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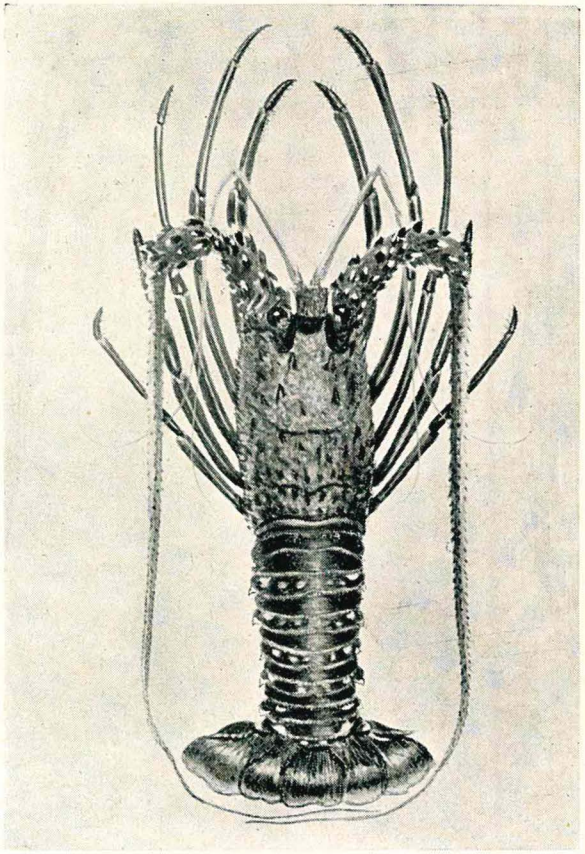
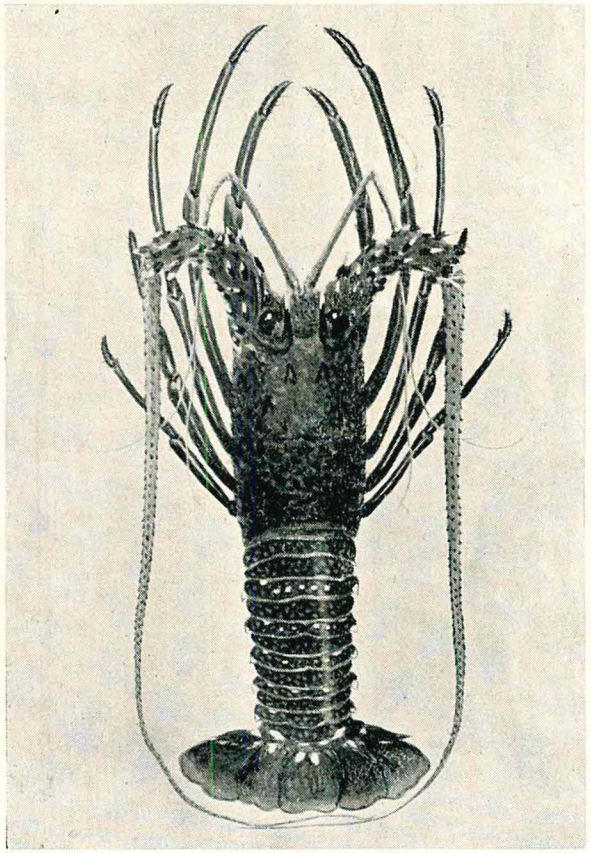
* It is of interest to note in passing that as recently as April, 1949, fisherman Roy Smith, of Mosman's, reported having seen seven crayfish in shallow water in Blackwall Reach. A few days later two were caught. These were undoubtedly "strays", as no record exists of the capture of any quantity of fish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



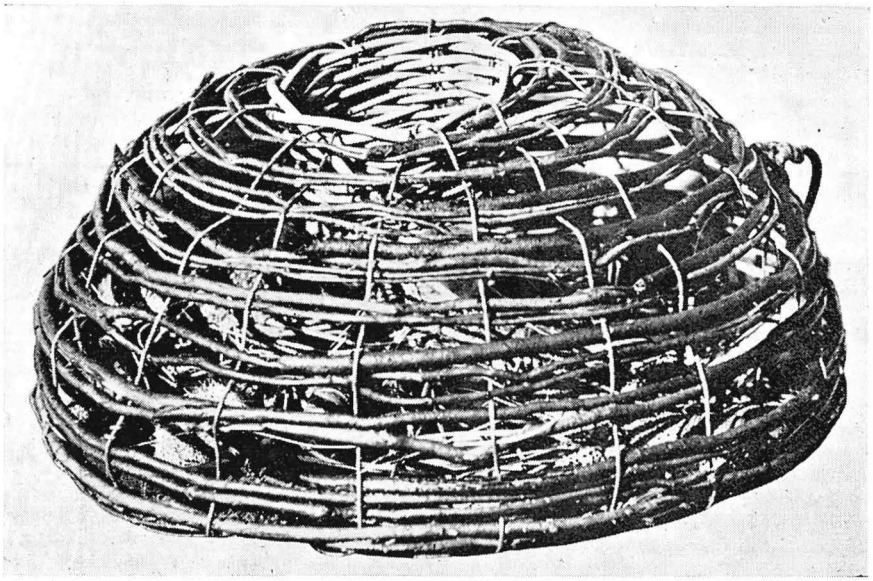
MALE



FEMALE

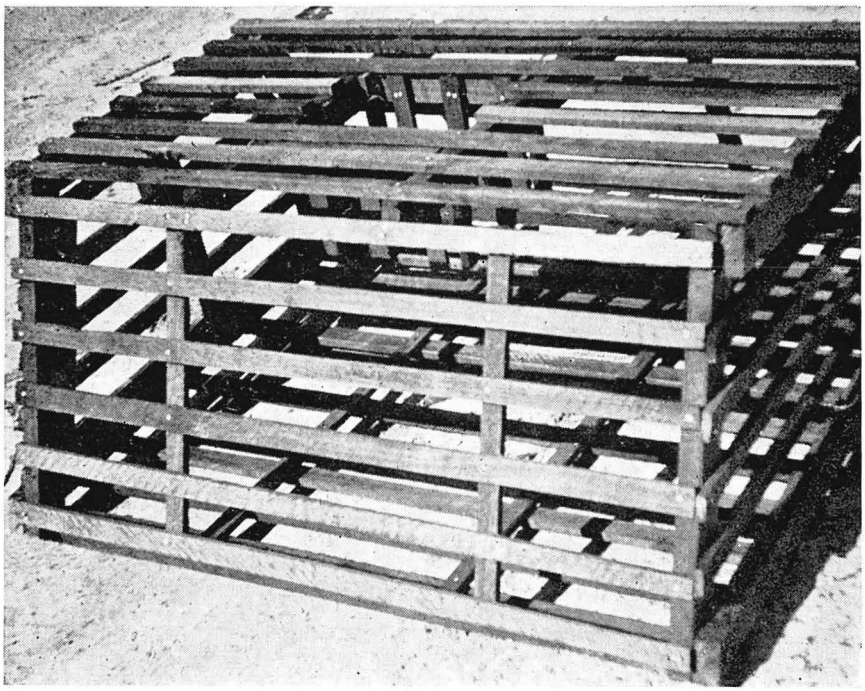
(K. Sheard del.)

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)

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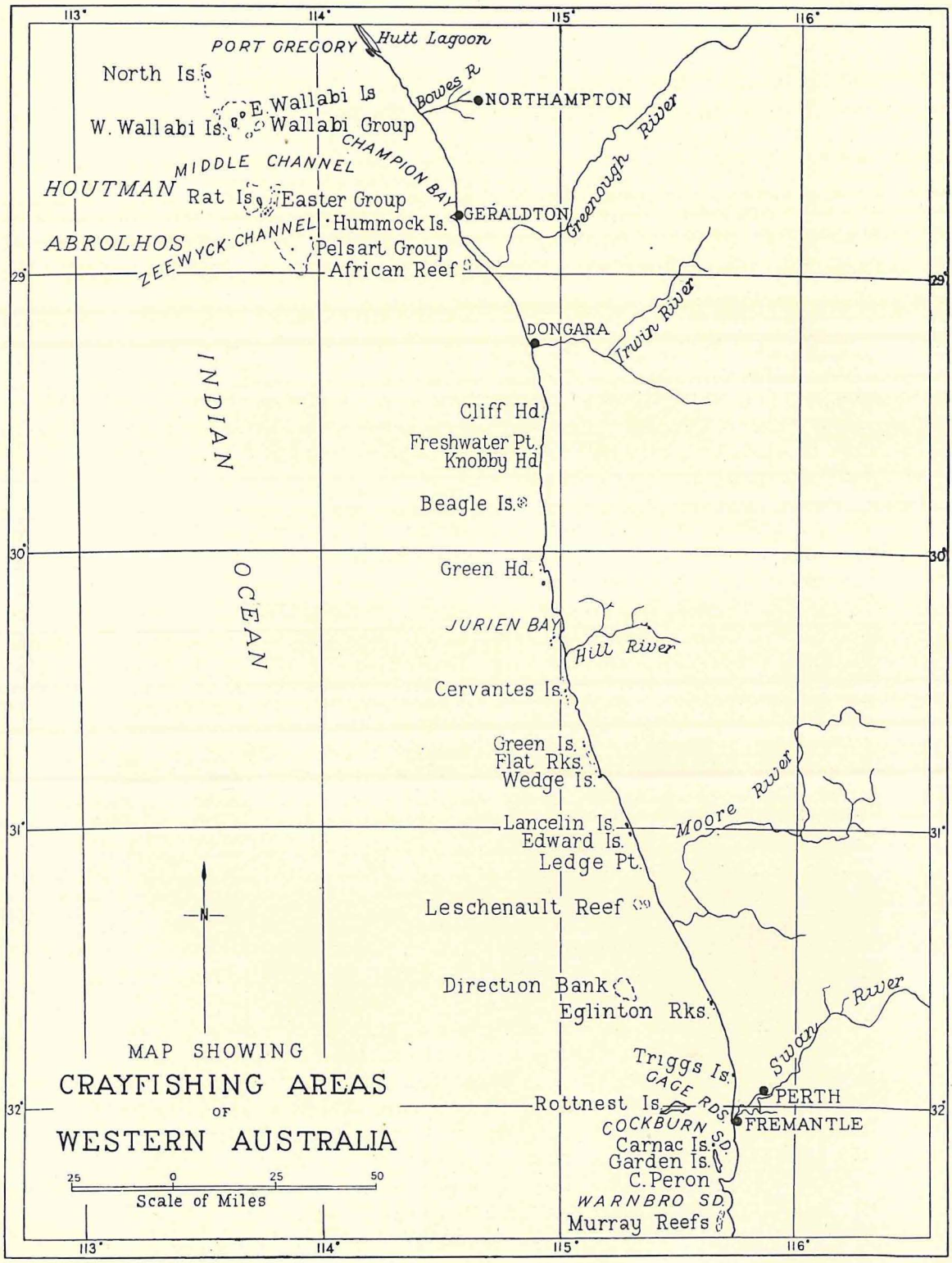
[*] The island being then a penal settlement the Inspector had first to obtain a permit from the Colonial Secretary.

"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.

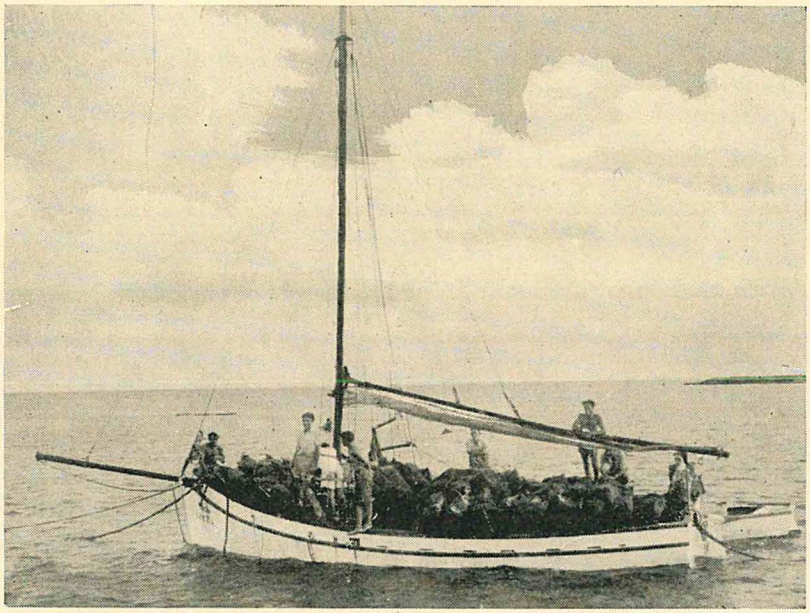
The crayfishery in this region now extends from Port Gregory in the north to Dongara in the south, and includes the whole of Houtman's Abrolhos. The Abrolhos fishery, by law and also very largely by reason of weather conditions, is a winter fishery, enduring from mid-March to mid-August. Here most of 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

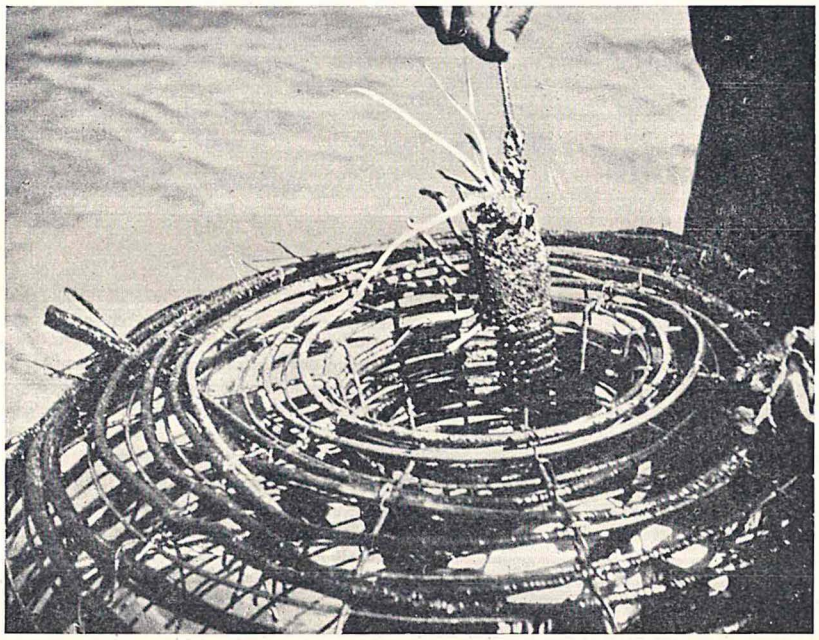
CRAYFISHING AT ABROLHOS



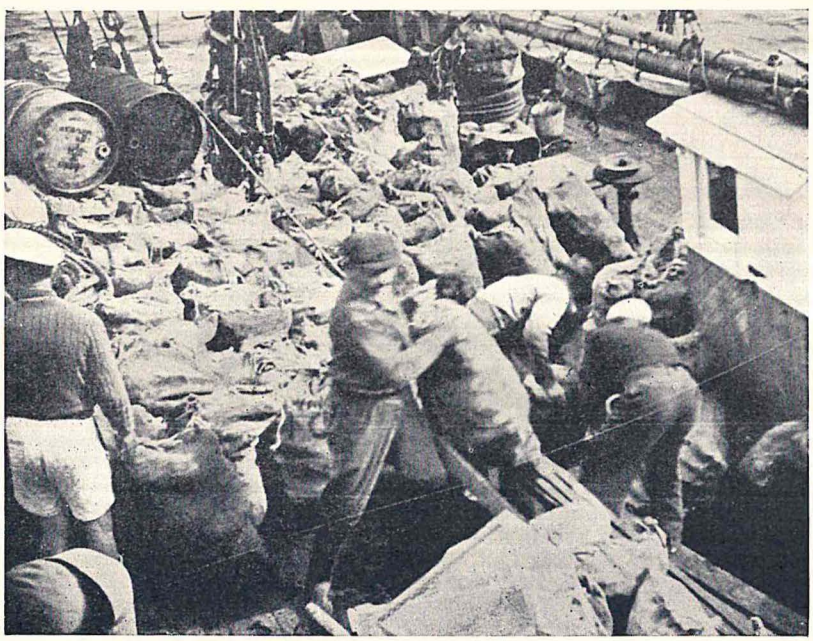
L.F.B. "Tartan" just back after pulling pots
(Photo Brown & Brade)

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

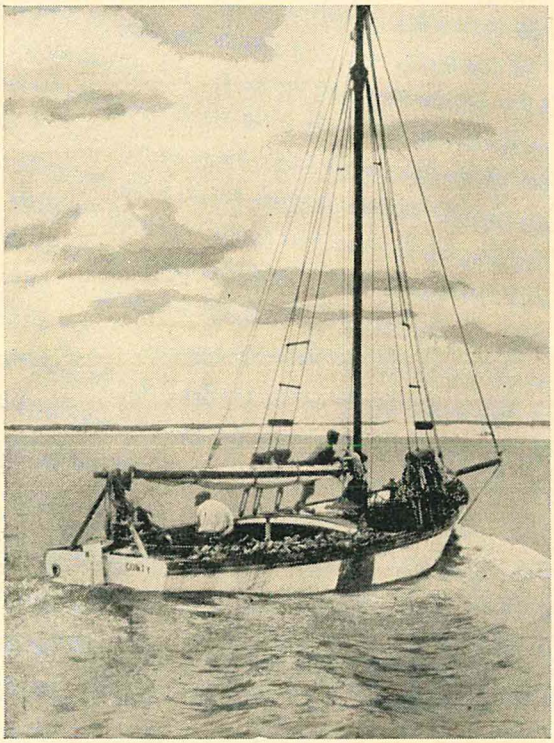
The export of frozen cray tails is not a new thing as far as either Australia or South Africa is concerned. In South Africa the crayfish industry has been well established for very many years. As early as the 'nineties of last century 5,000 cases of canned crayfish were exported annually to England, 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

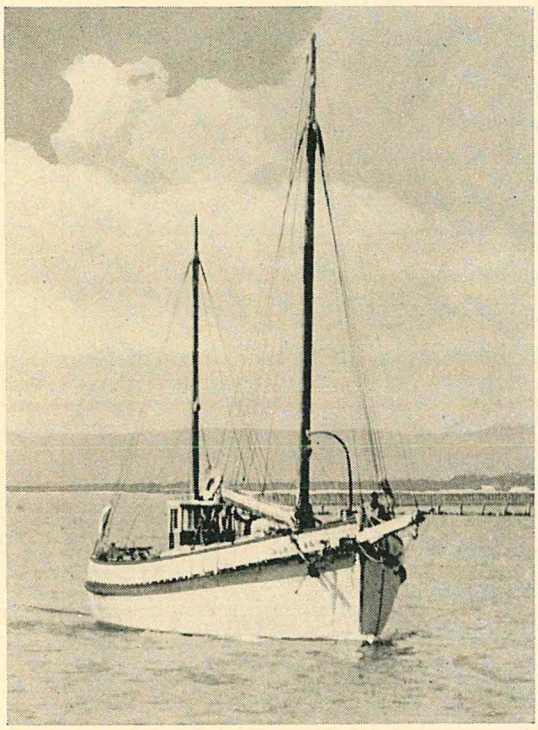
By 1948 the export of crayfish tails to the U.S.A. became a matter of national importance, and the Commonwealth Government, which alone of the Australian Governments can legislate in relation to exports, decided to take a hand with a view to improving the quality of the packs forwarded overseas. The 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

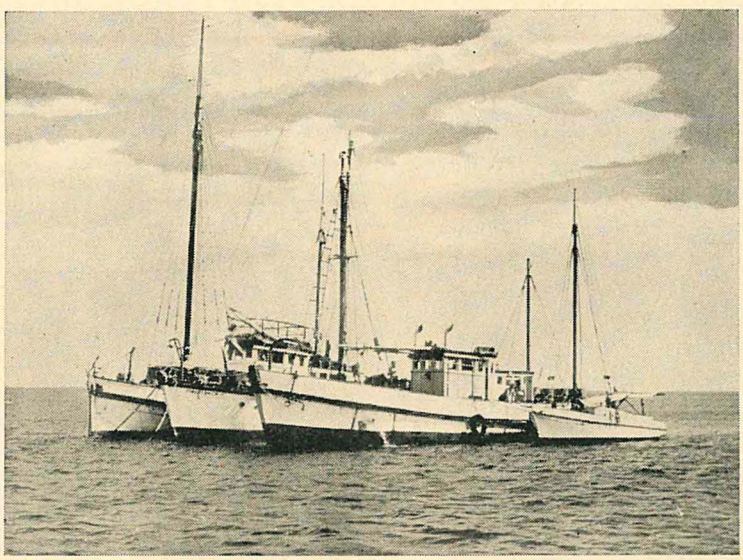


L.F.B. "Conty" operating at Lancelin Island



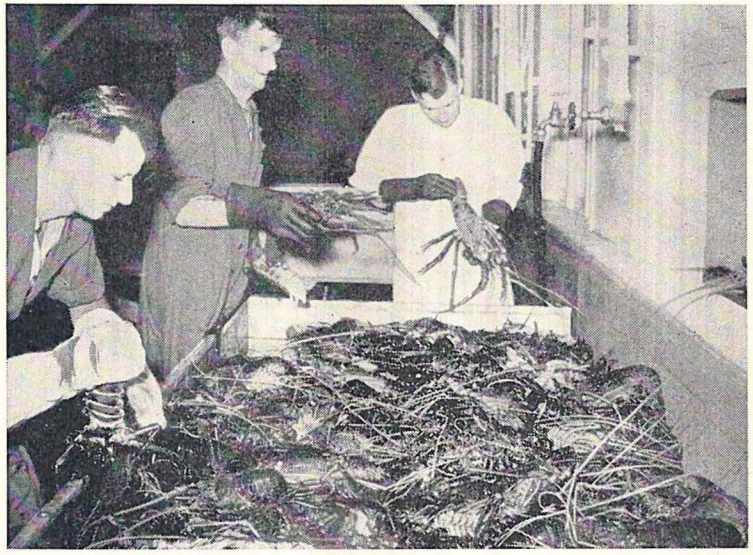
Former carrier-boat "Batavia Road" (Abrolhos-Geraldton)—now fitted out as freezer-boat

(Photo Brown & Brade)



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

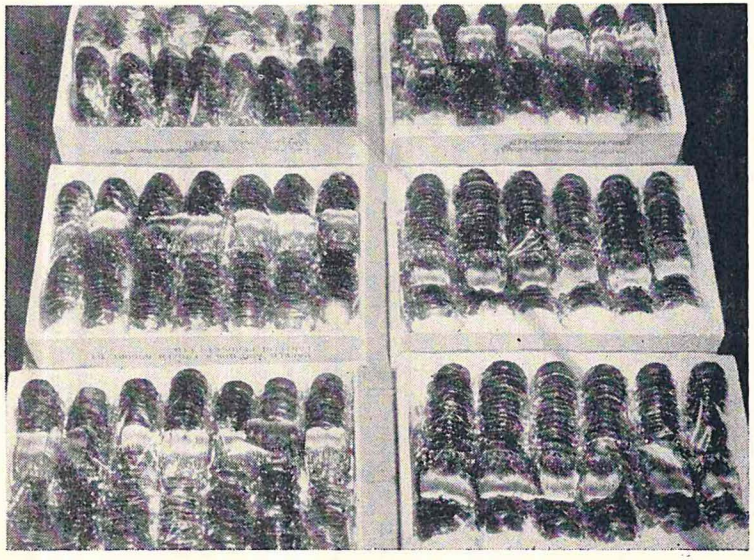
CRAYFISH DE-TAILING OPERATIONS



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.

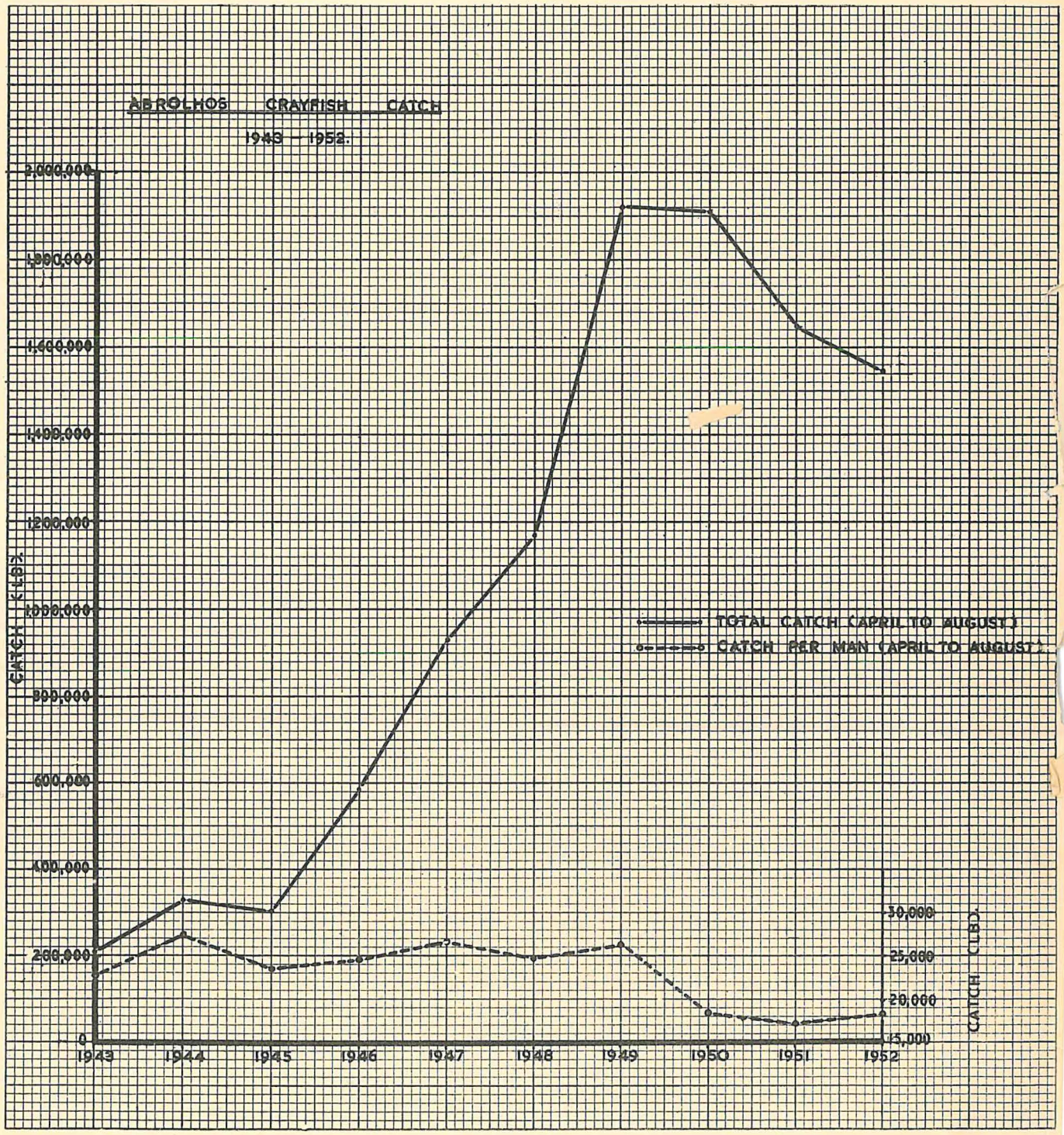
The year 1946 was spent by Dr. Sheard in familiarising himself with fishing methods, the nature of the fishing grounds and of the crayfish, and of processing and transport methods. The enquiries he made led him to the opinion that the industry was due to expand at a very fast rate. Furthermore, as the 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.