MENT, WESTERN AUSTRALIA

SERVICE BULLETIN

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STAFF NOTES

The Supervising Inspector, Mr. J.E. Bramley, will visit the Bunbury district from May 9 to 12.

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The Senior Research Officer, Mr. B.K. Bowen, accompanied by Technical Officer J.S. Simpson, will leave Perth by road for Geraldton on May 1. They will sail for the Abrolhos on board p.v. Dampier the following day for the Southern Group, where they will spend about 10 days continuing the main lines of the crayfish research set out in the March, 1963, issue of this Bulletin. On May 12 they will return to Geraldton and resume the catch sampling programme at local processing works.

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Miss M.A. Bartlett of Head Office, has, we regret to announce, resigned from the public service from close of business on May 14. She will stay in Sydney for 6 months or more and later return to the West.

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Senior Inspector J.E. Munro will review prawning practices and catches in the Shark Bay area during the month. He will leave Perth on May 10 and will be accompanied as far as Geraldton by Fauna Warden N.E. McLaughlan.

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The p.v. Vlaming, under command of her skipper, Inspector F.J. Campbell, with Assistant Inspector A.H. Ullrich as crew member, will sail on a familiarisation run from Fremantle to Geraldton and Carnarvon on May 7. She will be joined at Geraldton by Fauna Warden N.E. McLaughlan, who will act as pilot. This will be the first long distance run by the Vlaming which was commissioned late last year. She has since been engaged

on patrols in waters relatively close to Fremantle. A photograph, taken at her naming by the wife of the Minister for Fisheries, is reproduced elsewhere in this issue.

From Carnarvon, on May 15, Vlaming will take a scientific party to Bernier Island for a four or five days' survey. It will consist of -

- Dr. W.D.L. Ride, Director, Western Australian Museum;
- Dr. G.M. Storr, Curator of Reptiles and Amphibia, Western Australian Museum;
- Mr. F. Norton, Director, Western Australian Art Gallery;
- Dr. R. Hughes, of the Australian National University, Canberra;
- Mr. H. Tyndale-Biscoe, also of the Australian National University, but formerly of the University of W.A.

Dr. Ride and Mr. Tyndale-Biscoe were members of the party which carried out the survey of Bernier and Dorre Islands in July 1959. The party will carry out some follow-up research on the previous survey and obtain a few specimens for new work.

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Other officers to enjoy annual leave this month will include Fauna Warden N.E. McLaughlan, who commenced his leave on April 29 but will have to curtail it to join the Vlaming; Cadet Inspector I.L. Cardon, on May 6; Mr. P.G. Yewers, of Head Office, on May 13. He will spend a week spearfishing at the Wallabi Group in the Abrolhos; and Miss H. Sivwright, also of Head Office, on May 20, and Technical Officer R.J. McKay, the commencing date of whose leave has not yet been decided. Assistant Inspector L.R. Frizzell will begin three weeks' annual leave, plus time off in lieu, on June 4.

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Research Officer R.J. Slack-Smith will continue the prawn nursery area survey this month. He

will leave Perth on May 17 for Denham and will also conduct experiments on prawns in the new field laboratory. Mr. Slack-Smith intends to return to Perth during the second week in June.

PERSONAL PARS

Mr. I.S.R. Munro, Principal Research Officer, Division of Fisheries and Oceanography, C.S.I.R.O., is undertaking a further phase of the Australian salmon investigations, a reference to which was made in the previous issue of this Bulletin. Mr. Munro, who is well known for his taxonomic work and as author of the serialised Handbook of Australian Fishes, will endeavour to fertilise artificially the eggs of the western sub-species of the Australian salmon and to hatch them out in order that eggs and larvae taken in plankton hauls may be identified. He has recently succeeded in artificially fertilising the ova of the eastern sub-species and in rearing fry to the stage at which the yolk sac is absorbed. Mr. Munro says that the eggs of the western sub-species are substantially larger than those of the eastern sub-species. As the western sub-species in Western Australia freely mingles with the tommy ruff, it will be necessary also to experiment with the eggs of this near-relative of the salmon so that the eggs and larvae of each species may be separated.

The Department has placed r.v. Lancelin at Mr. Munro's disposal during the course of his investigations. She is operating from Busselton and it is understood that the eggs of many other species of fish have already been taken in her plankton hauls.

VISIT OF MR. R.E. MOREAU

The English ornithologist, Mr. R.E. Moreau, of the Edward Grey Institute of Field Ornithology, Oxford, will arrive in Perth on June 18. Mr. Moreau, who has made important ecological studies of African birds, in rain forest and arid environments, is visiting Australia under the auspices of the Academy of Science and the Division of Wildlife Research of the C.S.I.R.O. He will make some comparative observations in the same fields during his brief visit to Australia which will

last until the end of August.

In Perth he will give a lecture at the University Zoology Department on June 20 and on June 25 he will participate in a seminar at the University on "Post-Pleistocene Climatic Changes and their Biological Effects." During the weekend June 22 - 24 he will accompany Dr. D.L. Serventy and Dr. G.F. Mees on a tour of the south-west, including the Noisy Scrub-bird country at Two People Bay.

On June 26 he will leave on an extensive desert survey by the Division of Wildlife Research. The party will travel to Laverton, the Warburton Ranges, Giles, Mt. Olga and Ayers Rock and Mr. Moreau will leave it at Alice Springs. The rest of the party will return to Western Australia. The other members of the party will be Mr. H.J. Frith (Chief of the Division), Dr. D.L. Serventy, Dr. G.M. Storr (of the W.A. Museum), Mr. A.S. George (of the State Herbarium), Mr. J.H. Calaby (of Canberra), and Messrs. K. Keith and A.G. Mathews (technical assistants).

Mr. Moreau will return to Perth at the end of August on his way back to England.

PRAWN RESEARCH PROGRAMME

Opposite page 94, under the above heading, is reproduced a circular recently issued by the Director. It will be included in all the special log books issued to prawn-trawler skippers who have agreed to keep the detailed information required.

This is one of the two initial efforts to have recorded, on a voluntary basis, data on the fishing effort and catch of a fishery by those engaged in it. The other is the somewhat similar log to be kept by cray-fishermen, the details of which were explained by the Senior Research Officer at the recent Staff Conference. The system was used in the first place by the Division of Fisheries and Oceanography, C.S.I.R.O., to record information on the tuna and Danish seine fisheries of the eastern States.

Twenty log books have so far been issued to prawning vessels, representing a 100% response from those approached. It is indeed heartening to have our efforts

to understand the fishery greeted with enthusiasm. It is a sign of the increasing esteem in which the Department is held by fishermen and the industry in general.

NOTES FROM THE NEWS

Quite a few correspondents have ventured suggestions for a new name for the Noisy Scrub-bird. It was started off by a press correspondent who was supported by Mr. A.H. Chisholm, chairman of the Popular Names Committee of the Royal Australian Historical Society, Sydney. They maintained that the name was unsatisfactory, that it "wrote down" the bird's melodious song, and that the adjective "noisy" was absurd in such a case.

Our view is that the bird has been known by that name for 120 years, and, as Juliet soliloquised - "... a rose by any other name would smell as sweet."

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Following up the interest he displayed in our fauna during each of his recent visits, His Royal Highness, the Duke of Edinburgh, last month cabled Dr. D.L. Serventy as follows -

> " I GATHER THE PERTH DAILY NEWS HAS DISCOVERED THE PLEASURES OF BIRD WATCHING. I HOPE THIS WILL DRAW PEOPLE'S ATTENTION TO THE NEED TO PRESERVE AND PROTECT THOSE AREAS WHICH ATTRACT A WIDE VARIETY OF BIRD LIFE. IT IS NO CONSOLATION TO FUTURE GENERATIONS TO BE TOLD THAT 20 YEARS AGO ALL KINDS OF BIRDS USED TO FREQUENT THIS SPOT. I HAD A WONDERFUL MORNING AT PELICAN POINT. I HOPE MANY OTHERS WILL BE ABLE TO ENJOY IT IN THE FUTURE.
>
> PHILIP."

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The mauling of a young surf lifesaver, on April 13, by a shark at Yallingup was a shocking affair. Not surprisingly however, it has resulted in a great deal of publicity concerning the presence and catching of sharks in our waters. There certainly did seem to be a lot of sharks and rays about at that time. More

than 40 were caught in the area within four days of the attack. Later in the month, at City Beach, amateur fisherman Nicholas Lucas, of Mt. Hawthorn, caught a shovelnose ray which weighed 138 lb. and measured 6 ft. 10 in. The underwater divers investigating the old wreck at Ledge Point also took a large specimen. It was an 8 ft. grey nurse.

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According to an item in the issue of the "South-West Times" dated April 2, 1963, the Bunbury Chamber of Commerce has requested a ban on net-fishing in the Leschenault Inlet at Bunbury. The Chamber was said to be of the opinion that the ban, if implemented, would attract fishermen-tourists to Bunbury by giving them a reasonable chance of fishing success.

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As well as sharks and rays, another family of large fish has been figuring in the news in the past few weeks. It is the family of marlins and sail-fishes - the Istiophoridae - whose presence in our waters never fails to excite the hearts of gamefishermen. Those reported recently include -

- an 84 lb. sailfish, measuring 8 ft.6 in., caught at Geraldton by Mr. Keith Heard, of Perth, on April 15, 1963. It was said to have been taken on a 50 lb. breaking-strain line, rod and reel, with a feathered lure, from a boat a mile off Horrocks Beach;

- a 70 lb. sailfish caught in the Dampier Archipelago by Mr. W. Miller, of Port Samson, during the week ended March 30, 1963;

- an 11 ft. marlin found on the beach at Wonnerup early last month.

FISHERIES DEPARTMENT, WESTERN AUSTRALIA

PRAWN RESEARCH PROGRAMME

The Fisheries Department has been carrying out prawn trawling experiments in Shark Bay and Exmouth Gulf for over 10 years. The results of this work encouraged fishermen to try commercial prawning for themselves, and in 1962 a start was made in Shark Bay. These first commercial operations proved without doubt that commercial quantities of prawns exist there.

This year we will see 25 trawlers working in the area, and this heralds the end of the Department's exploration work in Shark Bay. Our role has now changed from that of Explorer to Manager. As in other fisheries, in other forms of primary production and in industry, good and sound management can be based only on full and accurate information. It is our desire during this and future seasons to collect just this kind of information.

This information will be of two types. The first will enable us to work out the life history of the different kinds of prawns, and the second to assess the catch, and the rate of catch, in a given time and in a given area.

Briefly, the life history studies will be aimed towards - (1) determining spawning areas and times; (2) mapping nursery areas and assessing changes in abundance of prawns from season to season; and (3) where possible, finding out the number of young prawns coming into the fishery each year.

One long-term aim of our work will be to estimate production in the next season. Estimates of this kind will be made by relating the catch rates to the abundance of young prawns in the nursery areas. The important feature of this work is that we need detailed catch and effort figures from the fishermen during the periods that the nursery area research is being carried out.

The second part of our work also involves the keeping of accurate catch figures. To make it easier for fishermen to get this information together, we have designed a simple prawn trawling log. This log will be given to all boats or skippers who are willing to help. It will be their personal property and all the Department asks is that the books be made available from time to time so that our research officers may be able to extract the information we need. I think it is not necessary to stress, but like all other information supplied to us by fishermen in their monthly returns this information will be used only in the research programme already outlined.

I feel sure it is the desire of all fishermen, as it is of the Department, that a stable fishery on prawns be developed. We all know, of course, that there are very violent annual fluctuations in productivity in prawn fisheries in all parts of the world, and it is our hope that the research we carry out will help us to discover some at least of the causes of such fluctuations. If we cannot discover the cause, some previous knowledge of the kind of fishing we may expect next year, whether it be good or bad, will save many people much hard work and money.

Will you please co-operate with us in this programme.

A.J. Fraser,
DIRECTOR.

The loss on her maiden voyage of the Nor'-West Whaling Company's trawler - Nor 6 - has been headline news since its disappearance on the evening of April 24. Just before going to press, the skipper of the vessel, Mr. J. Drinan, was picked up by the "Sonoma" and his account of the disaster gave renewed hopes that other crew-members may yet be found.

Other recent boat losses included the 39ft. steel craft "Yadranka", which sank off Ledge Point, about ten miles south of Lancelin, on Sunday, March 31. Skippered by Mr. L. Radich, of South Fremantle, with Mr. V. Koren, of Hamilton Hill, as crew, the vessel foundered after its propeller had been fouled by rope and floats. The two men were picked up by the fishing boat "Josephine", skippered by Mr. A. Frenis. The wheelhouse of the "Yadranka", which was then going down by the bows, exploded as compressed air blew out several windows and showered glassand kitchen utensils over the rescue boat. She sank in 120 feet of water.

Two fishing craft, the "Irene Castle" and the "Betty May", sank at their moorings at North Fremantle on the night of April 12. An explosion was heard about 7.15 that night and both vessels suffered heavy damage. They were refloated the following week and hauled onto the slips. It was then revealed that half of one side of the "Betty May" had been ripped out by the explosion, while the "Irene Castle" suffered extensive damage to her wheelhouse and engine and all her seams were opened. An inquiry will be held.

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In a reserved judgment, the State Full Court dismissed with costs an appeal by the Geraldton Fishermen's Co-operative Ltd. against its conviction by Magistrate K.J. Dougall in the Fremantle Police Court on September 10, 1962. In the judgment handed down on April 10, Mr. Justice Hale said that the weight of a crayfish tail should not be less than 5 oz. The company admitted that it had control over crayfish tails of less than that weight on the date in question. In his opinion, he added, the contentions raised on behalf of the company had failed. Mr. Justice Jackson and Mr. Justice Virtue agreed with the judgment of Mr. Justice Hale.

PEARLING RESULTS - 1962

In his annual report for 1962, the Pearling Superintendent, Broome, Inspector R.J. Baird, said that a total of 350 tons of shell was fished during the year. The shell was taken in a period of 9 months by 15 luggers manned by 141 crew members. Mr. Baird added that the sale of shell had been slow because prices offered by the overseas buyers had not been acceptable to some of the master pearlers. First grade shell brought up to £1,000 a ton, but the lower grades were down to £120. to £300. a ton. The cost of fishing and exporting the shell was said to approximate £500. a ton and, unless the divers were able to take a high percentage of first class shell, very little profit accrued to the owners.

Mr. Baird also reported that the pearl culture venture at Kuri Bay had enjoyed another successful year, while that at Exmouth Gulf had encountered some trouble with slime forming on the shell - possibly due to unsatisfactory water temperatures experienced in the winter months.

CROCODILE SHOOTERS' SUCCESS

With the export to Singapore of skins in excess of 1,300, crocodile shooters in the Kimberley Division enjoyed a profitable year. This was also revealed by Inspector R.J. Baird in his annual report for 1962. The average price received was between £12 and £15 a skin, Mr. Baird said. The variation was due to the size of the skin, he said, and added that most of the crocodiles were shot in the area between Cockatoo Island and Cambridge Gulf.

There were 6 persons licensed to take crocodiles for profit on December 31, 1962, although 8 licenses were current during different periods of that year.

MELBOURNE CRAYFISH CONFERENCE

A noteworthy effort of interstate co-operation was highlighted in a press release issued

by the Tasmanian Minister for Fisheries (Mr. Atkins) last month. Referring to the above conference, which was held in March, Mr. Atkins, among other comments, made the following points -

"This conference was attended by Fisheries Officers of the C.S.I.R.O. (Division of Fisheries and Oceanography) the Commonwealth Fisheries Office and the State Departments of N.S.W., South Australia, Victoria and Tasmania. Also present as an adviser was Mr. J. Gulland, the Principal Scientific Officer of the Fisheries Laboratory, Lowestoft, Great Britain, who recently completed a visit to all States of the Commonwealth and investigated crayfishing conditions in Tasmania.

The Conference reviewed all evidence from the current investigation into the crayfish fishing of South East Australia conducted by the C.S.I.R.O. Fisheries and Oceanography Division in conjunction with the various State officers under the direction of the Southern Pelagic Project Committee. The conclusion reached was that the overall status of the fishery indicated positively that a state of under-fishing existed and that production could be increased by liberalising some of the control regulations without any detriment to the availability of stocks of commercial crayfish.

A significant result also was the scientific proof of the slower rate of growth of the female crayfish, which would permit a smaller legal minimum length. At present both the Tasmanian and Victorian length was 4¼ inch carapace measurement and the closed season operated for a period of six months. It can, therefore, be seen that only a small proportion of the potential commercial stock was at present being taken. This has been stated to be as low as 4 or 5 per cent in Tasmanian waters.

The Conference therefore accepted the principle of liberalising regulations governing both the legal minimum length of female crayfish and an adjustment to existing seasons. These proposals were adopted unanimously and they will be submitted to the respective Governments for their consideration.

The Minister said that if the proposals were given approval, the season following would bring an

increased yield of between 20 to 30 per cent in the catch and in the long run a permanent increase of about 10 per cent could be expected. At the present time the Tasmanian crayfish production averages a little over three million pounds (weight). In the past 10 years the lowest production was 2.5 million pounds in 1952 and the highest 3.9 million in 1961. There are approximately 300 vessels engaged in crayfishing in the State and these employ some 700 fishermen. Mr. Atkins said he would be submitting the proposals, which were of such a far-reaching nature, to an early meeting of Cabinet in the New Year.

In conclusion, the Minister issued a warning against the taking of crayfish other than those of the present legal size. Adequate notice of any change would be issued if the new regulations are to be adopted."

TAMMAR ON HOUTMAN ABROLHOS

The report immediately below, written by Dr.A.R. Main, Reader in Zoology at the University of Western Australia, is reproduced here because of its high general interest. It was prepared for the information of the Fauna Protection Advisory Committee and was tabled at the last meeting of the Committee held on April 5, 1963. Dr. Main, the leader of the party, was accompanied by Professor W.R. Dawson, Professor of Zoology at the University of Michigan, and a team of graduate research students. The report is reproduced in full.

Report following visit to East Wallabi Is., Abrolhos, February 11 - 15, 1963.

Personnel: A.R. Main; J. Kinnear; D. Bradshaw; W. Lane; W.R. Dawson and V.Shoemaker.

Transport: F.V. "Dampier" : A. Pearce, L. Frizzell.

Preamble

Evidence from various sources has indicated that the exceptionally long and hard summer of 1961-62 had caused almost catastrophic reduction in numbers of quokka on Rottnest as well as tammar on Garden Island

and at the Tutanning Reserve, East Pingelly. These indications prompted the visit to the Wallabi Islands in order to see whether similar decline was apparent there. In addition to the major purpose of the visit it was decided to obtain some physiological measures of the status of the population as well as clinical indication of virus disease present. These measures involved killing animals and were to be used only if it was apparent that the population had not been subject to a decline.

Results

Numbers of animals present.

No census or accurate population estimate has ever been made for either of the Wallabi Islands and the duration of the present visit precluded a comphrehensive study of the population by making estimates based on mark and recapture techniques. This being so it was necessary to base opinions of numbers present on experience in other areas; in particular the following were used:-

(a) grazing pressure (heavy; population numbers high)

(b) evidence of regeneration (good regeneration; population numbers low)

(c) tracks, runways and scats (roughly indicative of presence or absence of animals in an area)

Evidence from the above suggested that tammar occurred everywhere and were relatively uniformly dispersed. Grazing pressure was high and regeneration almost absent. Traverses made at night as well as collections of animals made at night suggest that the density is about 1 tammar per 1.5 acres which gives a minimum population of about 600 animals.

As soon as the abundance was assured the planned collections were made.

Water.

Diplolaena leaves everywhere were rolled, presumably signifying absence of summer rain. The sand was powder dry even under rocks. An additional three

wells were located making a total of 7. Of this total the water was not accessible to the tammars in five, though two contained drowned animals. The two which were accessible bore every indication of being used regularly. One had ample water in a deep sheltered cavern, the other was open, exposed and had little water which was unlikely to last through the summer. It appears that a large proportion of the total population on the island does not have access to drinking water during the summer.

Collections.

Night of Feb. 12th, 15 animals caught, tagged, sexed and weighed on morning of Feb. 13th. 4 males selected for thyroid uptake measurement. Serum collected for Professor N.H. Stanley, Professor of Microbiology, - at slaughter. These were :

No.	Wt.	Serum No.	Thyroid uptake Measured by I_{31}	Hind foot
4403	3.8 K	21	6.1%	133.5 mm
4406	3.7 K	22	10.8%	130.6
4411	3.8 K	23	6.1%	132.0
4413	3.7 K	24	8.3%	134.3

The remaining animals were retained for transport to the University.

No.	Wt. at capture	Sex	Wt. March 11, 1963
4402	4.4 K	M	4.24 K
4404	3.5 K	F joey	died
4405	4.0 K	M	4.06 K
4407	4.6 K	M	3.83 K
4408	1.2 K	F	1.02 K
4409	3.0 K	F joey	3.02 K
4410	2.5 K	F joey	2.52 K
4412	3.3 K	F joey	3.38 K
4414	2.0 K	M	died
4415	3.7 K	F joey	3.32 K
4416	1.3 K	M	1.32 K

On Feb. 14th, 6 animals captured, 1 subsequently escaping overnight, the remaining five transported to the University.

No.	Wt. at capture	Sex	Wt. March 11, 1963
4619	unknown	F	1.52 K
4620	"	F joey	3.14 K
4621	"	F joey	2.36 K
4622	"	F	2.48 K
4623	"	M	4.2 K

The weights of animals at capture are, on the average lower than for a similar sample from say Garden Island, at the same time of the year. The lower average weight does not appear to be a serious reduction.

Physiology.

Morning of February 13, 1 animal shot for blood and urine. Evening of February 13 members of the party captured 8 animals. These animals were killed shortly after capture. Blood and urine samples were collected to measure urea, sodium and potassium concentration. Bladders were near empty or empty. Analysis of urine was hampered for this reason. In addition serum for Professor Stanley was collected.

The following morning February 14, 3 animals were shot to complete the sample. Blood and urine collected.

Summary.

Total number of animals caught 33 - 1 male escaped from confinement.
Total number of males caught 17 - 1 juvenile.
Total number of females caught 16 - 2 juveniles

All mature females except one (which was barren) carried very young joeys. 16 animals were brought back to the University - 14 survived to date. 17 animals slaughtered for physiological measurements, i.e. thyroid uptake, urea, Na, K levels in blood and urine.

Results from physiological analysis

Thyroid uptakes averaged 8.1% with a range of 6.1% - 10.8%. This compares favourably with a value from 1 animal resident in yards for 1 year whose uptake was 9%. The low thyroid uptake supports the hypothesis that the tammar has a low metabolic rate.

Blood urea levels average 30mg%. This is lower than the euro by approximately 20% when compared at the same time of the year. Urine analysis was hampered by the small quantities collected, but the general impression gained from the limited amounts of urine was that the concentration of urea was low. This implies that the tammar is conserving urea. Na, K, blood levels are on the expected range. Interpretation of Na, K levels in the body fluids will have to await the collection of more data particularly from different seasons of the year.

Discussion and Conclusions.

These collections are interesting from the standpoint of population size and structure. The total number caught (including 1 male escaped) is 34, of these only 3 were juveniles (= to births summer 1962). Night observations over the whole island indicate that juveniles were everywhere in similarly low numbers. However, 13 of the 14 mature females handled had small joeys which from experience would have been born in January 1963. This is the typical picture of high fertility among female macropods. What is unusual is the low recruitment of young into the population from the previous year's births. The reason for the poor recruitment of the young appears to be that the island area is at maximum density; and that territoriality of adults is killing off the young recruits which can only find a place to live when an established adult dies. This interpretation suggests that the population is in a healthy state. Density is high and there are more than sufficient recruits to fill possible places made available by natural deaths of established adults. Moreover we can conclude that the hot severe summer of 1961-62 had no effect on the population of East Wallabi because experience with quokkas suggests that under stress of drought both old and young have an equal

probability of dying, consequently the end result is a fairly high proportion of recruits in the surviving population.

Precisely similar population structures were obtained for the lizards Egernia stokesii, Amphibolurus barbatus mimus and Gymnodactylus milii. That a mammal and 3 distinctive reptiles should all show a stable mature age structure indicates that the biotic part of the environment is complex, well integrated and possibly a climax. That this should be so for an island less than 1000 acres in area is extraordinary and all care should be taken to see that nothing disturbs the balance already present. Two obvious ways to upset the climax would be to (i) burn or clear part of the area and (ii) remove the predators such as sea eagles which prey on these tammars unable to hold territory with adequate cover. In view of the demonstrated high fecundity of the tammar it is not expected that removing 20-30 animals for study will do anything other than allow more young to recruit into the population.

The results suggest that the tammar population on East Wallabi Island is responding to the arid environment physiologically. The conservation of urea allows an efficient and high level of recycling of urea which must contribute substantially to the nutritional status of the population. That blood urea levels in the tammar from this locality are lower than for euros from the Pilbara is quite unexpected.

What information we have clearly indicates that following further laboratory work more elaborate field analyses should be undertaken on a long-term basis with sampling from season to season. As at present visualised this should not necessitate removal of many animals from the island and none need to be killed on the island.

SIX LECTURES ON CRAYFISH

The Adult Education Board in a recent leaflet advises that a series of lectures will be given on various aspects of the Western Australian crayfishery, and of the life history of the crustacean on which it is based. The venue of the lectures will be the Western Australian Museum,

Beaufort Street, Perth. They will all commence at 8 p.m. on the dates shown hereunder.

The circular exhorts anyone interested to enrol at the office of the Board - 3 Howard Street, Perth. The fee for the full course of lectures will be £1.5.0.

1963.

May 23 1. What's in a Name? The W.A. crayfish goes to America as Spiny Lobster. W.A. freshwater "crayfish" - marron, gilgie and koonac. The existing confusion of common names throughout the world. By D. Bathgate, Teacher, W.A. Museum.

May 30 2. Growth of a Crayfish. Reproductive cycle. Recruitment paths. Current research on larvae. "White" and "Red" crayfish. Underwater observations and tagging. Growth to maturity. By R.W. George, B.Sc., Ph.D., Curator of Invertebrates, W.A. Museum.

Jun. 6 3. Marine Crayfish of the World. Other commercial and non-commercial species; their distribution, "catchability" and evolution. Recent research on the "true" scientific names. By R.W. George.

Jun.13 4. Development of an Industry. America's demand for frozen craytails brings post-war "explosion" of the industry. Fishing grounds. Scientific study of population fluctuation after heavy fishing. By K. Sheard, D.Sc., formerly C.S.I.R.O. Fisheries Division.

Jun.20 5. Catching and Exporting. Fishing methods - existing and future. Handling and processing. Bait preferences. Export to America. Market trends. By T. Kailis, Manager, Ross International Fisheries.

Jun.27 6. Danger of Exhaustion? Fisheries statistics. Their use and application to management. By B.K. Bowen, B.Sc., State Fisheries Dept.

SEMINAR ON FISHERIES MANAGEMENT

Will officers in possession of the report of proceedings of the Fisheries Management Seminar, 1962, please note and correct an error that has been made in the reproduction of Dr. J.M. Thomson's experience paper at page 59. In lines 5 and 6 the words "Percalates colonorum" should read "Pelates sexlineatus".

DEPARTMENTAL CONFERENCE

The twentieth annual conference of departmental field officers was held at Headquarters in Perth from April 22 to 24. All field staff, including research and technical staff, were present with the exception of the master and crew of r.v. "Peron", which was on the slip, and Inspector T.B. Baines, of Shark Bay, who was on long service leave. The Director, Mr. Fraser, occupied the chair.

Official Opening

The Minister for Fisheries (Hon. Ross Hutchinson, D.F.C., M.L.A.) formally opened the conference. During the course of his remarks he said:-

> "We have been compelled in recent months to introduce certain controls in regard to the activities of fishermen. At this time we do not quite know how these controls will work out. We have restricted the number of boats allowed to take part in crayfishing operations, we have controlled the number of boats permitted to engage in the prawn fisheries of Shark Bay, and we are giving a lot of thought to restricting the number of craypots which may be used. In a free country people do not like having their activities controlled, and the Department and the Minister both realise that these controls will make the task of the field officer even more difficult than it is now.
>
> "I know that all field officers will continue to do the best they can. The industry will frequently blame you for these controls, but you must back up the Department by explaining

the need for them. It has always been my endeavour to let fishermen know that the job of the Department and its field officers is to assist and not to hinder them. We are here to see that laws designed for the protection of the fishing industry are upheld, and the good fishermen appreciate this. Any trouble that arises in the industry is usually started by the 'no-hoper'.

"Many problems are posed in the normal day-to-day work of the Department and of myself. Sometimes the outside staff must feel a little despairing and perhaps disgruntled when according to their book something is right and then subsequently either the Director or myself reverses an officer's decision or declines to accept a recommendation. If in such cases you try to appreciate that at the top it is not possible to be hard and fast in these matters, not to vary decisions, to be irrevocably uniform in all respects, and never to break precedent. Human factors are frequently involved and must be considered in all cases. So far as precedent is concerned, I am convinced that the world will never progress if precedent is not at times broken - it will merely stand still.

"The Department needs your understanding and your co-operation in regard to any decision we may make. These controls that we have imposed are controls which in the present state of our knowledge we think are necessary. If they are shown to be unnecessary or based on 'wrong understanding' we shall certainly see they are either amended or withdrawn entirely.

"The essential work of the Department must go on despite criticism. If you maintain your morale in spite of your critics, the Department's morale will remain high. Do the work assigned to you and administer the law as you find it and you will be doing your job. A large number of people depend for their very livelihood on the fisheries of this State. The potential of a fishery will be determined and its future security assured only if you do your job conscientiously.

"In conclusion, I would like to recommend that you all read the Director's paper on fisheries management which he delivered at the seminar last year. It is a very worth-while contribution. The publication in which it appears has, I understand, been sent to each fisheries district and vessel.

"It is a pleasure for me to be here again. I hope this Conference will be of value to you. I trust you will do what you can to improve your own understanding of the fisheries, the implications of our laws, and the methods and aims of fisheries science."

At the conclusion of the Minister's address, Mr. R.J. Baird, Pearling Superintendent, Broome, moved a vote of thanks to Mr. Hutchinson. It was carried by acclamation.

Procedure

A number of items for discussion had been placed on the agenda by various officers. These were considered at branch meetings presided over by the branch heads - Mr. J.E. Bramley, Inspection Branch: Mr. B.K. Bowen, Research Branch: and Mr. H.B. Shugg, Fauna Protection Branch. They were later brought before the conference as a whole by spokesmen appointed by the respective branches, and the views of the officers of those branches expressed. Subsequently they were put to conference, and resolutions adopted.

Films

An afternoon was set aside for educational films. Through the courtesy of the Superintendent of Visual Education, Department of Education (Mr. N.L. Uren) films made available on loan by the organisations named were shown at the Leederville studios. The Department was most grateful for the opportunity to present these excellent films, which were appreciated by all who saw them.

The films shown were -

"Crayfish for Julie" (Fremantle crayfishing) - Fisheries Department, W.A.

"Seine Net" (Scottish underwater film showing operation of danish seine) - C.S.I.R.O.

"Shrimp, Please" (Louisiana and Mississippi prawn fishing) - Department of Primary Industry.

"Tuna Fishing" - Department of Primary Industry.

"The Big Catch" (Tasmania's fishing industry) - Mobiloil Aust. Ltd.

"Kereru" (Protection of the New Zealand wood pigeon) - Victoria Fisheries and Wildlife Department.

"Trout in the Karri Country" (Trout acclimatisation in Western Australia) - Audio-Visual Section, W.A. Education Department.

Talk on Public Relations

Mr. H. Ende, of the Management Department of the Perth Technical College, a public relations expert, addressed the meeting. The Director, in introducing Mr. Ende, said that among the duties of the field staff were to maintain good relations with the public, and to represent the Department to various groups of people who were interested in, connected with, or dependent on the fishing industry and fauna protection activities. "In the past", he said, "We have perhaps not given as much time and attention to the development of proper public relations as we should have done, and we have taken the opportunity, while you are all here, to invite Mr. Ende, an acknowledged expert in his field, to address you on the subject".

Some of the highlights from Mr. Ende's talk are given below -

* Everyone must have a public relations programme. So should this Department, although it is probably not organised. This Department should have one, and so should every Government Department.

* The public will criticise you or any Department which has to administer laws. So you may as well, if you are to be criticised, show your best self.

- The way you dress will determine to some extent what sort of respect you will command from the public. Neat clothing and a clean appearance are essential for a good public reaction.

- When you have to explain the law you rub up against the public. The public will be very mindful of, and remember very well, the kind of rub you give them. To the majority of people you are not officers of the Fisheries Department - you are the whole Fisheries Department, you are the Government. They are not concerned with the Premier, the Minister or Director - they are concerned with you.

- You have run up against likeable men, well-meaning, good family men, who become on being challenged fighting, loud-mouthed vulgarians. Why is this? Because they are frightened. Because they are afraid that if they lose the argument they are going to lose something more valuable.

- Don't try to please everybody, but try to please as many people as you can.

- Some people will not like you. Some will not like your face, but there's not a lot you can do about that. Some won't like the tone of voice you use, your manner, the language you use. You can do a lot about that.

- For example, you approach a man. Gruffly you say "I'm not satisfied with the way you are obeying the Fisheries Act". Or, "What the hell are you up to?". You may think that's the proper way, but is it? And it's not always what you say, but the tone you use when saying it. Try going softly instead; it will make a world of difference. When you get to know somebody better, then you can perhaps take liberties, but don't do this with a stranger.

- You people are the Department's front-line men. Can you turn on the charm and adopt a stern attitude alternately, depending on the person you are dealing with? Can you control your temper when somebody irritates you? Or perhaps you are

naturally bad-tempered! Many of you men are technically qualified. But do you really believe that with the highest qualifications you can succeed in life if you can't get on with people? You may be the backbone of the Department, the best qualified of all, but although you may not all the time be saying "I'm a wonderful fellow," if your manner suggests that you know you are, you are just a thickhead! People just won't wear that sort of thing. You may be the most knowledgeable, the most efficient officer who ever worked here, but where is that going to get you if everybody hates your guts?

* A man can change his basic nature. You older men are not the incautious, wildly enthusiastic types you were in your youth. Your nature has changed. This change can be speeded up.

* The moment at which you learn to control yourself is the very beginning of understanding.

* Most of the problems facing you are conflicts with people, and if you can learn to influence people, and show your best face to people, you will be judged to be more effective and command greater respect. When you have respect, you've gone most of the way to winning the battle.

* When you, in your official capacity, come up against people, it is you who should determine their conduct, not let them determine yours. If you become emotional when challenging a fisherman, and use angry words, believe me you will not be able afterwards to remember what was said either by yourself or by anyone else.

* People would rather talk than listen. If you have the capacity to encourage other people to talk and shut up yourself you will be surprised at what you will learn.

* Don't crawl to your superiors - don't make it clear to your juniors that they <u>are</u> juniors.

* You always have the whip, the other fellow knows it, therefore you don't have to use it.

* Never threaten prosecution: never threaten. Threats make people mad. Always try to make

the other fellow save face: nothing is so irritating, aggravating and annoying as losing face.

At the conclusion of Mr. Ende's thought-provoking, challenging and stimulating address, Mr. Shugg moved a vote of thanks which was carried by acclamation.

Resolutions

By resolution, Conference adopted the following recommendations in relation to items placed on the agenda by officers -

1. That amateur net-fishermen be prohibited from taking more than 2 gallons of prawns daily.

2. That the Department consider the banning of fish traps at the Abrolhos.

3. That the Department's policy of allowing fishermen to hold unbaited craypots at the Abrolhos prior to the opening of the season be reconsidered.

4. That it is desirable to alter the opening date of the Abrolhos crayfishing season from March 1 to March 15.

5. That the Department be asked to seek a legal opinion whether a prosecution could succeed for possession of undersize crayfish if the carapace only were available.

6. That the Department be requested to look into the question of the transport of craytails suspected of having been processed illegally at sea.

7. That the Department be asked to notify all district inspectors of the names of all persons to whom a license has been refused by any inspector.

8. That the Director be requested to issue specific instructions concerning the disposal by officers of seized fish.

9. That the Director be asked to convene regular meetings of branch heads.

10. That the editor of the Monthly Service Bulletin set out for the information of all officers, as simply and unequivocally as possible, such details of the Public Service Allowances Agreement as are applicable to the staff of the Fisheries Department.

11. That the appointment of additional cadets, especially in the Fauna Protection Branch, be considered, and that departmental training courses be introduced.

Addresses and reports were given by the Supervising Inspector (Mr. Bramley), the Chief Clerk (Mr. Saville), the Senior Research Officer (Mr. Bowen) and Research Officer (Mr. Slack-Smith), the Fauna Protection Officer (Mr. Shugg) and the Director (Mr. Fraser).

FISHERIES FIELD OFFICERS' ASSOCIATION REQUESTS

The executive officers of the Fisheries Field Officers Association (Messrs. S.W. Bowler, Chairman, J.E. Munro, Vice-Chairman, and J.S. Simpson, Hon.Secretary) waited on the Director recently and brought forward for discussion a number of matters which had exercised the minds of members of the field staff. The Director subsequently discussed the various questions at a meeting of departmental branch heads.

The following is an outline of the subjects introduced at the interview, and the Director's decisions. They have been conveyed verbally to Mr. Bowler -

(1) Request: Although approval was given some years ago for the provision of sponge rubber mattresses in all departmental vessels, there have been cases recently of kapok mattresses being supplied. These are far less satisfactory, it was said, and it was asked that rubber mattresses be furnished in all cases.

Decision: Rubber mattresses will in future be supplied. Kapok mattresses at present in

use will not be replaced until they become unserviceable.

(2) Request: That when junior officers use private motor vehicles on official business, mileage rates be paid in accordance with the Allowances Agreement.

Decision: Junior officers will be paid mileage rates only if the use of a private vehicle is approved beforehand by the junior's immediate superior. Such approval shall be endorsed on the mileage claim, which must be submitted to Head Office through the superior officer. Claims received without such endorsement will be rejected.

(3) Request: It is a requirement that skippers of research and patrol vessels accept responsibility for the proper mooring of their vessels, and that if bad weather eventuates at week-ends or on public holidays they visit their vessels to ensure that they are safe. In such cases, an officer should be permitted to use his private vehicle and be paid mileage.

Decision: This request was approved.

(4) Request: Officers comprising the crew of research and patrol vessels required to depart from their moorings after midnight and before 6 a.m. should be permitted to go aboard overnight and to receive the proportion of the subsistence allowance payable as if they were at sea.

Decision: This request was approved, subject to the officers concerned actually sleeping aboard.

(5) Request: That all field officers (including fauna wardens and technical officers) be allowed time off for two complete consecutive days in each week. If this cannot be taken at week-ends, two normal working days should be given.

Decision: The Public Service Commissioner having by agreement with the Civil Service Association approved the payment of certain

annual allowances to cover overtime, and as the arrangements for all officers are not identical, the Director suggested that the Field Officers' Association take the matter up with the Civil Service Association with a view to re-opening negotiations with the Commissioner, if it were deemed desirable to do so.

(6) Request: That police assistance be sought when establishing road blocks for searching vehicles for undersize fish, etc.

Decision: This is not considered necessary. Under the Fisheries Act an inspector has the power to stop and search any vehicle, and if a vehicle fails to stop, remedies exist under the Act. An inspector could perhaps supply himself, at departmental cost, with a sign identifying himself as an inspector, as do fruit inspectors employed by the Department of Agriculture.

(7) Request: That directions be issued concerning the disposal of undersize fish.

Decision: Under the regulations, fish forfeited to the Crown may be sold, destroyed, or given to a charitable institution or to indigent persons, as determined by the Director. The procedure to be adopted is now laid down, as follows - If the fish is unfit for human consumption, it must be destroyed forthwith by burial, burning or disposal through the "chute" at a processing works. If fit for human consumption it may, if it is convenient to do so and no undue cost is involved, be delivered to a hospital or institution, or to a poor family or families. If it is more convenient, the fish may be placed in cold storage for later disposal, provided no cost is involved, or it may be taken or sent to Head Office for disposal. In no case shall it be dealt with in any other way except with the specific approval of the Director or, in his absence, Mr. Saville. In all cases, the method of disposal of the seized fish must be mentioned in the report of the seizure.

FAREWELL TO CAPT. H.C.W. PIESSE

Captain H.C.W. Piesse resigned from the Department last October to join the staff of Planet Fisheries, a division of Engineer and Marine Services Pty. Ltd., as master of their prawning fleet. During a social evening at the conclusion of the recent inspectors conference both Mr. Hutchinson and Mr. Fraser complimented him on his service to the Department during his 24 years' tenure of office. Mr. Hutchinson, as a token of esteem from his former colleagues, presented him with a barometer and an easy chair. Particular note was made of his work in the research section, where he carried out extensive surveys of prawn, scallop and troll fisheries in north-western areas. The prawning industry at present being established in Shark Bay is a direct result of his efforts.

It is appropriate that a short history of his efforts in the research section be given here as a further compliment to his work.

Captain Piesse joined the research section in 1951 when he took command of the r.v. "Lancelin". In that year, and the two following years, he carried out general surveys between Fremantle and Broome. During this period various types of trawling and trolling gear were obtained or constructed and tested, making the "Lancelin" an efficient survey ship. With this gear he demonstrated the possible presence of a prawn and scallop fishery in Shark Bay, a prawn fishery in Exmouth Gulf and a troll fishery between the Abrolhos Islands and Broome.

Biological data was collected in conjunction with C.S.I.R.O., Division of Fisheries and Oceanography, from 1954 onwards, and in 1954 he carried out commercial prawning tests in Exmouth Gulf. He demonstrated beyond doubt the presence there of a commercial fishery.

In 1956, commercial quantities of prawns were found in Shark Bay grounds. The Shark Bay scallop grounds were surveyed in 1957 and commercial quantities were again found.

Captain Piesse took charge of the r.v. "Peron" in 1959, but due to engine troubles and other breakdowns little survey work was carried out until 1962 when the

present research programme was established.

We all wish him well in his new venture.

PRESENTATION TO MR. L.G. SMITH.

At the social evening which marked the conclusion of the recent staff conference, opportunity was taken to say farewell to Mr. L.G. Smith, who retired from the position of Technical Officer, Grade 1, towards the end of last year, after having served the Department faithfully and well for nearly 28 years.

Both the Minister and Director spoke of the contribution made to the Department during Mr. Smith's long association with it in the capacity of inspector and, later, technical officer. On behalf of the assembled guests, the Minister presented to Mr. Smith a transistor radio in token of the high regard in which he had always been held.

DRIFTING SEEDS.

In the March and June issues of 1961, we published notes on the identification of logs and other vegetation washed up on our shores. Some interesting details have recently come to hand on the finding of seeds of tropical plants on our southern and western beaches. A large, dark-brown, D-shaped seed about 2 inches by 1½ inches was found by Honorary Warden W.H. Horley, of Mudiarrup, on the beach at Bremer Bay, east of Albany. The seed was identified by the Curator of the State Herbarium, Mr. R.D. Royce, as that of Entada scandens, a widely distributed plant. It grows in jungles and its bean pods are three to four feet long. It is believed that they break off and float down the rivers and are carried away on currents. The seeds break away from the pods and many are washed up on distant shores. The plant is also known as the matchbox bean. The shells are extremely hard and are sometimes polished and sold as curios and jewellery.

Mr. Royce says that the recovery of these seeds have been reported from our south coast for many years. They are washed up mainly around Denmark, but

have also been found from a little to the east of Albany up to Cottesloe Beach. He added that last season quite a lot of unusual seeds or fruits were washed ashore. Entada was widespread and a number of other types were found. These included Nipa fruticans (a palm), Heritiera (a tropical plant called dungun), Carapa (commonly known as crab wood) Sapium (called the tallow tree or milkwood) and Picea, a member of the spruce family.

Professor H.N. Barber, of the University of Tasmania, to whom the latest specimens were also forwarded, says that Entada seeds are carried across the Atlantic in the Gulf Stream. He wondered whether the plant was grown here in cultivation or if it were possible that they, and the Picea, might have been carried from the northern hemisphere by natural drift. As far as is known by Mr. Royce, the only Entada grown here was from a seed which an Albany resident was able to germinate, but nothing is known of the fate of the seedling.

FAUNA NOTES

Assistant Inspector L.R. Frizzell regularly comes forward with interesting observations. Last April, for instance, he reported the sighting in Houtman Abrolhos of two male hair seals in the lagoon at Wooded Island. He also recorded a bird rarely sighted - the Spotless Crake. This species was seen, he said, at both the north and the south ends of Wooded Island. Another interesting record was that of a number of immature Little Shearwaters in the mangroves at the south end of the island. They had their full plumage but were apparently not able to fly for they hid beneath overhanging rocks on the edge of the mangroves.

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During a visit to the Perrilup district, in the Shire of Plantagenet, to witness certain vermin control trials being run by an officer of the Agriculture Protection Board, Fauna Warden S.W. Bowler had occasion to visit the property of a Mr. M. Trotter. He was staggered to hear a complaint from that gentleman that Western Magpies were damaging and eating his apples. Mr. Trotter's story was confirmed by Mr. P. Strugnell, of the Agriculture Protection Board. As some squeakers (Strepera versicolor) were seen in the vicinity it was

thought that these birds might have been taken for magpies, but both men maintained that the birds causing the trouble really were magpies.

BEHAVIOURAL AND PHYSIOLOGICAL STUDIES OF LIZARDS

For some time now, research into a phase of lizard ecology has been conducted by The Western Australian University under the direction of Dr. A.R. Main. It has comprised an investigation into the extraordinary ability of lizards to exist on massive rock outcrops, such as that at Boyagin in the Brookton district, where the surface temperature fluctuates between what is to us unbearably hot and unbearably cold. The March meeting of the Royal Society of Western Australia, held at the Western Australian Museum, after the formal business of the evening had been transacted, took the form of a symposium on the results so far obtained from this most interesting research.

With the kind permission of the Society, we reproduce below a synthesis of each speaker's remarks. While some of the terminology may well be beyond the understanding of our readers, in most cases the average reader can follow the trend of the text fairly adequately. The contributor of the general remarks was Professor W.R. Dawson, Professor of Zoology of the University of Michigan, U.S.A., who is here on a Guggenheim Grant. The next two contributors, Messrs. Paul Licht and S. Donald Bradshaw, were graduate students from Professor Dawson's University, while the third, Mr. V.N. Shoemaker, is an honours graduate of our own University.

BEHAVIOURAL AND PHYSIOLOGICAL STUDIES OF LIZARDS

General Remarks - William R. Dawson

Lizards are among the most common residents of hot, arid regions. Their success in such places depends on a complex interplay between behaviour and strictly physiological capacities. Among behavioural patterns of importance are basking and selection of favourable micro-climates, which allow the animals to achieve a surprising amount of control over their

body temperatures during activity. Physiological capacities of importance reflect a variety of adjustments to temperature which are evident both in processes within the intact animal and in the performance of individual tissues under in vitro conditions. The nature of these adjustments indicates that temperature adaptation in lizards has involved wholesale physiological modifications rather than just changes within the central nervous system.

Thermal Preferenda and Upper Lethal Body Temperatures of Some Australian Lizards

Paul Licht

Thermal preferenda of a number of lizards have been determined experimentally in a photothermal gradient which permits analysis of the temperature relations of these animals when all are afforded equal access to heat. Results obtained indicate differences in the general levels of thermal preferenda in such families as the Scincidae and the Agamidae, the former being somewhat less thermophilic than the latter. The results also establish the Gekkonidae as a family whose members are remarkably divergent in their thermal relations. Some geckos lack well-marked thermal preferenda, whereas other have very distinct ones. Of particular interest is the fact that the preferenda of these latter animals, which are often at a surprisingly high level, appear more closely related to the temperatures within shelters utilized during the day than to body temperatures employed for activity at night. This situation contrasts with that for most lizards in which the thermal preferendum is related to body temperatures maintained during activity in nature.

The upper lethal body temperatures of various species correlate in a general way with the level of the thermal preferendum. However, in at least one genus (Amphibolurus) whose members have rather uniform preferenda, some significant differences in heat resistance are demonstrable. These correlate well with the ecology of the species concerned.

Field Behaviour and Physiology of Amphibolurus ornatus

S. Donald Bradshaw

From field studies it is known that the small dragon lizard Amphibolurus ornatus is completely restricted to large granite outcrops where it is confronted with two problems: intense heat and the absence of surface water during the summer months. This animal copes with these problems by a combination of behavioural avoidance of extreme conditions and appropriate physiological tolerances. The thermoregulation which it achieves by behavioural means prevents body temperature from exceeding 40°C., even though the temperature of the rock surfaces within its habitat may reach 75°C. Loss of water from the respiratory tract and the skin is slow and excretion is curtailed during summer, so the water obtained in a diet of insects is sufficient for maintenance of water balance between the widely spaced summer rains.

Aspects of Kidney Function in Lizards

Vaughan H. Shoemaker

Relatively few studies of the functional characteristics of the kidneys of lizards have been made, and virtually nothing is known of the effects of temperature on these organs. Accordingly, an investigation of how temperature influences the capacities of several species of lizards for eliminating experimentally applied water loads has been undertaken. In the lizards studied (Amphibolurus barbatus, Gymnodactylus milii and Tiliqua rugosa) the rate of excretion of a water load equivalent to 10% of body weight varies directly with temperature between 14° and approximately 35°C. This appears largely due to the increasing rate of glomerular filtration which develops with increasing temperature. The ability of the animals to resorb sodium from the glomerular filtrate appears directly related to temperature between 14°C. and some higher temperature which varies with the species. Beyond this higher temperature, an inverse relation develops. The effect of temperature on sodium resorption appears independent of that on filtration rate. The

significance of the former effect is that it indicates that conservation of sodium during elimination of water loads is temperature dependent.

DEPARTMENTAL VIEWS ON DIVING FOR CRAYFISH.

Last February, the Secretary of the Geraldton Professional Fishermen's Association (Mr. F.J. Hacket) forwarded to the Department a request that the Minister prohibit the taking of crayfish for commercial purposes by means of diving and extracting them by hand from their places of refuge. The Association thought, Mr. Hacket explained, that this method would lead to the depletion of the grounds by taking all the "pot-shy" crays. It also pointed out that there was an unduly high mortality rate of hand-caught crayfish in holding pots.

The Association's request has been very carefully considered for we appreciated that it represented the considered views of many experienced fishermen. It has been decided, however, not to prohibit this means of capture at the present time for the following reasons, most of which have been formed from observations by our own research staff while diving on the grounds -

1. At the start of the season many crays are not ready to "crawl" and are not taken by pots at that stage. Later on, though, when their shells harden, many do enter pots and so are lost to the fishery.

2. High mortality rates are not restricted to hand-caught fish. Instances of losses from pot-caught crays are known to have been as high as two bags a night. Crays which have just started to crawl are also in a very weak condition.

3. Although pots can be set by hand among large concentrations of fish and a higher catch-per-pot obtained, far fewer pots can be set by this method, which reduces the time/effort efficiency rating to a figure comparable with normal potting.

4. Crayfish frightened from their hiding places by divers are not necessarily lost to the fishery as they simply hide elsewhere on the grounds.

The Association has been assured that the Department will keep the matter under constant review and, if at any time in the future fresh evidence suggests that our decision was wrong, appropriate action will be taken.

Naming of P.V. VLAMING

THE MINISTER FOR FISHERIES USHERING GUESTS ABOARD FOR CEREMONY

NOTE . . .

The *Vlaming*, the latest of our patrol vessels, was christened by Mrs. Ross Hutchinson at the department's Victoria Park boat-shed on December 20 last. Powered by twin G.M. diesels, each of 90 h.p., *Vlaming* was built by Back Bros. & Co., of North Fremantle, to designs prepared by the Naval Architectural Division of the Maritime Services Board of New South Wales. She is a 40-ft. raised-deck, cabin launch with a self-baling cockpit and is fitted with 2-way radio, toilet, bath and shower. Her skipper is Inspector F. J. Campbell and Assistant Inspector A. H. Ullrich is crew member.

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CLEARING HOUSE

FAIR GAME

An hilarious mixup around at the Victorian Fisheries and Game Department throws new light on the Victorian way of life in 1960. An officer from the Department was alerted to collect three large black cormorants sent in from the country for research purposes. They were arriving by fish transport and would be off-loaded at the Fish Market. When he arrived he was somewhat staggered to discover that they had been sold.

A second man sent out to make enquiries traced them to a Greek cafe proprietor and set off in pursuit.

In the meantime, three large black cormorants were discovered in the market's office, where they had been left by the truck driver.

The Department had no sooner taken possession than their second officer returned, glassy-eyed after his struggle with the Greek cafe man, bearing not three but five very small birds. The story he told was that the safe man had bought them for 5/- each under the impression that they were ducks - and ducks they would have been on the menu!

The matter was happily settled when the Market declared all costs off. The lesson to be learnt from this story, declares a Department spokesman, is to be careful when you order poultry in cafes.

Cormorants are a delectable table bird. Many years ago, in a less sophisticated era, they used to turn up in the Melbourne fish markets with their beaks trimmed and were sold under the name Rock Duck!

A.F., Melbourne.

(Better Business October, 1960)

Note: This item was included at the specific request of Inspector F.J. Campbell who thinks it is still funny. You may note the year of publication - 1960 - and recall that Scots have a reputation for not seeing the point of joke until it has been long dead! (Ed.)

EVALUATION NEEDED OF EFFECTIVENESS OF ARTIFICIAL REEFS TO ATTRACT MARINE FISH

For over ten years, sport fishing promotional groups have been dumping everything from concrete-filled beer cases to old car bodies and streetcars into marine waters of the United States to create artificial reefs.

A small reef in California is built of 20 car bodies; an Alabama reef utilizes a scuttled 5,000-ton drydock; a third is composed partly of artificial rocks from a movie set; and others use building rubble, sunken boats, or concrete pilings. Plans call for a New Jersey reef using 7,000 concrete-filled car tires.

The purpose behind these underwater marine junk yards is to create artificial fish habitat where none existed before, and a number have been reported to be successful. The surprising fact is that, until early in 1961, there had been no scientific evaluations of their true worth.

The Maryland Department of Research and Education and the Magothy River Association have cooperated in a test of one of the many possible types of artificial reefs and in this case it failed to produce better fishing.

The study was conducted near the mouth of the Magothy River in Maryland from May through October 1960, using a paid angler to fish the experimental areas west of Gibson Island. The artificial reef was created by planting 700 bushels of oyster shells on a natural soft, muddy bottom and fishing here was compared to a nearby area on which no shells were planted.

In the course of the six-months experiment, 208 fishing trips, totalling 403 fishing hours, were completed with 906 fish caught over the reef and 1,166 fish caught over natural bottom.

The fisheries biologist who supervised the study tested fishing success against the popular Solunar Theory promoted by a nationally known outdoor writer. He found that the Solunar Tables were not successful in predicting the best fishing periods.

Commenting on the results of the study, the Director of the Department observed that creation of artificial reefs is quite costly and that thorough and careful research should precede expensive installations. He further stated that there are at least half a dozen ways that some of these reefs may affect fish and fishing, and that knowledge of the basic principles through research can help enormously in providing the best possible fishing at the lowest possible cost.

Although the reef did not improve the total catch of fish, the study produced other discoveries of interest to tidewater fishermen. Spot, pumpkinseeds, and toadfish were easier to catch over the reef, while white perch and brown bullheads favoured natural bottom. More crabs were taken over the shell reef, and tide conditions made little difference in fishing success in either area. Best fishing came in the middle of the day, the best month for fishing was October, while June and July were the poorest. The best of the baits tested in the study was peeler crabs, with bloodworms, nightcrawlers, and clams in second place. Cut bait and shrimp were found to be poorest. (Maryland Department of Research and Education, Inland Resources Division, Annapolis, Md.)

(Commercial Fisheries Review, Washington,D.C., Jan. 1963)

NORWAY WRITES OFF WHALING

Whaling as a financial source has now been completely exhausted as far as Norway is concerned, said Mr. Anders Jahre, president of the Kosmos Company last week.

He added: "Time will show what is going to happen to whaling, but it is just as well to be prepared to write it off as a business proposition. The main reason is diminishing stock because of indiscriminate catching."

(The Fishing News, London, March 15 1963)

DEVELOPMENTS IN WORLD'S FISHERIES

Forecast by Dr. D.B. Finn

The control of stocks of commercially-valuable sea fish, the transplanting of fish from the northern to the southern hemisphere, and a forecast of at least doubling the present harvest from the sea in the coming two or three decades, were some of the prophecies made in a recent speech by Dr. D.B. Finn, CMG, FRSC, Director of Fisheries Division of the Food and Agriculture Organization of the United Nations.

After tracing the changes in fisheries during the past 40 years at the annual dinner of the Newfoundland Board of Trade, Dr. Finn turned to the question: Where are fisheries going?

"One thing that is basic to such consideration is this: Fishing is still a hunting operation. Beyond the territorial waters, whatever they may be, it is first come, first served, and devil take the hindmost.

"I am confident that some day this will change; there are already signs of it coming. For example, the 'abstention principle' which is a feature of the North Pacific Fisheries Treaty. But it is my opinion that many years will pass before humankind will be able to achieve such an equity.

"In the meantime it will be up to nations, while doing their utmost to bring about a more reasonable regime, to adjust themselves to things as they are and to keep up with changes."

On the catching side, Dr. Finn said there will be continued improvement in the efficiencies of boats and gear and fish-finding operations.

The use of very high frequencies in echo sounders and asdic are already making it possible to locate a single fish half a mile away. Moreover, it is possible to identify the kind of fish giving the echo.

"The time may come when certain species of marine fish will be attracted by some means - for example by light, sound or fenced in by electric impulses or screens of air bubbles - and pumped from the sea",

he opined. "Actually this is already being done experimentally by the Soviets.

Electric Impulses

"The Germans are doing considerable work with electric impulses. This works quite well in fresh water, but much more will have to be discovered before the technique can be made economical in sea water.

"New lightweight, non-deteriorating synthetic fibres will be used in knotless nets. The introduction of transducers into trawls will make trawling a much less chancy operation.

"The continued study of fish behaviour in the ocean will make them easier to catch. Much work in this field is being done by the USSR, Japan, Canada and the USA."

Design of new hull shapes will increase stability, safety and propulsion efficiencies and new mechanised hauling, such as the powered block, will make it quicker and easier to haul the gear.

Dr. Finn feels that the capital employed in floating equipment will tend to move upwards and fisheries are moving away from the "cottage" to the capitalised industry stage.

Fish culture is another realm of progress as yet barely started. Coastal oyster culture is well-known in many lands, and recently FAO, through the Expanded Programme of Technical Assistance, has started pearl shell culture in the Red Sea.

Referring to examples in the Far East and Australia of the culturing of the oyster which yields pearls, Dr. Finn said: "But I am not so much concerned with this as with the really exciting work which has been going on, for example, at Lowestoft, on the plaice.

High Mortality

"The natural mortality of the young larvae plaice is so great in the first few weeks that less than one thousandth of one per cent survive. After this period the chances of survival are better.

"The English biologists thought that if they could protect the young larvae for from six to eight weeks and get them over the initial critical period, it would greatly increase the yield. After many trials and many failures, it seems that they have succeeded. Survival can now be increased to well over 30 per cent and possibly more.

"It does not take much imagination to see what this might lead to: plaice hatchery on an inlet of the sea, an inlet which could be closed at will; the nurturing of the young fish initially in the hatchery and subsequently in the inlet itself, the waters of which might be fertilised; the subsequent transplantation of the young fish to the natural banks.

"Biologists are of the opinion that this might at least quadruple the yield of the fishery if proper agreements could be made among the different countries fishing."

Another example he cited is the recent success of Dr. Shao Wen Ling, under FAO Technical Assistance, in breeding the giant freshwater prawn in Malaya. Yet another development is the transplantation of fish, an example of which is the recent Soviet success in transplanting pink salmon from Siberia to the Baltic which may result in an entirely new fishery.

Permanent Bar

Many of the fish in the Northern Hemisphere are permanently barred from the Southern Hemisphere by the belt of high temperature equatorial waters, outlined Dr. Finn. Some of these might be transplanted with the probable result of increased production.

An example of this is the transfer of trout and salmon from the Northern Hemisphere to New Zealand. The ample presence of food has led to phenomenal growth in the trout, and 30 or 40 lb. trout are not unusual.

"Another thing which I am fairly certain will take place is that man will eat many more kinds of fish than he does now," he continued.

"In the Northern Hemisphere the kinds of fish

consumed by man are relatively few. There are many kinds which he does not eat. Often a change in the name of a fish will bring about a demand for it. I think in the future man will eat them without knowing what he eats.

"This will come about by introducing changes in product form. For example, many countries have followed the Japanese lead in the manufacture of fish sausages. The Japanese have over a hundred ways of diversifying their products".

Of aquatic plants, Dr. Finn believes there will also be an increased usage, perhaps not so much in direct consumption as in food producing industries and in agriculture. There are millions of tons of aquatic plants available.

Dr. Finn continued: "The obvious support for believing in increased yields is that certain seas are abundant in fish that are not being caught. Take the Arabian Sea and Indian Ocean for example. There is no doubt that the fish are there. But, as far as we can find out, there is no attempt to fish these waters. The result is a huge, untapped resource.

"All this adds up to the increased production of sea fish ... Within the next 20 or 30 years I think that harvests from the sea will be at least doubled."

In 1961 about one quarter of the world catch of more than 40 million tons of fish went into fishmeal.

A new idea is to manufacture fishmeal from fresh material under sanitary and hygienic conditions to prepare a wholesome protein concentrate for human consumption. Africa and India and South Asian countries are examples where this material is used in fish soups and curries, etc., and supplements predominant carbohydrate diets.

(The Fishing News, London, March 15, 1963)

SOUTHERN ENDEAVOUR

- the final account

The Chairman of the Southern Trawling Co.

formed in Australia for the purpose of determing whether fish resources in the Great Australian Bight were sufficient to support a viable industry, has recently made a report on the company's operations from March 1960 until it disposed of its assets in November 1961.

The report gives a full account of the operations carried out with Southern Endeavour (Ex. Princess Elizabeth of Hull); of experience gained in marketing her catches; of the financial results of her operations; and includes comments on the factors which contributed to the company's losses. It may be summarised as follows:

OPERATIONS

Fishing Experience

Between March 1 1960 and November 17 1961, the trawler carried out 31 trips to the fishing area in the Great Australian Bight, which occupied 405 days. After allowing for the time taken in getting to and from the areas, and bad weather, the trawler was able to conduct fishing operations on 255 days, during which it worked for 3,906 hours and made 1,056 hauls.

The total landed catch for the entire period of operations was 1,809,647 lb. (808 tons) of which 120,231 lb. (54 tons) were unsuitable for sale, leaving a balance of 1,689,416 lb. (754 tons) of fish which was sold for £83,123.

Marketing Experience

The bulk of the trawler's catches was sold as wet fish, although in the latter stages of operations experiments were made in disposing of significant quantities as frozen fillets.

Principle outlet was the Sydney fish market, with lesser quantities being sold on the Melbourne and Adelaide markets, and at the wharf at Port Adelaide when the trawler unloaded.

Although the quality caught was fully up to expectations, some 25 per cent of the catches had little or no market acceptance, and even for the better known species such as Red Snapper, Flathead and Morwong, prices received were disappointing.

A major adverse cost factor with which the company had to contend in marketing its catches was the high cost of transporting the fish, in refrigerated trucks, to the Sydney and Melbourne markets. At the concluding stages of operations, marketing costs had been reduced to 5½d. per lb. against an average of 7d. per lb. for the full period.

Financial Results

The company incurred the following costs in conducting its operations for the fishing period March 1, 1960 to November 17, 1961: Ship's operating expenses (including depreciation and interest) £160,349, marketing expenses £47,097, administrative expenses £24,482, total £231,928 (per lb. of fish sold) 2/9; against which it earned: From the sale of fish £83,123, miscellaneous revenue £2,456, £85,579 (1/-); net loss £146,349 (1/9d.).

DISPOSAL OF ASSETS

At the Government's direction, the company took steps to offer its assets for sale. The directors subsequently obtained an offer of £70,000 from certain Australian fishing interests, which offer was accepted by the Government.

Losses incurred as a consequence of the sale of the company's assets amounted to £100,680, consisting of: Expenses incurred, pending completion of sale £22,074. Loss on realisation: Book value of assets £148,606; sale proceeds £70,000, £78,606, total £100,680.

(The Fishing News, London, March 22, 1963)

CRAYFISH WAR IS DANGEROUSLY POISED.

Brazil and France Problems

Despite the friendly nature, on the surface, of the negotiations now going on between Brazil and France in what has been called the Crayfish War - arguments over the proposed extension of the Brazilian fishing limits to include the whole of the ocean shelf - massive and threatening action has been taken by the

South American republic to safeguard her fishermen.

Twelve warships have taken up stations around the coasts, and 80 aeroplanes are held in readiness in airfields near the ports.

On the French side, the much heavier armed navy vessel, the Paul-Goffeney, has been sent to relieve the fisheries protection vessel Tartu, charged with the active protection of the six "langoustiers" currently fishing in those waters.

There, the continental shelf extends for about 100km. - more than 60 miles - from the coastline and this, the French claim, cannot fairly be regarded as territorial waters.

The Brazilian newspapers have taken an active part in this campaign with enormous headlines in which the French fishermen are denounced as "Imperial Pirates" and "Colony Exploiters" and the whole population has been raised to a pitch where if a veritable shooting war broke out, nobody would be surprised.

Plastic bombs have already been thrown at some of the French business houses, and others have been defaced with huge notices painted on them: "The Crayfish are Ours!"

At Recife the French consul, M.Morin, who last year was honoured by the city council has now been openly accused of "espionage" on behalf of French fishing interests, and there have been extensive anti-French manifestations by student groups.

Without any question, it is the presence of the fisheries protection vessel which set off this rumpus and has ruptured the long-standing friendship between the two countries.

It is pointed out in Rio de Janeiro that American fishermen are continuing their work without any armed support while Japanese tunnyfishers, operating from Brazilian ports and by companies formed in that country, but with 100 per cent Japanese capital, are also fishing without hindrance.

The fact is that French fishermen have only recently commenced to fish in those waters, following

the virtual end to crayfish fishing around Mauritius - and due, it is said, to severe over-fishing by the French.

This has given rise to a very real fear on the part of the Brazilian fishermen that if they do not stand firm their livelihood, too, will be gone.

(The Fishing News London, March 22, 1963)

CANADA BUILDS 76' BARGE FOR FISHERIES RESEARCH

Studies of fish populations will be conducted by a scientific staff aboard a 76' steel barge being built at the New Westminster shipyard of John Manly, Ltd., for the Fisheries Research Board of Canada.

The barge will be a floating laboratory, to be towed to various points along the British Columbia coast for a wide variety of fisheries investigations. The craft will have accommodation for an operating crew of 14 men for extended periods.

Tentatively, it is planned to use the barge during the coming season for observation of young salmon as they emerge from fresh water into the ocean. Ocean survival has become one of the most perplexing and serious problems confronting the B.C. salmon industry.

Hull and deckside of the barge will be built entirely of steel, while some other areas will be of wood.

(Pacific Fisherman, San Francisco, March, 1963)

The village blacksmith had just hired a new assistant.

"Listen carefully and I'm sure you'll do all right," he said to the nervous lad. "Now - I'll take this horseshoe from the fire and place it on the anvil. When I nod my head you hit it with this big hammer."

The assistant did just that. Now HE'S the village blacksmith.

AIR FREIGHTING FRESH SALMON BIG BUSINESS

Volume of fresh-caught spring salmon shipped from Vancouver to Europe by air freight is expected to double this year to 100,000 pounds. Unhampered by tariffs, this burgeoning new market is limited only by the availability of suitable fish here.

By Bruce Young

B.C. spring salmon is now being featured in the swank restaurants of Paris and it's every bit as fresh as that sold in Vancouver supermarkets.

The UNFROZEN, troll-caught fish are flown into Paris and other European centres in 16 hours by speedy jet airliners.

The business started three years ago and has grown at the rate of 30 per cent annually. Optimistic forecasts are that the business will double in 1963 to raise overseas shipments of fresh spring salmon to 100,000 pounds.

The growing business with Europe comes as an addition to the longer-established air freighting of B.C. fish products to the rest of Canada and the U.S. The North American business is older because shorter distances involved enabled markets to be served by slower propeller aircraft.

Apart from the fast jets, the fresh fish market in Europe has been growing because well-heeled gourmets have proven willing to pay premium prices for the delivery. Virtually all the exported fish are sold through wholesalers to hotels and restaurants.

Cost of medium red springs in Europe is about £1.55 to £1.60 per pound. The price includes air freight at 47c a pound and the wholesaler's normal markup.

Strangely the United Kingdom has not as yet been a big customer for B.C. salmon. However, fisheries and airlines officials, have detected an increasing British interest in the product and are confidently predicting that sales to Britain will skyrocket in the years ahead.

(Western Fisheries, Vancouver, January, 1963)