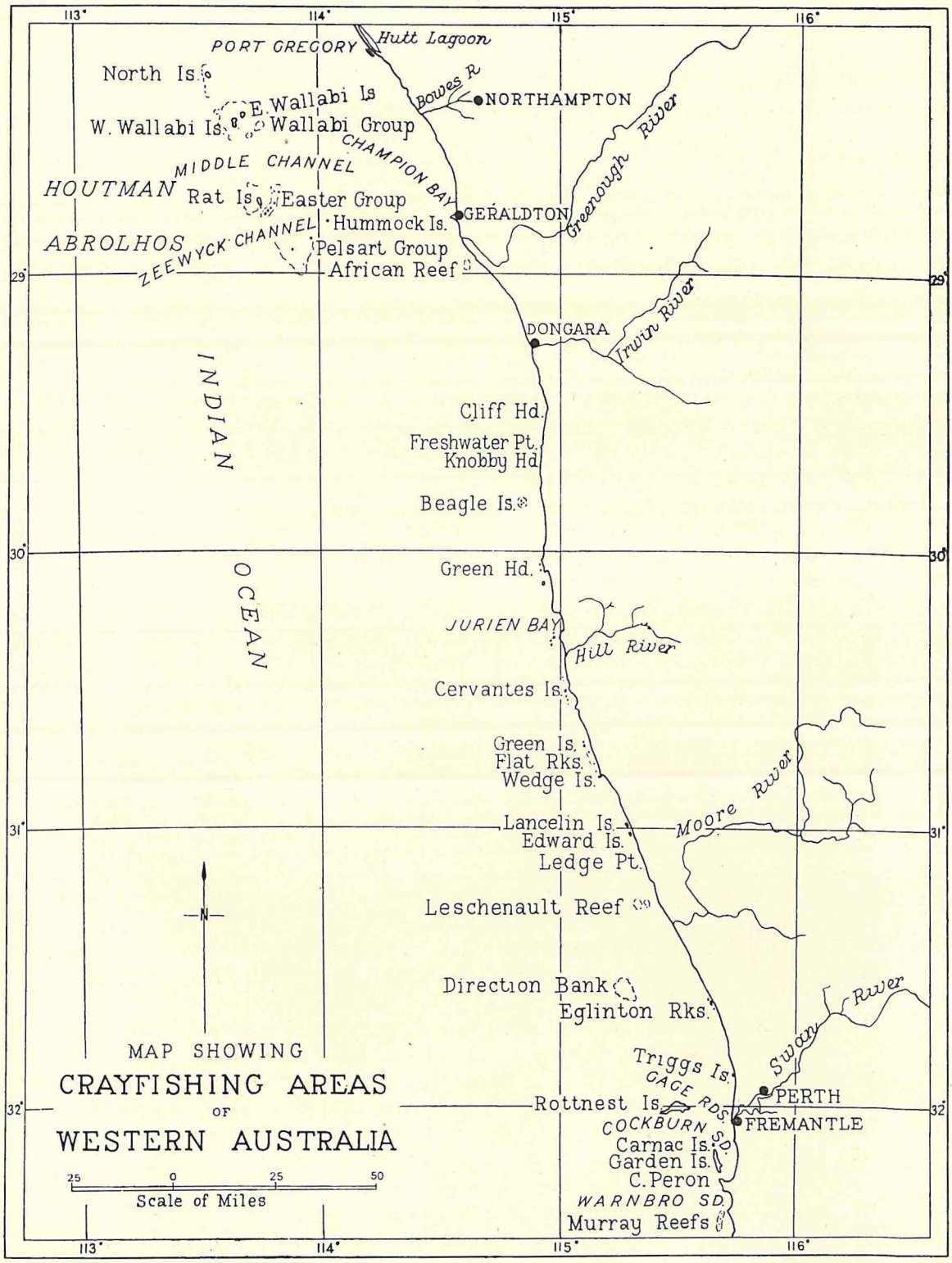
[*] The island being then a penal settlement the Inspector had first to obtain a permit from the Colonial Secretary.

"taking of any she fish during the months of November, "December and January. Crayfishing around Rottnest "has been carried on for many years without any "restriction or protection whatever so it is no "wonder the fish is scarce.

"In my opinion there is no necessity to have "a closed area that includes Garden Island and Carnac, "because it is not a profitable fishing ground by any "means, the crayfish there being a small species and "not plentiful."

A statement of Lindsay Thompson's views concerning the general question of crayfish conservation is contained in one of his reports. In common with that of Inspector Abjornsson above, it is of considerable interest in the light of our present-day knowledge. It is consequently quoted at length -

"For the edible crustaceans, except that the "capture of the prawn is prohibited during seven "months of each year, commencing in May, there is no "law to regulate either their propagation or capture. "Of the crayfish, the principal sources from which "they are supplied to the metropolis are the sub- "merged reefs and rocks surrounding Rottnest and "Garden Island, and spreading along the coast for "some miles from Fremantle. The diminutive size of "a large proportion of the crayfish daily exposed "for sale in the Perth shops seems to suggest the "necessity for placing some restrictions upon their "capture; and in any future amendment of the fisheries "laws this point should not be overlooked. The range "of the gestation period of these fish from inception "to the time the female throws off the berries, would "absorb the better part of six months, probably from "June to December. It is within this period that "protection for propagation purposes should be "afforded; but, unfortunately, the portion of it "during which the female carries the 'coral' is "exactly the time when they are in best condition as "food; so that to make a hard and fast close season "in which they may not be captured, would result "in unduly limiting the supply of a very excellent "and highly prized diet. Effective means must, however, "be taken to ensure continuous propagation, and this "can best be done by proclaiming certain specified


113°
114°
115°
116°
PORT GREGORY
Hutt Lagoon
North Is.
E. Wallabi Is
W. Wallabi Is.
Wallabi Group
Bowes R.
NORTHAMPTON
CHAMPION BAY
MIDDLE CHANNEL
HOUTMAN
Rat Is.
Easter Group
Hummock Is.
GERALDTON
Greenough River
ABROLHOS
ZEEWYCK CHANNEL
Pelsart Group
African Reef
29°
DONGARA
Irwin River
INDIAN
OCEAN
Cliff Hd.
Freshwater Pt.
Knobby Hd.
Beagle Is.
30°
Green Hd.
JURIEN BAY
Hill River
Cervantes Is.
Green Is.
Flat Rks.
Wedge Is.
Moore River
31°
Lancelin Is.
Edward Is.
Ledge Pt.
Leschenault Reef
Direction Bank
Eglinton Rks.
Swan River
Triggs Is.
GAGE RDS
PERTH
32°
Rottnest Is.
COCKBURN SD.
FREMANTLE
Carnac Is.
Garden Is.
C. Peron
WARNBRO SD.
Murray Reefs
N
MAP SHOWING
CRAYFISHING AREAS
OF
WESTERN AUSTRALIA
25 0 25 50
Scale of Miles

"localities within which their capture shall not be "permissible. The duration of the first close "season should embrace a period of from two to three "years. I suggest such a lengthened period, not so "much to secure a substantial initial result in the "propagation of the species, as to enable it to be "determined whether the fish will not, by being "afforded a prolonged opportunity to mature, acquire "a greater size than is at present usually seen in "the Perth shops. The crayfish on the coast of New "South Wales, north of Port Jackson, are often more "than twice the size of those seen here; and as they "seem to be subject to very similar pelagic conditions, "the experiment is worth attempting. I am inclined "to believe that it will succeed, because only a few "days since I noticed some crayfish on exhibition for "sale which appreciably exceeded the size usually seen "at the fishmongers; doubtless these were older fish "which had hitherto escaped capture."

These investigations and reports were followed by a proclamation published on June 7, 1899. It prohibited the taking, offering for sale or possession of female crayfish during November, December and January in every year, and at the same time closed all waters within one half-mile of highwater mark of Rottnest Island to fishing for crayfish. This proclamation was in the following November amended to apply only to female fish carrying berry. The half-mile closure endured to October, 1953, when the use of more than two craypots by any person in any waters within one mile of Rottnest was prohibited.

## THE FISH

The fish we call "crayfish" in this State are known as "crawfish" in South Africa, and as "spiny lobster" or "rock lobster", or even merely "lobster", elsewhere. Several species occur here belonging to either the genus Jasus or the genus Panulirus. The species which forms the basis of Western Australia's valuable crayfishery is Panulirus longipes. No other species is at present fished commercially.

## DEVELOPMENT OF THE FISHERY

### (a) Fremantle Region

It seems that the first commercial fishery was established in Fremantle between 1895 and 1897 when James Cuthbert Brown (later an inspector of the Fisheries Department) arrived from Victoria, where he had been working for some years as a crayfish and snapper fisherman at Queenscliff. Brown brought with him the "Queenscliff" pot, a semi-cylindrical piece of gear constructed of wire netting, with a conical entrace at each end, the bait being suspended from the top. In company with Pasquale Tombolini, who had been shipwrecked and eventually landed at Fremantle, Brown started crayfishing with the new pot. It was not until some years later - it is not certain which was the exact year - that the beehive pot was introduced.

At this time the fishery, as has been seen earlier, was based entirely on the shallow reef area surrounding Rottnest Island. Since that time, by gradually improving their vessels, the fishermen working out of Fremantle have extended the range of their operations to Murray Bight in the south to Direction Bank in the north in depths up to 25 fathoms. The method of capture by baited pots set on the bottom has remained substantially unaltered, although refinements in the pots have occurred. In earlier days all crayfish boats were under sail and equipped with wells, in which live crays were brought from the grounds to market. Since engine-power was introduced faster transit to port has resulted, largely doing away with the need for wells. Most crayfish are now brought back in bags on deck. A few old fishermen persist in the use of well-boats but not more than half-a-dozen of this type remain.

In view of the relatively small demand for crayfish in the years before World War II the level of production in the Fremantle region was by present-day standards very low. There was no canning and no export market.

Since the development of the cray-tail industry in the immediate post-war years, the whole production pattern at Fremantle has changed. Today very few of the local fishermen restrict their activities to the capture

of "scale"fish, the vast majority having turned their attention to the more lucrative cray. Bigger and better boats are continually coming down the ways at local shipyards, and almost without exception these are fitted with diesel power.

(b) Lancelin Island-Green Islets-Cervantes Island Region

This region embraces broadly the area lying between the Hill River to the north and the MooreRiver to the south. It takes in all the islands, islets and reefs within about 20 miles of the shore along some 75 miles of coastline. Here are a number of excellent anchorages, the best of which are the three whose names are used to designate the region. The availability of crayfish in the area had long been known to the Fremantle fishermen, but it was only in the 1947-48 season, under the stimulus of the American cray-tail market, that the first attempts were made to garner its resources.

At the outset operations were confined to the waters immediately adjacent to Lancelin Island, which is only ¾ mile from the mainland, the intervening waters providing a quite good anchorage at most seasons. However, with the pressure of more and more boats, the coming into the area of several 65-foot refrigerated vessels equipped for de-tailing, packaging and freezing aboard, and the establishment on the mainland of two processing factories, the working area quickly expanded and the whole region was soon being fished to capacity.

Catching methods are no different from those followed elsewhere in Western Australia, but the fishing routine varies to meet local conditions. During the fishing season, which lasts from about the end of November to the following May, the prevailing wind is south-west, light in the morning but freshening towards the afternoon. There is a sand bar at the passage into the anchorage carrying little more than 2 fathoms of water. To negotiate the bar before wind and wave render it unduly hazardous, the fishermen of necessity return early in the afternoon. As a rule this permits processing to be finished soon after, if not before, dark. The entire catch is bagged immediately the fish are removed from the pots and brought back to the anchorage on deck.

## (c) Geraldton-Abrolhos Region

Fishing for crayfish has been followed in a more or less desultory way in the whole of the Geraldton region for very many years, but it was not until the last war that any really organised fishery took place. The reason for this was the demand by the Defence Foodstuffs Administration for canned crayfish for the armed forces, and by special arrangement with the Manpower Directorate exemption from military service was afforded to approved fishermen who undertook to sell at least 75% of their total catch to a cannery which was re-established about 1941. This cannery had originally been brought into operation a good many years earlier, but through a chain of circumstances which it is not necessary to relate here, the project was only short-lived.

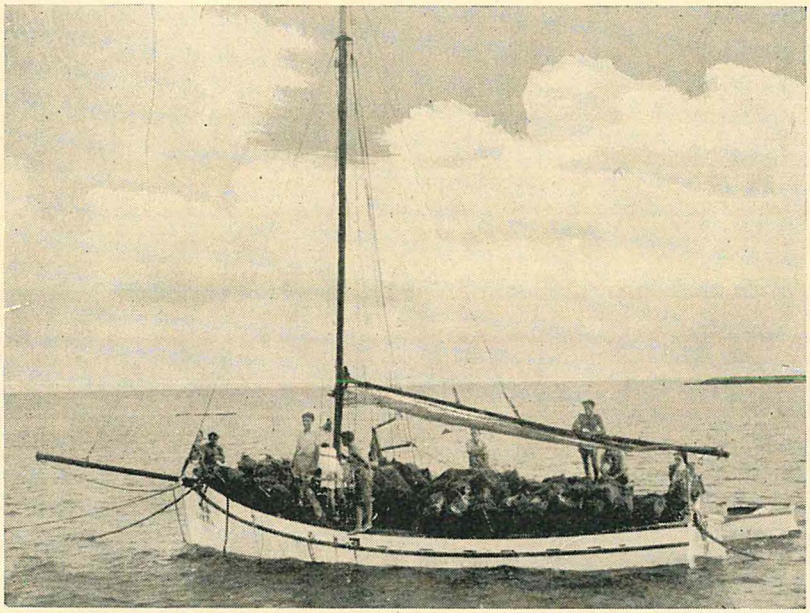
The crayfishery in this region now extends from Port Gregory in the north to Dongara in the south, and includes the whole of Houtman's Abrolhos. The Abrolhos fishery, by law and also very largely by reason of weather conditions, is a winter fishery, enduring from mid-March to mid-August. Here most of the fishing is done in shallow waters, pots being frequently set in water which is not more than 6 feet in depth. In shallow water batten pots are most frequently employed, whilst in the deeper waters to the east and west of the Abrolhos, and in the channels between the island groups, the beehive pot is most favoured. The boats in use are mostly small, of the "scooter boat" type, and the catch is brought back daily to base and held in holding crates pending transport to the mainland by the "carrier" boats. The whole catch is bagged immediately prior to shipment to Geraldton whither it is carried on deck. The time occupied in transporting the catch from the islands to the mainland does not as a rule exceed 8 hours from the Wallabi Group or 5 hours from the Pelsart Group. Although slight losses do occur during the early part of the season, when the weather is warm and the sea calm, the losses throughout the year would not reach 1% of the total transported.

## PROCESSING

### (a) Canning

As previously indicated a cannery, known as the Red Tail Cannery, was established in Geraldton in 1933, but did not succeed. Earlier (in 1931) a small cannery had

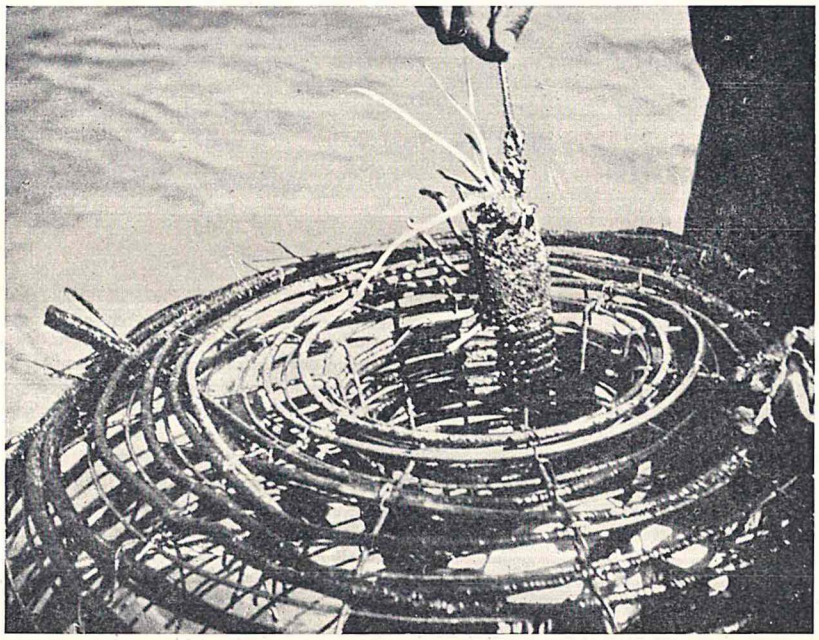
# CRAYFISHING AT ABROLHOS



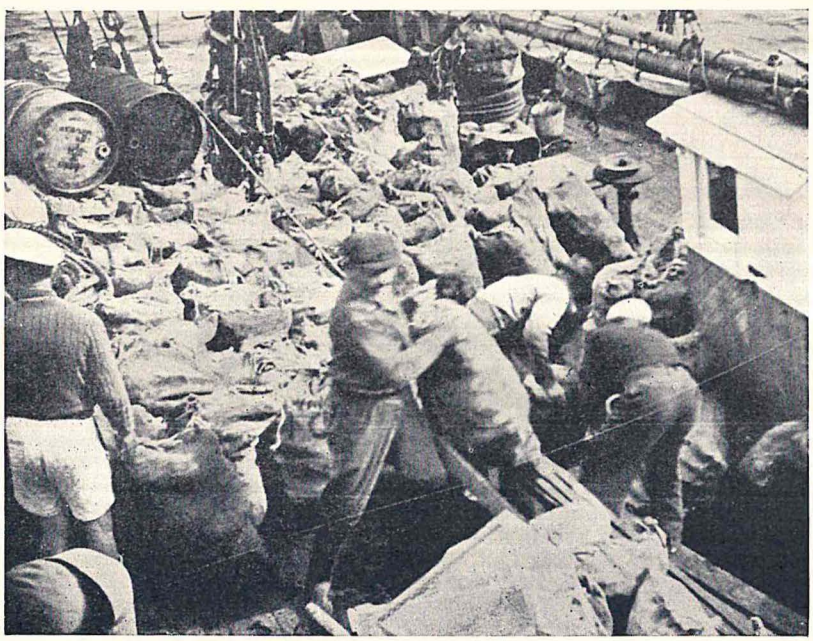
L.F.B. "Tartan" just back after pulling pots
*(Photo Brown & Brade)*

Vincent (left) and Victor Basile bringing craypot aboard "Tartan"
*(Block courtesy C.S.I.R.O.)*

# CRAYFISHING AT ABROLHOS



Removing crayfish from pot after bringing aboard



Transferring bagged crays from L.F.B. "Dawn" to carrier-boat "Batavia Road"

*(Blocks courtesy C.S.I.R.O.)*

been erected on the Abrolhos Islands, but this also was unsuccessful. In 1941, the Geraldton cannery, which had lain idle for the best part of a decade, was overhauled and put into working order again, with Government financial assistance, and tails were canned for the use of the armed forces. Following the demand for frozen tails in the post-war period, canning ceased in 1950.

(b) Frozen Tails

The development of the frozen tail export industry has been spectacular. Originally processing was carried out on land in plants established at Geraldton and Fremantle, as well as on the mainland in the vicinity of Lancelin Island. More or less concurrently a number of 65-foot fishing vessels decided to attempt processing at sea, and the "Kingfisher", "Eckero", "Eureka" and "Bluefin" were refitted for this purpose. There is no doubt that the development of crayfishing in the Lancelin-Cervantes region was due solely to those four vessels, which pioneered the catching and processing of crayfish at sea. Originally these were the only vessels capable of turning from general fishing to freezing, but other similar vessels from time to time joined the fleet and sought to expand northwards and into the Abrolhos.

THE EXPORT TRADE

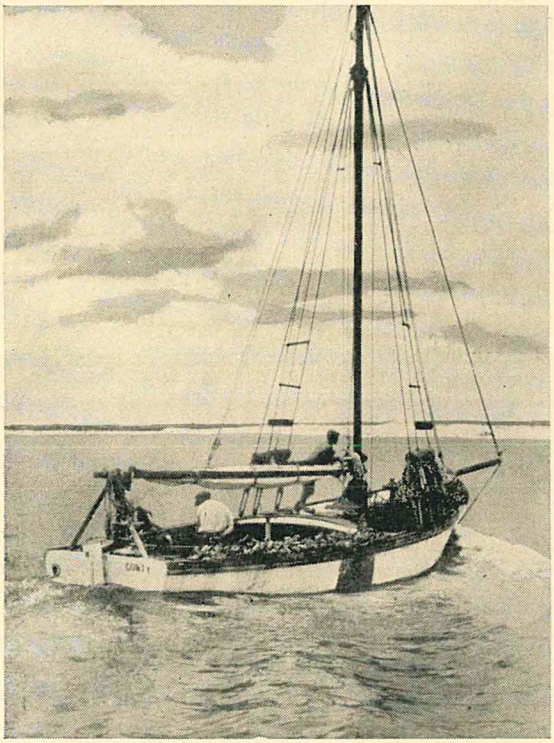
The export of frozen cray tails is not a new thing as far as either Australia or South Africa is concerned. In South Africa the crayfish industry has been well established for very many years. As early as the 'nineties of last century 5,000 cases of canned crayfish were exported annually to England, and by 1912 this figure had increased to something like 150,000 cases. By 1928 quite a number of canneries were operating in South and South-West Africa, and exports were of the order of 4 million lb. a year, the great bulk going to France. By the 1930's frozen tails were being shipped to England in 30-lb. cases which realised from 20/- to 30/- a case according to the size of the tails. New Zealand was also at this time exporting frozen tails to London and in 1933 the Red Tail Company of Geraldton sent a few consignments of frozen tails to England.

## EXPORT REGULATIONS

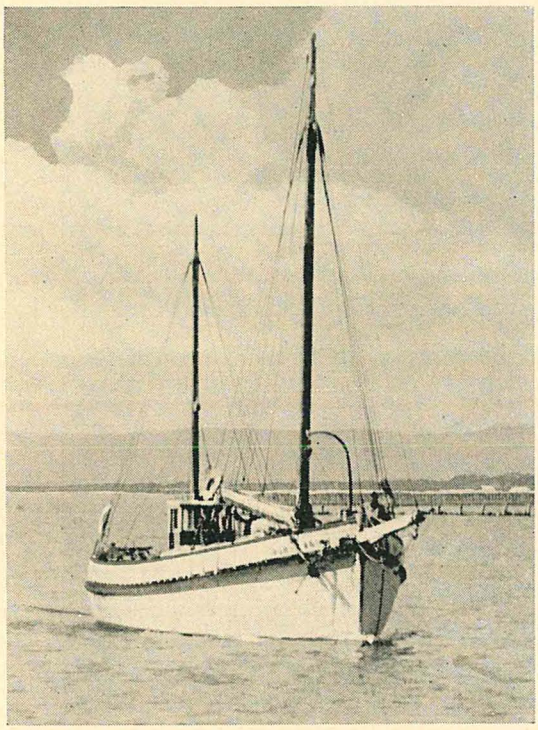
By 1948 the export of crayfish tails to the U.S.A. became a matter of national importance, and the Commonwealth Government, which alone of the Australian Governments can legislate in relation to exports, decided to take a hand with a view to improving the quality of the packs forwarded overseas. The Department of Commerce and Agriculture, a Commonwealth instrumentality, convened a conference in that year of all interested parties to discuss a plan of proper inspection and certification of processed fish intended for export. At the conference, which was held in Adelaide, Western Australia was represented by the Chief Inspector of Fisheries (Mr. A. J. Fraser), the Chief Health Inspector (Mr. W. Dow), Mr. T. M. Fitzgerald, of the Golden Gleam Fish Processing Pty. Ltd., processors, and Mr. E. Russell, of Russell Pty. Ltd., exporters. Following these deliberations, and in line with the resolutions carried at the conference, the Exports (Fish) Regulations, made under the Customs Act, 1901-1949, and the Commerce (Trade Descriptions) Act, 1905-1933, of the Commonwealth Parliament were promulgated. These made adequate provision for processing, freezing, storage, consignment and description of fish for export. All export establishments, including freezer boats, were required to register under the new regulations, and inspectors of the Department of Commerce and Agriculture were located in each establishment. The regulations were most stringent, but there is no doubt that they were solely responsible for the greatly improved quality and appearance of the pack put up in this State.

Competition in the United States from the old established and well organised South African export trade in frozen cray tails moved the Commonwealth Government in December, 1949, to exhort local exporters to develop a co-ordinated sales policy with suitable publicity in America. It also suggested that an orderly export marketing scheme would have many advantages. Subsequently the Crayfish Exporters' Association of Australia was established, with a branch in Western Australia, and although the trade could not see its way to agree to the introduction of any compulsory orderly marketing scheme, it nevertheless holds regular meetings at which export policies are freely discussed by its members. Undoubtedly this has had a beneficiel effect as far as the Western Australian export trade is concerned.

# VESSELS EMPLOYED IN CRAYFISHING INDUSTRY

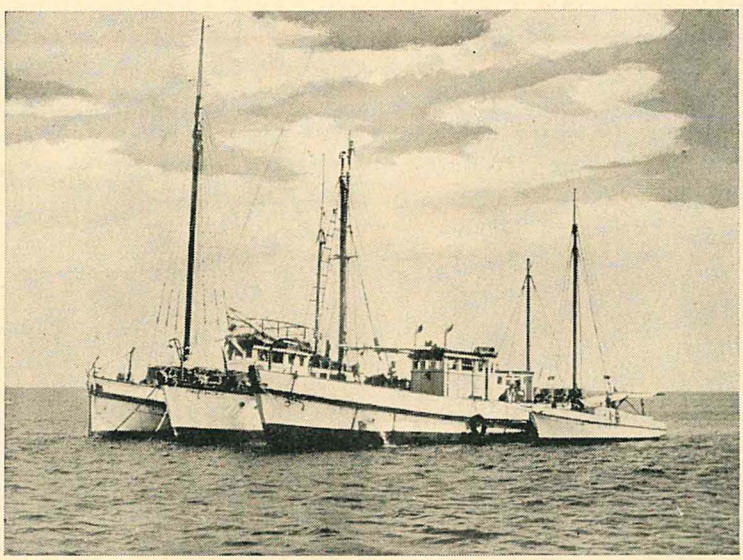


L.F.B. "Conty" operating at Lancelin Island



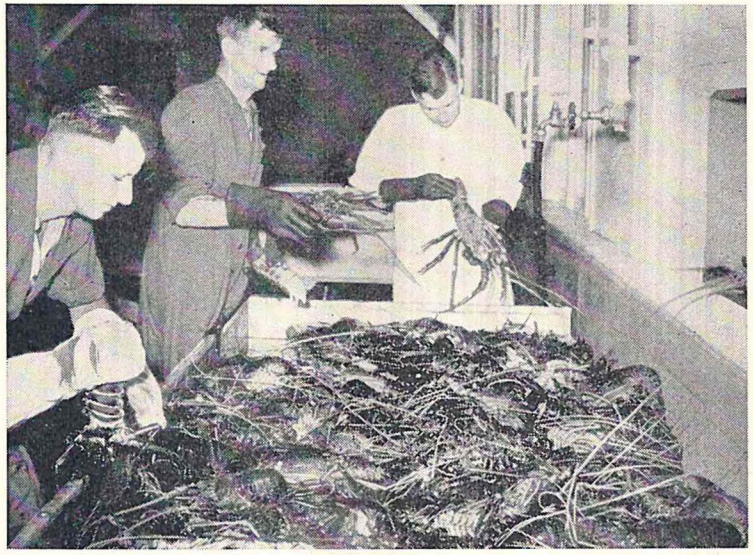
Former carrier-boat "Batavia Road" (Abrolhos-Geraldton)—now fitted out as freezer-boat

*(Photo Brown & Brade)*



Freezer-boats at Lancelin Island anchorage (Fisheries Department's patrol vessel "Kooruldhoo" alongside)

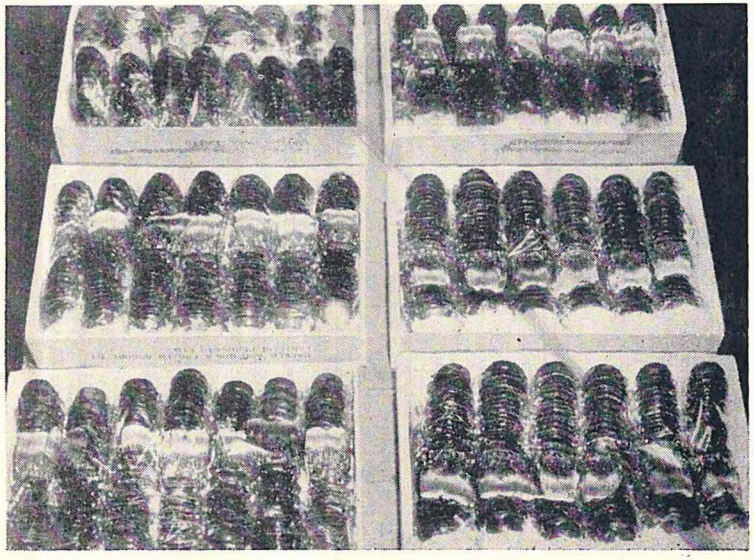
# CRAYFISH DE-TAILING OPERATIONS



De-tailing crayfish, Lancelin Island

Grading tails


Packing aboard freezer-boat



Tails packed ready for freezing

At the outset 8 freezer boats applied for registration as export establishments, but none could meet the requirements of the Exports (Fish)Regulations. However, provisional registration to June 30, 1950, was granted to give them an opportunity of improving their freezing equipment to the standard laid down by the Department of Commerce and Agriculture. Subsequently all vessels fully complied with that Department's requirements and were granted full registration. Today 7 land-based factories and 10 freezer-boats hold certificates of registration as export establishments.

## CONSERVATIONAL MEASURES

The very nature of the Abrolhos crayfishery and the special problems associated with it, and to relieve fishing pressure at the Islands, which were becoming overcrowded, prompted the Government to define a policy which would delimit the area of operations of fishermen working from Fremantle and Geraldton respectively. In 1948 a Ministerial directive issued requiring licensing officers to endorse the licenses held by all crayfishermen and cray boats to the effect that no fisherman or boat which in any calendar year had engaged in the taking of crayfish north of 29° S. could in the same year engage in the taking of crayfish south thereof, and vice versa. In June of the same year the directive was varied to make the line of demarcation the 30th parallel, and this operates to the present day.

In July, 1948, an approach was made to the Department by the Fremantle Crayfishermen's Association to close all waters north of Rottnest Island against the taking of crayfish from October 1 in each year to February 14 in the following year, and the waters south of Rottnest from October 1 to November 30 in each year, in order to preclude the capture of crayfish with berry or eggs attached. At a conference in Fremantle at which 80 fishermen were present, the men expressed the fear that the fishing pressure in the Lancelin area would force men southwards to grounds fished by the Fremantle fleet, and that their livelihood would be in jeopardy. No Departmental action followed this request, other than to refer the matter to the Fishermen's Advisory Committee for investigation. The Committee found that no immediate

necessity existed for the proposed closures, and there the matter rested until 1950. By this time the industry had expanded tremendously, and it was fully realised that there was great need for protecting female crayfish at least during the months they were carrying eggs. Accordingly in August, 1950, all waters south of 30°S. were closed until November 14, 1950. In October of the same year the proclamation was varied to make the southern limit of the closed area the 33rd parallel, so that certain vessels could carry out experimental crayfishing in waters bewteen Mandurah and Bunbury. In 1951 the close season covered the period August 1-November 14, but in 1952 the close period was extended to November 23, and in the current year to December 1, with a view to affording some protection to the "white" (recently moulted) crayfish, which for a short period towards the end of each year, are found in great abundance in Cockburn Sound.

In order to add weight to the Commonwealth Exports (Fish) Regulations, regulations were in December, 1949, made under the Fisheries Act of Western Australia prohibiting the processing of cray tails in any boat which was not licensed as a fishing boat under the State law and registered as an export establishment under the Commonwealth law. It was also declared illegal to bring ashore any severed tail of a crayfish unless such had been processed on a vessel so registered, and the possession of or consignment of cray tails measuring less than $6\frac{1}{4}$" in length was made illegal.

In 1951 the westernmost reefs of the Abrolhos were closed against the taking of crayfish, to protect the young fish at their point of first lodgment after passing the larval stages.

A further closure, taking in the whole of the coastline between Knobby Head and Hill River, was proclaimed in 1951, firstly to provide sanctuary to crayfish in a comparatively virgin area, and secondly to give scope for fishermen by opening it again if at any time in the future it became necessary for conservational purposes to close other areas. There is now an abundance of "accumulated stocks" of biggish fish in this area, which may to some extent be regarded as a good control area, and it has been decided to throw it open to crayfishing during the period January 1-July 31, 1954, to enable a proportion of the large predatory fish to be removed.

## SCIENTIFIC RESEARCH

When the Western Australian crayfishery commenced to expand, a request was made by the Department to the Division of Fisheries, C.S.I.R., that comprehensive research be commenced on the local marine crayfishes before any great inroads had been made into the existing stocks, so that a close watch could be kept on those stocks during the period of development of what was virtually an unexploited fishery. In May, 1945, Mr. (now Dr.) Sheard, a West Australian who had done some work on crayfish in South Australia, was assigned to this duty and commenced the investigation at the beginning of the following year. Dr. Sheard largely spent the intervening period in familiarising himself with the fishery and broad outlines of the crayfish problem. Laboratory space was provided by the University of Western Australia, initially at the Institute of Agriculture, and later at the Department of Zoology. This liaison proved particularly advantageous, as the advice and assistance, firstly from Professor G. E. Nicholls, and latterly from Professor H. Waring, and their staff, were of considerable value in the course of the work. The one-man investigation was further facilitated by the co-operation of the inspectors of the Fisheries Department and of the fishermen themselves, who appreciated the need for a complete investigation.

No organised data at the time existed on the Western Australian species, except that the system of block statistics commenced by the Department in 1941 facilitated an analysis of the fishery during the war years. In addition, a most valuable series of length/weight measurements and gonad collections made by departmental inspectors during 1942 and 1943 on crayfish caught at the Abrolhos and Geraldton provided a very useful introduction to some of the characteristics of the species.

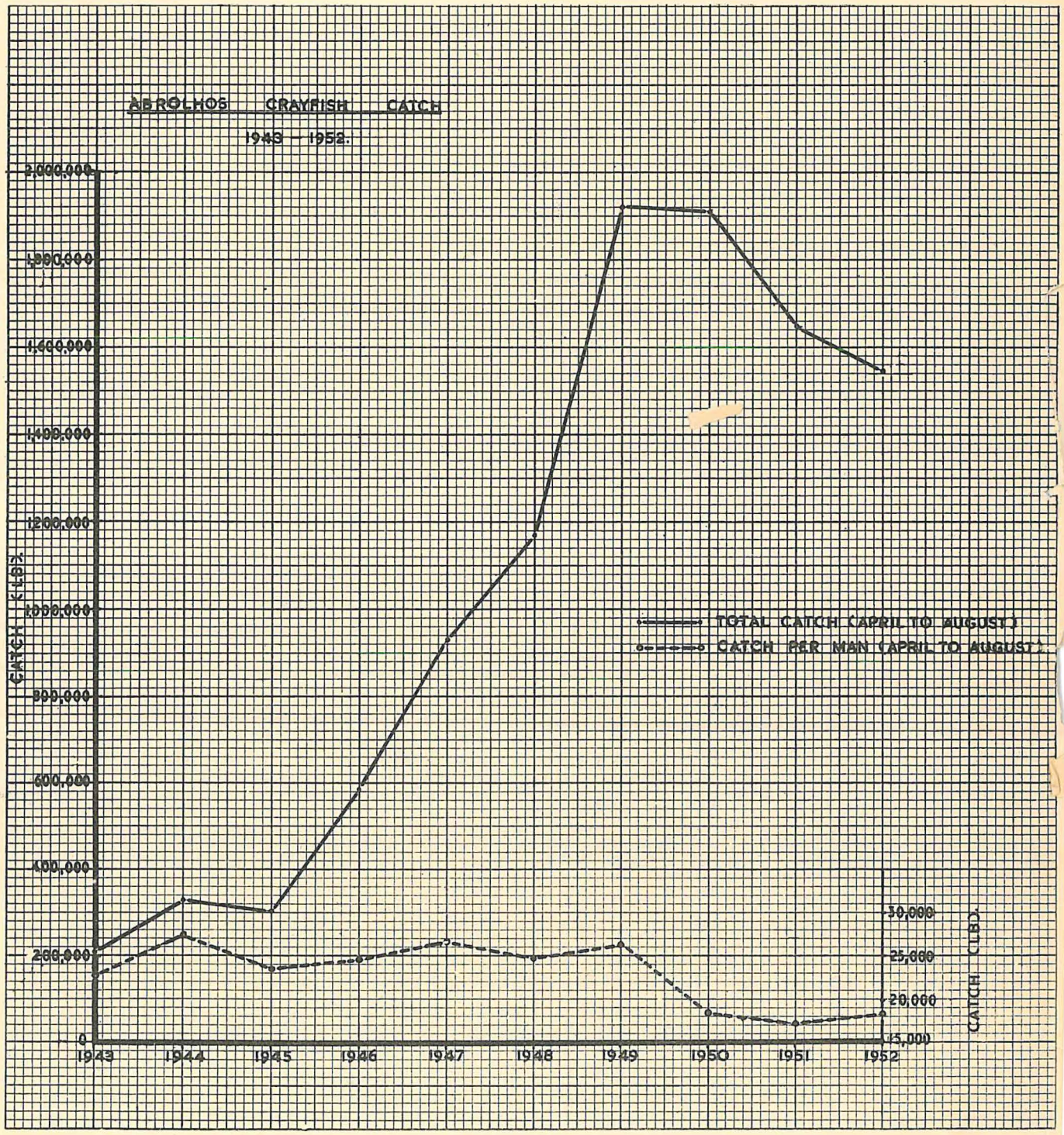
The year 1946 was spent by Dr. Sheard in familiarising himself with fishing methods, the nature of the fishing grounds and of the crayfish, and of processing and transport methods. The enquiries he made led him to the opinion that the industry was due to expand at a very fast rate. Furthermore, as the market in the United States was beginning to accept frozen crayfish tails in large quantities at higher prices, it was appreciated that a further stimulus might be forthcoming, although at that stage most of the fish produced at Geraldton were canned.

Consequently it was decided that a full-scale investigation was necessary if any worthwhile information was to be made available to the industry. It was early realised that management problems would most likely soon arise, largely as a result of the fact that the scarcity of safe anchorages would tend to force large numbers of fishermen to congregate within rather restricted areas. The subsequent growth of the fishery has already been described. It exceeded all expectations and brought many problems in its train. Now that the "accumulated stocks" have been removed from many of the coastal areas, most of the problems are obvious to all sections of the industry, although it is doubtful whether many are yet aware that a crayfish population like that of Western Australia is most vulnerable to damage from unsound fishing practices.

Dr. Sheard's programme was designed in such a way as to permit of the various elements being investigated concurrently. These included (a) the biology of the genus Panulirus, including its distribution and population characteristics; (b) the effect of varying degrees of fishing intensity on the populations on different types of reef areas; (c) the technology of canning and freezing, together with a study of fishing, storage and transport methods; and (d) the distribution and population characteristics of related species in Western Australian waters.

The results of the preliminary work were published in 1949 as C.S.I.R.O. Bulletin 247 under the title "Marine Crayfishes of Western Australia" (K. Sheard), and in several shorter papers. A further report by Dr. Sheard under the title "Continuous Crayfishing Tests, 1947 and 1948" will shortly be published as a bulletin of the Western Australian Fisheries Department. Other papers on the results and effects of each year's fishery are now in advanced stages of preparation and will be published as opportunity offers These results and effects have been provided annually to the State Fisheries Department for consideration in relation to each year's management programme.

The following is a brief summary of the investigations which have been undertaken by Dr. Sheard since 1946 -


ABROLHOS CRAYFISH CATCH
1943 – 1952.
2,000,000
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
CATCH (LBS.)
TOTAL CATCH (APRIL TO AUGUST)
CATCH PER MAN (APRIL TO AUGUST).
30,000
25,000
20,000
15,000
CATCH (LBS).
1943
1944
1945
1946
1947
1948
1949
1950
1951
1952

1946. General survey; analysis of the existing fishery; planning future programmes; onshore surveys, North-West Cape to Jurien Bay.

1947. Continuous fishing tests at Houtman's Abrolhos; onshore survey, Port Gregory to Moore River; analysis of the causes of discolouration of canned crayfish; carapace length frequency distribution of the Abrolhos commercial catch (this most important work has been ably continued from year to year by Fisheries Inspector S. W. Bowler, of Geraldton); ecological studies of reef areas; investigations into causes, prevention and cure of the skin infection known as "crayfish poisoning".

1948-49. Continuous crayfishing tests, Houtman's Abrolhos; onshore surveys Cape Leeuwin to Cape Riche (the Southern Crayfish, Jasus lalandii, was found to exist in quantities comparable with those in onshore areas in South Australia, although no commercial fishery has yet developed along the south coast of Western Australia); causes of discolouration in frozen tails and development of techniques for its prevention; treatment of crayfish offal; studies on the "white" crayfish moult phases; studies of South Australian crayfishing areas for comparison with those of Western Australia; planktonic distribution of crayfish larvae; commercial sampling, Fremantle and Lancelin Island; laboratory gonad work.

1950. Collection of data for length/weight and gonad studies; study of moulting periods of various size groups; crayfish habits relative to moult and sex cycles; further studies on the treatment of crayfish offal; initiation of detailed surveys of fishing grounds from Sandy Cape to Moore River; survey in m.v. "Villaret" of North-West Cape-Monte Bello Islands-Fortescue River region; experimental work on growth of young crayfish at Sandy Cape.

1951. Routine studies continued and results analysed; studies in cutical changes in the moult cycle commenced by Mr. R. W. George, of the Department of Zoology, University of Western Australia; further investigations in relation to discolouration

of frozen crayfish; co-operative surveys of Cape Naturaliste areas by State Department of Fisheries and Division of Fisheries (Mr. K. Godfrey representing the C.S.I.R.O.).

1952. Plankton studies using high-speed nets to map distribution of planktonic crayfish larvae; analysis of crayfishery statistics; laboratory studies on growth and gonad cycles; survey of Bunbury-Hamelin Bay region by "Suda Bay"; tests of glazing solutions for use in tail processing; length/weight studies on "white" crayfish, Lancelin Island, Rottnest and southern areas; experimental work on growth of young crayfish at Sandy Cape terminated.

1953. Continuous crayfishing tests at Houtman's Abrolhos in charge of Mr. R. W. George, now a Research Officer of the Division of Fisheries, C.S.I.R.O.

## PRODUCTION

The following table shows the crayfish production of Western Australia from 1944 to 1952 inclusive -

| Year | Region | | | | |
|---|---|---|---|---|---|
| | Fremantle | Lancelin-Cervantes | Abrolhos | Geraldton onshore | Total |
| | lb. | lb. | lb. | lb. | lb. |
| 1944 | 8,551 | - | 515,541 | 71,699 | 595,791 |
| 1945 | 155,700 | - | 508,231 | 96,220 | 760,151 |
| 1946 | 289,436 | - | 845,358 | 137,475 | 1,272,269 |
| 1947 | 660,941 | 99,200 | 1,375,260 | 200,425 | 2,335,826 |
| 1948 | 653,939 | 509,611 | 1,309,814 | 354,648 | 2,828,012 |
| 1949 | 545,526 | 2,062,096 | 2,012,819 | 511,912 | 5,132,353 |
| 1950 | 1,137,792 | 2,703,784 | 2,132,780 | 575,455 | 6,549,811 |
| 1951 | 1,805,206 | 3,690,524 | 1,647,824 | 651,377 | 7,794,931 |
| 1952 | 2,246,511 | 3,883,025 | 1,593,047 | 692,842 | 8,415,425 |

Western Australia supplies 60% of the total annual Australian catch and 77% of the total exported. Of the exports 95% is destined for the United States. The export of crayfish and crayfish tails overseas from 1949 to the current year is set out in the following table -

| Export Year | Country of Destination | Quantity lbs. | Value £A |
|---|---|---|---|
| 1949/50 | United Kingdom | 37,500 | 6,575 |
| | Singapore | 47,380 | 4,334 |
| | U.S.A. | 2,005,214 | 425,275 |
| | | 2,090,094 | 436,184 |
| 1950/51 | Singapore | 98,237 | 14,378 |
| | U.S.A. | 2,119,934 | 539,796 |
| | Other | 25 | 7 |
| | | 2,218,196 | 554,181 |
| 1951/52 | Singapore | 40,771 | 6,488 |
| | U.S.A. | 2,849,502 | 924,130 |
| | Other | 390 | 104 |
| | | 2,890,663 | 930,722 |
| 1952/53 | Singapore | 30,307 | 6,701 |
| | U.S.A. | 2,897,910 | 1,035,069 |
| | Other | 365 | 138 |
| | | 2,928,582 | 1,041,908 |

## ACKNOWLEDGMENTS

In the preparation of this brief review of the crayfish industry of Western Australia, I am greatly indebted to Dr. Keith Sheard, of the C.S.I.R.O. Division of Fisheries, for providing the information on which the paragraph on scientific research was based. Dr. Sheard has since his transfer to Western Australia in 1946 carried out a sound programme of work, and the Department gratefully acknowledges his ready co-operation in making his findings available. It is on these that the Department's management programmes have been very largely based.