OF FISHERIES AND FAUNA
STERN AUSTRALIA
ILY SERVICE BULLETIN

Vol. XIV, No. 2 February, 1965

STAFF NOTES

The Director, Mr. A.J. Fraser, and Fauna Officer H.B. Shugg will be leaving Perth by air early in April to attend the 1965 Australian Fauna Authorities Conference to be held at Kingscote, Kangaroo Island, South Australia, between April 5 and 10. While in Adelaide the Director will attend a meeting of the I.P.F.C. Committee of the Commonwealth-States Fisheries Conference.

* * *

We congratulate Cadet Research Officer R.C.J. Lenanton, on his success at the recent University examinations. By passing final year subjects Zoology III and Botany III he has completed the requirements for a Bachelor of Science degree. Mr. Lenanton will be appointed Research Officer after his term of Cadetship has expired later this month.

* * *

We welcome to the staff Mr. D.E. Blackman and Mr. W.F. Carruthers, who started in the Department on January 5 and 25 respectively. Mr. Blackman was appointed Cadet Inspector and has been posted to the Perth Inspectorial District. Mr. Carruthers was appointed Inspector Grade 2 and has taken over duties as Master of p.v. "Misty Isle".

* * *

Our congratulations are extended to Inspector C.W. Ostle, of the Mobile Patrol and Miss Hazel Armstrong, of Moora, who announced their engagement last month.

* * *

Several movements of the inspectorial staff took place last month. After gaining promotion to the position

of Inspector, Grade 1, Inspector A.T. Pearce has been transferred from his former position as Master of the p.v. "Dampier" stationed at Geraldton, to the Perth Inspectorial District. Inspector G. Clifford has been appointed Master of the "Dampier". Assistant Inspector G.D. Noble has been transferred from Lancelin to Jurien Bay, Assistant Inspector G. Hanley from Jurien Bay to Lancelin and Assistant Inspector R.J. Lindsay from Green Islets to Cape Leschenault. After being stationed at Cape Leschenault for the "white" crayfish season, Inspectors T.B. Baines and C.W. Ostle have resumed their roving patrol duties. Owing to a back injury he received on board, Cadet Inspector P.W. Harrison has been transferred from the r.v. "Peron" to the Perth Inspectorial District. Cadet Inspector K. Lewin has been transferred to the "Peron".

* * *

The r.v. "Peron" left Fremantle for Shark Bay on January 31, to carry out further work in connection with the prawn research programme. Initially a sediment and hydrology sampling survey will be carried out under the supervision of Mr. D.E. Cebulski, Geology Department, University of W.A. Later, under the supervision of Research Officer R.J. Slack-Smith, who will join "Peron" on February 16, a prawn staining programme will be carried out in the Hopeless Reach area. The staining programme, which involves injecting a harmless dye into prawns, is part of the research work designed to plot the annual migration of prawns across and out of Shark Bay. Technical Officer E.H. Barker will be joining the "Peron" on February 22 to assist with the work.

PERSONAL PARS

Mr. Gilbert P. Whitley, Curator of Fishes at the Australian Museum, Sydney, retired on September 8 last, after rendering valuable service of some 42 years. During his career Mr. Whitley established a high reputation among fisheries taxonomists in other parts of the world as well as his own State. He travelled widely on collecting tours and to attend fisheries conferences overseas. He became well known among ichthyologists the world over as the author of numerous papers on fish taxonomy. Mr. Whitley joined the staff of the Museum in 1922 as Assistant Curator of Fishes. In 1925 he was appointed to the position of Curator. During World War II he was seconded to the C.S.I.R., and undertook fisheries investigational work in Tasmania and this State. We wish him well in his retirement.

TAPE RECORDERS FOR FIELD STUDIES

The Department has recently acquired three Monofon Attache transistorised tape recorders to be used by technical staff. The recorders measure approximately 7 inches by 4 inches by 2 inches and they each have a wide variety of attachments which make them extremely versatile and admirable for field recording. Another feature is that they can be operated either by battery or from the main power supply. The instruments will be used particularly in the crayfish and prawn measuring programmes. Previously it has been necessary for two officers to be present at a processing plant; one to measure the fish and one to do the recording. By using a tape recorder one officer will be able to do both measuring and recording without difficulty. The recorders will also be extremely useful when measuring is carried out at sea on small fishing vessels. It is simply not possible to have two men on board in addition to the crew on many of these small craft.

MONOFILAMENT NETS

We apologize for an incorrect statement made in the January edition of this publication.

Mr. A. Dunbavin Butcher, Director of Fisheries and Wildlife, Victoria, has drawn our attention to the third paragraph on page 10 and advised that contrary to our statement Victoria does have the power under existing legislation to ban monofilament nets within territorial waters and he enclosed a copy of a Notice of Intention to ban such nets. He said that unfortunately due to an oversight the proclamation had not been proceeded with but would be taken up again immediately Parliament resumed.

One important matter was not spelt out in the regulation, says Mr. Butcher, as it was covered by another section of the Act. It was hoped to carry out experimental fishing with the assistance of interested fishermen, and the Minister had by the section in question power to authorize an investigation of this nature despite the general prohibition in the proposed regulation.

DIVING FOR CRAYFISH BANNED IN THE ABROLHOS

As a result of recommendations made by the Western Fisheries Research Committee at a meeting held in August last,

and by the Fishermen's Advisory Committee following meetings held on October 27 and 28 last in Geraldton, the taking of crayfish by any means of capture other than crayfish pots has now been prohibited in the whole of the Abrolhos area. The main reasons for the imposition of the restrictions are as follows -

(1) The development of diving for crayfish could considerably increase the total effective effort on the fishery.

(2) Crayfish which are normally pot-shy were being taken by divers. The general belief is that the pot-shy fish could be breeding stock or in the stage of some biological change and because they fail to enter pots, do themselves to some extent conserve the fishery.

(3) If diving for crayfish were not banned it would have a snowballing effect. Some fishermen maintain that if it were not prohibited they would themselves consider taking crayfish by means of diving.

(4) Diving is one way of defeating pot limitation.

(5) Divers are wantonly breaking up the natural habitat to get at the more secluded crayfish.

(6) Soft-shelled crayfish, which normally do not enter pots, are liable to damage.

GARDEN ISLAND WATERS

To facilitate the crayfish research programme on juvenile stocks, some waters adjacent to Garden Island have been totally closed to crayfishing. The area of the ban is the whole of the waters bounded by lines commencing at Callista Point and extending one-quarter of a mile west; thence generally southerly and parallel to the foreshore to a point one-quarter of a mile west of Collins Point; thence east to Collins Point; thence generally northerly along the high water mark of Garden Island to the starting point.

Dr. R.G. Chittleborough of C.S.I.R.O., who is currently engaged on crayfish research in the area, was having his marking and recovery technique hampered by

fishermen (mainly amateurs) potting in the area, even though the crayfish stocks were almost 100% undersize. It was also suspected that unauthorized persons were pulling the pots Dr. Chittleborough was using to catch juvenile fish for marking.

SOUTHERN INSPECTIONS BY FAUNA SUB-COMMITTEE

To acquaint themselves with local situations associated with requests to use some south-west lakes for water sports, and to investigate a report of the presence of the Noisy Scrub-bird in the Quarram area, a sub-committee of the Fauna Protection Advisory Committee carried out a four-day visit of inspection from January 18 to 21.

The Director, Mr. Fraser, led the party which included Committee members A.J. Milesi, J.B. Higham, G.M. Storr and A.H. Robinson. Fauna Officer H.B. Shugg, Wildlife Research Officer T.L. Riggert andSecretary G.E. Dixon accompanied the committee.

The first inspection was at Lake Towerrinning, where an on-the-spot discussion was held with some members of the Shire of West Arthur and local Honorary Fauna Wardens R.J. Schinzig and W.H. Horley. The Committee has agreed to lease to the Shire a portion of the waters of the lake for the purpose of water ski-ing, boating and swimming. The Shire requested the Committee to increase the area originally offered. However, it is apparent that in the near future, action will be necessary to gain control of the overflow levee bank which is at present freehold property and part of an adjoining farm. Should the owner decide to plough and crop the bank, which is at present stabalized by the existing natural growth, overflow water could cut through the bank and allow the lake to drain away. Local flooding could also be the result.

Next morning, following a rendezvous with four members of the Tone River Progress Association - one of whom was Honorary Warden J. Connor - the sub-committee visited Lake Unicup. A discussion was held at the lake side. The Progress Association members were advised that no objection would be raised to their request that water ski-ing be permitted on the lake, that a boat launching ramp or apron be constructed, that they be permitted to clear reeds 200 yards on either side of the boat launching site - to provide a clear swimming area for children, that approval be given to the partial clearing and cleaning up of a

small area adjacent to the swimming site to cater for picnickers, and that authority be granted for the erection of shelters and sanitary conveniences. A short visit was made to Little Unicup Lake, which is situated approximately one mile north-west of Lake Unicup. Unlike Lake Unicup, Little Unicup is salt. However, the vast number of water fowl and wading birds on Little Unicup at the time certainly proves its worth as a fauna reserve. During the afternoon the sub-committee was shown around Byenup and Tordit-Gurrup Lagoons east of Lake Muir by local farmer and Honorary Warden Bessel Hanekamp.

Following an overnight stay at Walpole an investigation was made of the reported presence of the Noisy Scrub-bird in dense growth adjacent to a swamp along the Boat Harbour track, near Quarram. Although there was no sign of the bird, members of the committee were enthusiastic over the possibilities of its existence there. The habitat where the bird was reported is very similar to that at Two People Bay where the Noisy Scrub-bird was re-discovered two or three years ago. The party took the opportunity to go the extra two miles to visit Boat Harbour where a commercial salmon fishery exists. The sub-committee called on the Shire Clerk at Albany later in the day, and an informal meeting was held in the Council Chambers with three members of the Shire and the Shire Clerk. Several matters were discussed, including the Department's suggestion that a Folk Museum be built on the Fauna Reserve at Two People Bay as an added tourist attraction. The following day before returning to Perth, a visit was made to Two People Bay to acquaint those committee members who had not previously seen the Noisy Scrub-bird habitat, with the nature of its domicile, and also to inspect the damage caused by the recent fires at Two People Bay and on Mt. Gardner.

SPERM WHALING

Inspector D.P. Gordon, reporting on the 1964 Sperm Whaling season, says that the Cheynes Beach Whaling Company commenced operations on March 1 and concluded on December 7. During that period 711 legal size whales and 90 undersize (under permit for research purposes) were taken.

It will be recalled that in the May edition of this Bulletin it was mentioned that the Minister for Primary Industry had approved of the taking for scientific purposes five undersize sperm whales each month during the 1964

season and that after sampling had taken place the carcasses were to remain the sole property of the Cheynes Beach Whaling Company. This quota was subsequently raised to a total of 140, to be taken at 25 each month over a period of five months. It will be remembered too, that the failure of the International Whaling Commission to give further protection to the sperm whale stocks off the Western Australian coast resulted in the decision of the Minister for Primary Industry to abolish sperm whale quotas in August, 1964. The restriction of the minimum size is however still applicable.

Mr. Gordon reports that production of sperm whale teeth find a ready market, and those from Albany were exported mainly to the United Kingdom, U.S.A. and Tahiti in that order. On the London market the teeth fetched 6/3d. (Aust) a pound.

Only one aircraft was used for whale spotting. This was a Cessna 172 float plane which replaced the Company's older wheel-equipped Cessna. The use of planes for whale spotting has proved its worth and has contributed largely to the success of the Cheynes Beach Whaling Company, whose figures have shown a marked increase since the introduction of spotting aircraft.

Three chasers were operating during the season. These were the Cheynes II and Cheynes III and the Kos VII. The Kos VII was taken out of service during the 1963 season but was recommissioned on August 14, 1964, after a complete and costly, refit. Although the Kos VII is a slower vessel than her counterparts she has proved a very efficient catcher and has increased the company's catch rate by nearly one-third.

The Company's old chaser Minilya has been sold as scrap. All deck fittings and as much metal as profitable will be removed before she is towed out to sea and scuttled.

An old Nissen hut which served as quarters for some flensers has been replaced by a new building, giving added comfort to the employees.

Several additional items of equipment have been purchased for the factory. A second hand Lemvann three-stage evaporator and four Simons roller driers were purchased during 1964 and are now partly installed. The Company anticipates that the additional equipment will be operating by early April. The new plant will be capable of producing solubles with a protein contant of 80% at an average of

three tons for each whale. Both Japan and Italy are interested in this product, which will be priced at approximately £75 per ton.

Other machinery additions and factory improvements include a new DeLaval oil purifier, a new oil storage tank with capacity of 750 tons, and an additional 50,000-gallon water storage tank. A new 500 h.p. Cleaver Brooks boiler will be installed to power the solubles plant. The existing catwalk has been extended and improved to carry permanent whale oil lines as well as those for sea water, fuel oil and compressed air. A new laboratory is to be erected in the soluble plant building.

Two additional leading hands and four other persons to operate the soluble plant will be employed during the coming season, which, if all goes according to plan, will open on February 25.

DISPOSAL OF CONFISCATED FISH AND FISHING GEAR

The attention of the staff, particularly the field staff, is drawn to the requirements for the disposal of confiscated fish and fishing gear. Unfortunately, on not a few occasions, seized fishing gear, crayfish pots, holding crates, nets etc., have been disposed of in a manner which does not fulfil the requirements of the Fisheries Act. Section 50 of the Act makes the following provision -

> "The Chief Inspector of Fisheries may, subject to the approval of the Minister, and in the manner prescribed by the regulations, sell or dispose of all boats, nets, lines, engines, implements, appliances and other articles and all fish forfeited in accordance with the provisions of this Act."

In future no confiscated fishing gear may be sold or otherwise disposed of, or transferred from one district to another district, or to a boat, without the authority in writing of the Director or, in his absence, the Administrative Officer. All officers must comply strictly with this direction.

FAUNA AUTHORITIES CONFERENCE

Earlier in this publication it was advised that the Director and Mr. Shugg would be attending the 1965 Australian

Fauna Authorities Conference at Kangaroo Island, South Australia, early in April. Some of the matters to be raised at this conference and which are of concern to Western Australia are as follows -

(1) Illegal exports and quarantine regulations.

(2) Export of Johnstone crocodile skins.

(3) Research and management reports.

(4) Pet food trade.

Background papers will be submitted in association with items 1 and 2 and also reports on the Western Australian situation in respect to items 3 and 4 relating to research and management and the ramifications of the pet food trade in this State.

There is a fairly lengthy agenda for the meeting. The following are some of the topics set down for discussion:-

1. Public relations and wildlife conservation.

2. Training and acquisition of staff.

3. Government-sponsored areas for the conservation of wildlife.

4. Non-Government-sponsored areas for the conservation of wildlife.

5. Conservation of rare fauna.

6. Re-establishment of rare species.

7. Utilization of fauna for sporting purposes.

8. Utilization of fauna for commercial purposes.

9. Acquisition and disposal of fauna by zoological societies.

10. Research programmes.

11. Bird banding.

12. Inspection duties under fauna legislation.

(13) Australian Conservation Foundation.

(14) Pesticides and vermin control.

APPOINTMENTS OF HONORARY INSPECTORS

Mr. R.G. Agnew, of Nedlands, Mr. Rex Hall, of Victoria Park and Mr. G.A. Turner, of Serpentine, have recently been appointed honorary inspectors under the Fisheries Act, primarily to assist in policing the unlawful taking of trout in the streams in the Serpentine-Jarrahdale area. Mr. Hall and Mr. Agnew are active members of the Serpentine-Jarrahdale Trout Acclimatisation Society and are also keen trout fishermen. Mr. Turner is employed as ranger at the Serpentine pipe-head dam.

RECOVERY OF BANDED SEA-BIRDS

In the December, 1964, edition of the Bird Bander, the journal of the Bird Banders Association of Australia appeared interesting reports concerning the recovery of banded sea-birds far from their original place of banding.

A Giant Petrel (Macronectes giganteus), with band number 130-43120 attached, was found dead on Naval Base beach, W.A., on August 7, 1964. This bird was banded by Mr. M.C. Downes at West Cape, Heard Island, on February 20, 1963.

A Wandering Albatross (Diomedea exulans) with band number 140-02781 attached, was recovered (then later released alive with the band still attached) 130 miles south of Hopetown, W.A., on August 29, 1964. It was banded by Mr. D. Gibson at Thirroul, N.S.W., on August 20, 1959.

An Australian Gannet (Sula serrator), banded by Mr. R.H. Green at Black Pyramid, Bass Strait, Tasmania, was found dead with band number 130-21786 attached, approximately 15 miles south of Mandurah, W.A.

This is the most extensive wandering by an Australian Gannet, within Australian waters, so far recorded.

CLEARING HOUSE

SKIN DIVING RUINING CRAWFISH INDUSTRY

Complaints are mounting among Cornish shell fishermen about the effect of skin-diving on crawfish catches. Fishermen at various ports have protested that the industry is being seriously damaged.

Mr. Clifton Pender, Cornwall's chief fishery officer, is drawing up a comprehensive report to present to the Sea Fisheries Committee soon. "The majority of shell fishermen who work with pots on the Cornish coast have said that free diving for crawfish will have a serious effect on their catches," he states. Mr. Pender's report will be presented to a special sub-committee appointed to deal with the issue.

Effect on Stocks

Complaints were first raised a year ago when the Newlyn-Mousehole Fishermen's Protection Association and the Porthleven and District Fishermen's Association asked the Sea Fisheries Committee to consider the effect of the activities of skin divers on shellfish stocks. The question was also raised of licensing skin divers within the committee's district, subject to such licenses being issued only to bona fide fishermen.

The fishermen were told then that development of skin diving for shellfish was being closely watched, and the committee would take action to protect the fisheries if there were evidence of depleted stocks. No action was taken however.

(Fishing News London December 4, 1964)

TRENDS IN AMERICAN SHRIMP CULTIVATION

by S.F. Manning

There is so much demand for shrimp in the U.S.A. that the total output of the extensive U.S. shrimp trawler fleet is almost matched by shrimp imports. Yet cultivation of shrimp production, looks a long way off. Tank breeding of native marine shrimps is still very much in the hands of marine biologists; yet shrimp farming, or rearing of sea-spawned stock to market size in tidal compounds is effectively blocked by the laws and politics of the southern coastal states.

The artificial breeding of shrimp in tanks to maturity or for stocking ponds, seems the obvious answer to this problem. But it is not so simple as it might appear, as several leading scientists in this field have already made clear. For example, Milton J. Lindner, of Texas, has reported some success - though not consistent success - with brown shrimp (penaeus aztecus), but he emphasises the problems of contamination by other organisms, difficulties of temperature control and that of providing suitable food. He continues to work on these problems, especially on that of costs.

Transportation

At Miami, Florida, Donald M. Allen has had some success with white shrimp (penaeus setiferus) and pink shrimp (penaeus duorarum) though the method is, he says, insufficiently developed for commercial application. One answer, he thinks, may be the transplantation of more suitable foreign species such as the Kuruma shrimp (penaeus japonicus) or Australia greentail prawn (metapenaeus mastersii).

One of the main exponents of shrimp raising is Dr. G.R. Lunz, of Bears Bluff Laboratory, S. Carolina, who succeeded in raising shrimp to spawning stage at 8.5 in., only to lose them due to inadequate temperature control. He, too, mentions the difficulty of cultivating suitable food, and he puts his faith for future shrimp production in developing effective methods of culture.

Delicate balances

It seems as though successful shrimp culture requires delicate balances of water temperature and salinity, the provision of microscopic foods, and the control of minute contaminants. Added to this is the need for a degreee of co-operation - apparently given by the Kuruma female- which the native Penaeus females sadly lack.

There are no operating Asian-type commercial shrimp farms in the U.S., although there seems little reason, from a technical standpoint, why such a venture should not be profitable. The southern coastal states abound with shrimp-supporting marshland. Much of the technology required to adapt Asian methods of prawn farming to American shrimp species has already been established by Dr. G. Robert Lunz.

Fattened

Dr. Lunz has shown conclusively that the shrimps which spawn offshore and are taken by American trawlers, are the same shrimp which inhabit the coastal marshes during the post-larval stages. In ponds up to one acre size on the grounds of the laboratory, he has successfully recruited post-larval shrimp of the three native commercial species and has fattened them to market size in successive seasons throughout the last five years.

Relatively low yields (450 lb. per acre, maximum, as against 700 to 1,400 lb. per acre on prawn farms in India) have led Lunz and other scientists to believe that the possibilities of Asian-style prawn farming here are limited by a pattern of offshore spawning which may or may not produce enough juvenile shrimp to base an industry on the natural source.

Of prime importance to future shrimp growers, Lunz has successfully eliminated fish predators in his shrimp ponds by means of sluiceway screens and by careful use of rotonone - a cheap and available fish-killing chemical. Pamphlet 36, Control of Predaceous Fishes in Shrimp Farming in South Carolina, published by Bears Bluff Laboratories, describes the experience leading to adoption of this chemical for selective killing in shrimp ponds and prescribes both the dose and the method of applying it.

Available also, by application to this state-operated laboratory, are the Annual Reports (1956-1963) in which are listed the yields of Lunz's experimental ponds along with the various methods he employed in recruitment, feeding, controlling predators and harvesting the crop.

Dr. Lunz has informed me of half a dozen or so attempts by private individuals to make a go of Asian-type shrimp farming, apparently on their own land, in the coastal marshes of South Carolina. However, the failure of these small farms in each case was due to technical reasons which he readily pointed out.

If American scientists feel that the natural supply of shrimp is inadequate for profitable marsh farming of shrimp here, interested businessmen look to practical engineering as the means to cull a steady supply of juvenile shrimp from the hordes of larvae which seasonally invade America's southern shores.

Legal snags

However, investment capital cannot get a crack at marshland shrimp farming in this country. Pre-maricultural conservation laws forbid the holding or transporting of seed shrimp. Overlapping jurisdictions - federal, state, private - over tideland bottoms, established in another era when farming of crustaceans was unthought of, blocks new-aquisition or leasehold rights over most marshland areas for purposes of mariculture other than oyster farming. Finally, to the despair of would-be shrimp growers, there is no political will in our southern shrimp states either to re-write the offensive laws or to clear the marshland titles for the benefit of non-local enterprise. Few Southerners seem to be much interested in growing shrimp.

Spearheading the attack or "outside" business interests on Southern shrimp-growing restrictions is John Hart Knox, a professional business-management consultant, of Greenwich, Connecticut. Dedicated and articulate, Knox has spent a personal fortune in learning shrimp technology surveying the marshes for shrimp growing purposes throughout the South Atlantic and Gulf Coast states, and waging a one-man war against the legal and political barriers which shut shrimp farming out. Knox contends that the natural supply of seed shrimp is more than adequate for profitable farming on a large scale if tidal recruiting is supplemented by more inventive means to funnel greater numbers of seed shrimp into a given pond. Use of plankton weirs, pumps, seines or electrical fields to trap, prod, or attract migrating juvenile shrimp might well be the answer to greater production. Some of these devices have worked with qualified success in Lunz's ponds; others have not, and for reasons which Knox has noted. Better recruiting, however, would offset the loss of mud-buried shrimp when the pond is drained at time of harvest.

The big problem of the shrimp grower - that of controlling predaceous fish within the pond, has been solved by Lunz. Rotonone-killed fish, properly ground up and distributed, provide most of the feed for the growing shrimp. Predaceous crabs may be caught in convential crab pots and sold as a by-product.

Like other businessmen who look to culture as the means for increasing U.S. shrimp production, John Knox views marsh farming of sea-spawned stock as a practical first step. Knox points out that the average low price

paid to U.S. trawler operators for market shrimp during the last 10 years has been about 50 cents per lb., heads off. Prices have ranged as high as $1.10 on the wholesale market at Chicago. If, through inventive pond engineering, yields are increased by just 50 lb. per acre over Lunz's best harvest in the small laboratory ponds, then the 500 lb. per acre yield of a 40 acre pond would gross a minimum of $10,000 annually: (500 lb. x 50 cents per lb. x 40 acres). "Forty acres", says Knox, "is the minimum practical size which can support a profitable commercial enterprise for an individual. The maximum size pond which one man can handle through recruiting, predation control and harvest is one square mile - a pond sixteen times larger than the minimum size."

No growls

Future shrimp growers in this country can look forward to capturing the import sector (nearly 50 per cent) of the lucrative shrimp market without a single growl from the trawler industry. Marsh farming of shrimp will salvage much of the shrimp larvae doomed to destruction by nature. Timing of the shrimp crop will tend to stabilise prices for all concerned by filling in the low spots of trawler production. One really-successful pilot farm may be all that is required to melt away the legal barriers, for Americans are a people who jump to change anything if a profit is seen to be made.

Propagation secrets

So far as culturing shrimp in tanks or ponds ashore is concerned, this may some day be the answer to fully controlled production of shrimp. Much work remains, however, before the secrets of shrimp propagation are thoroughly understood by the scientists. When American shrimp have been made to reproduce reliably in tanks, commercial shrimp culture will probably take on the automation of a modern chicken farm.

(World Fishing London December, 1964)

CANNED ABALONE ARE WORLD-BEATERS

Australian canned abalone are now competing successfully on world markets and earning a small but steady export income for the nation.

Mr. Katsi last year exported 100 tons of raw, snap-frozen abalone. This was carried out in conjunction with Australian Food Distributors Pty. Ltd. of Sydney. However, Mr. Katsi sees the major production in future being canned for export sales. Long-term contracts have been signed with overseas distributors and a steady 1,000 cases a month (worth 30,000 U.S. dollars or about £Aust 15,000) are being shipped from Sydney.

Behind the canned abalone success story lies many months of careful planning, a big research bill and the know-how of a young American businessman, Michael Katsi. Mr. Katsi is a seafoods broker (a refined way of describing an exporter and importer of fish). He came to Australia with his wife and children a few years ago and became interested in abalone because he'd heard there were a lot of them here and because he'd been in the abalone business in Mexico at one time.

Mr. Katsi began by chartering a Seine boat and engaging half a dozen skin divers to make a survey of known beds along the east coast. The survey lasted about six months and cost about £3,000 but it convinced him that abalone existed in commercial quantities.

His next step was to form a company, Nataus Foods Pty. Ltd., and to organise his lines of supply before arranging with the Sydney firm of Harry Peck Ltd. (the anchovy people) to cook and can the abalone. Since the abalone were to be exported, a distinctive name "MYEE" brand (an aboriginal word for "good to eat") was selected for the product.

MYEE has now been established on the main abalone markets of the world, U.S.A., Hong Kong, Malaysia, Bangkok and England, where it is successfully competing against the product from Mexico and other cheap labour countries. The name, however, is not the main reason for the success of MYEE brand; it is the quality of the abalone which are cooked by a "secret" process.

Not new line

Mt. Katsi said Australian abalone were different from those in other parts of the world and needed their own special cooking treatment. The canned abalone, he said, must be "chewey" not tough. It should need no preparation by the housewife and could be eaten straight from the can.

Attempts to popularise canned Australian abalone have been made in the past and according to Mr. Katsi have hurt the industry becuase the quality was not up to standard. When he visited South-East Asia with samples of MYEE brand, distributors turned their noses up when they learned he was offering Australian-produced abalone. Once he broke down the sales resistance to the Australian abalone tag he had no difficulty in placing orders for his product.

Abalone is not a cheap food, he pointed out. It is a delicacy and sells locally at about 9/- a 1lb can. The abalone is a marine snail or mollusc related to the oyster and clam family. It grows in a one-sided, disc-shaped shell and is found on rocks in waters up to 100ft. deep.

It is harvested by divers who go below with half-moon-shaped lengths of iron to flick them off the rocks to which they cling with a sucking foot. At present Mr. Katsi uses five "mother ships" in his harvest operations in N.S.W. and Tasmania. Some of the boats are 65 feet and one has a 12-ton freezer. In addition the skin divers use about 25 power boats.

Contract workers

The skin divers work on contract and are paid on a poundage basis for abalone in the shell. Average weekly earnings are about £45 but the hard workers earn their £60, £70 and £80 a week. About three hours a day is the limit for divers who use aqualungs. Splitters, who also work on contract, are employed to remove the abalone from their shells and to gut and clean them for freezing as expeditiously as possible.

Mr. Katsi recently engaged a professional skin diver from England to supervise his firm's team. Although divers work on a contract basis only, it is necessary to ensure that daily quotas are maintained. The supervisor instructs new divers how to work a bed, how best to use equipment, the safeguards to be taken, and also look for new grounds. Divers work in pairs. Their greatest danger appears to be underwater surge which could dash them against rocks while harvesting.

Mr. Katsi sees abalone development on an Australia-wide basis. In South Australia and Tasmania, canning is being carried out in conjunction with SAFCOL (South Australian Fishermen's Co-op. Ltd.). In southern N.S.W. fishing

is being increased, with operations supervised and controlled through the Ulladulla Fishermen's Co-op.

Mr. Katsi's company is at present also undertaking a survey of abalone stocks from Geraldton to Albany in Western Australia and, it is possible, operations will extend to that State in the near future. Commenting on the possibility of our abalone stocks standing up to more intense fishing, Mr. Katsi said divers at present were working only in 25ft to 30ft of water and had not gone deep (100ft) where the big ones are.

It has been found that some beds can be harvested every eight weeks as the abalone move up from the bigger depths to replace those taken from the shallower waters.

(Fish Trades Review Sydney December, 1964)

DRIFT CARDS TRACK CRAYFISH

How the movement of crayfish larvae in ocean currents is followed by the Australian Commonwealth Scientific and Industrial Research Organisation.

Australian fishery scientists have this year launched a major research project, aimed at learning more about the west coast crayfish, or rock lobster stocks. This fishery is important to the economy of Western Australia, and is valued at about £A6 million a year, most of which is export to hard currency areas.

Use of aircraft

The research programme called for the study of water movements in relation to the coast, to learn more of the distribution of crayfish larvae during its free-swimming pelagic stages. To do this, aircraft were used to drop drift indicators along 1,000 miles of coastline, at distances from the coast up to 300 miles in fixed relation to the continental shelf.

The type of marker used was the drift card, enclosed in waterproof plastic and offering a reward of 4s. to anyone returning a card to the Australian Commonwealth Scientific and Industrial Research Orgnisation in Perth, the body responsible for the project. The cards were dropped in bundles of 100, a water soluble gum allowing them to float free once

in the water. Within two months, some 50 cards had been returned from the more frequented beaches near Fremantle.

The larval stage of the crayfish begins after a two-month incubation period under the tail of the female. It lasts 11 months during which time the larvae pass through three distinct stages and a number of moults. While this is going on, large colonies of larvae drift for great distances, and by 12 months the surviviors will have grown to a length of about 35 mm. and begin to settle on the bottom. Commercial maturity is reached after a further five or six years.

During so long a period, mortality must be high, due to natural conditions and predators. Despite this, the annual catch amounts to about 20 million pounds weight per year, or many millions of crayfish.

Naturally, the question of conservation is of great concern to the State Fisheries Department and the C.S.I.R.O. and in addition to the study of migration, scientists are studying the crayfish themselves in special aquaria. The long term benefit of these studies could well be some form of controlled rearing which would enable larvae to pass through the vulnerable early stages with increased chances of survival and so maintain Western Australia's stocks of this valuable species.

(World Fishing London December, 1964)

NEW PERMANENT COATING MAKES STEEL RESIST RUST

A new metal coating material containing phenolic, vinyls and metallic derivatives has been developed by the An-Cor Company of Sunnyvale, California, which claims that the coating provides a low-cost corrosion and rust resistant bonded surface for exterior metal applications.

According to the company release, the An-Cor process is bondable to all metals which have been cleaned by sand or vapor blast, or, in the case of machine parts, by a zinc-phosphate wash. Temperatures required to set the process range from 125° to 700° F, and durations depend on the mass of material.

The material can be applied with gun-type drying units setting up the bond as fast as the coating can be sprayed, and treated structures can be re-touched in the event the An-Cor surface has been ruptured by drilling, welding, or extreme abrasion, by means of brush or aerosol application and drying unit.

Cost of the coating is about 1.8¢ per square foot, the company says, with coverage averaging 1,000 square feet per gallon and a quantity price of $18.00 per gallon.

(Pacific Fisherman San Francisco November, 1964)

CROP SPRAY DESTROYS FISH IN SOUTHERN B.C. STREAM

Samples of water taken from Semiault Creek in southwest British Columbia where 2,500 dead fish were discovered several weeks earlier have been found to contain thiodan, an insecticide used for spraying crops.

Dr. A.S. Arnold, director of the Upper Fraser Valley Health Unit, carried out the examination and reported the result for the Canadian Department of Fisheries. Several of the dead fish were found to have been infected with thiodan.

Efforts to ascertain the identity of those responsible for the spraying over the river have not been successful, although it is known that several farmers in the area used thiodan spray.

Various government agences in B.C. have issued warnings against the use of such insecticides in areas where fish-bearing streams are likely to become contaminated.

(Pacific Fisherman San Francisco November, 1964)

GLASS SHIPS IN THE FUTURE?

Engineers at the David Taylor Model Basin are taking a second look at glass as a possible building material for deep submergence vessels. Ordinary glass is very strong in compression and comparatively light. Under special treatment the surface of the glass can be put into compression so that it has still greater strength.

(Sea Frontiers Miami September, 1964)