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DEPARTMENT OF FISHERIES AND FAUNA
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DEPARTMENT OF FISHERIES AND FAUNA

MONTHLY SERVICE BULLETIN

MEET OUR NEW DIRECTOR

MR. B.K. BOWEN
DIRECTOR
DEPARTMENT OF FISHERIES AND FAUNA

Mr. Bernard K. Bowen, B.Sc., has been appointed Director of Fisheries and Fauna for Western Australia in succession to Mr. A. J. Fraser. Mr. Fraser retired on January 2 on attaining the age of 65 years.

Mr. Bowen, who is 37 years of age, graduated Bachelor of Science at the University of Western Australia in 1951. Previously he had been a pupil of Wesley College, Perth, where he represented his college in football, cricket and tennis.

Mr. Bowen joined the Fisheries Department immediately after leaving University and became Senior Research Officer in 1961.

He was one of two Australians who in 1955 attended a course in fish culture at Bogor, Indonesia, held under the auspices of the Indo-Pacific Fisheries Council. In 1959 he spent a month in New Zealand studying different aspects of fisheries.

In 1966 Mr. Bowen undertook a 10-week course at the Australian Administrative Staff College at Mount Macedon, Victoria, and last July the Government sent him overseas to study some of the world's most important fisheries. In the course of a 4½ months' tour he went to Japan, the United States (including Hawaii), Canada, Britain, Norway, West Germany, France, Italy and South Africa, and visited many fishing ports, markets, canning and reduction plants, administrative offices and scientific and technological laboratories. Whilst in Europe he attended international technical meetings on fisheries at Hamburg and Bergen.

Mr. Bowen is married with four daughters.

STAFF NOTES

All members of the staff extend their congratulations to Mr. B.K. Bowen on his appointment as Director, Department of Fisheries and Fauna. Mr. Bowen in succeeding Mr. A. J. Fraser becomes the fourth Permanent Head of this Department since it was founded in the late 1890's.

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The fishing industry of Western Australia is on the brink of a new era of research development and expansion which no doubt offers an exciting challenge to Mr. Bowen.

The administration of the recently proclaimed Fauna Conservation Act (previously the Fauna Protection Act); the chairmanship of the Western Australian Wildlife Authority; the development of the prawn fishery; the possibility of a Northern tuna fishery; the research programmes to be undertaken at the new Marine Laboratories being built at Waterman --- all these new ventures added to the present responsibilities of the office of Director will ensure that though the future may be hard - and sometimes harassing- it will be rewarding and fruitful.

We all wish the new Director every success and assure him of our complete support and enthusiasm during the years ahead.

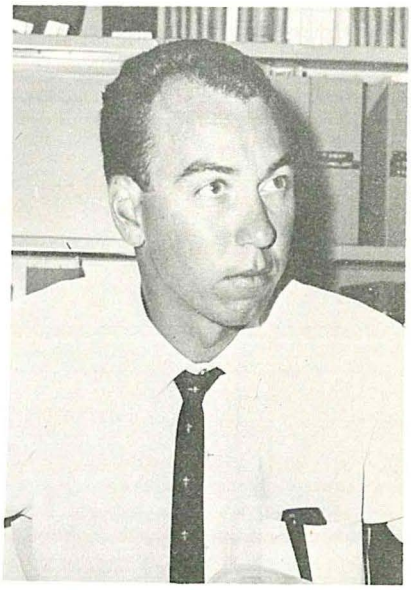
FAUNA BRANCH PERSONNEL MOVE TO KOONWARRA HOUSE

During December the Department's Senior Fauna Warden, Mr. S.W. Bowler, the Warden for the Metropolitan area, Mr. A.R. Marshall and Cadet Fauna Warden Mr. R. Emiliani moved into their new offices at Koonwarra House, 233 Adelaide Terrace, Perth. Mr. J.J. Mott, Wildlife Research Officer, will also move into an office at Koonwarra House.

In future the Wildlife Authority, the Crayfish Industry Advisory Committee, the General Fisheries Advisory Committee, and other Departmental committees will hold their meetings at Koonwarra House.

The telephone number for Koonwarra House is 23 4312.

J.W. PENN GRADUATES

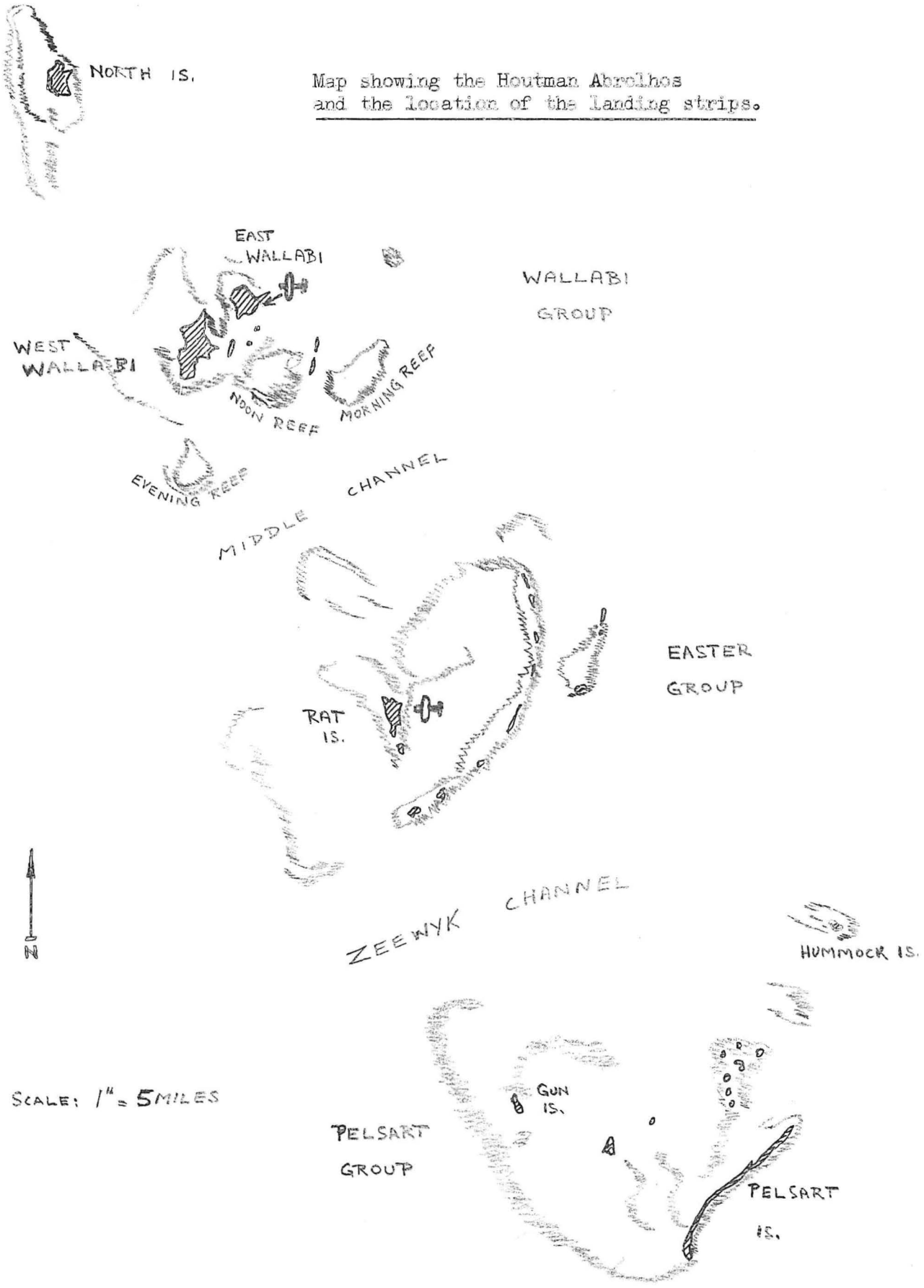


Congratulations are extended to Mr. J.W. Penn, fisheries cadet research officer, who successfully completed his Bachelor of Science Degree at the University of Western Australia.

Mr. Penn commenced his studies in 1965, and is the second to graduate as a fisheries research officer under the Departmental Cadet training scheme. The only other officer at present studying under this scheme is Mr. D.I. Heald, who completed his first year in 1967.

OVERTIME ALLOWANCE FOR WARDENS INCREASED

As a result of representation by the Civil Service Association, the Public Service Commissioner has given further consideration to the overtime allowance determined for Wardens. In view of the submission made it has been decided that an additional allowance of $90 per annum should be paid for the period September 1, 1965 to May 5, 1967.



Map showing the Houtman Abrolhos and the location of the landing strips.

MINISTER FOR FISHERIES AND FAUNA APPROVES APPLICATION FOR ADDITIONAL LANDING STRIP IN HOUTMAN ABROLHOS

An application by Geraldton Air Charter Pty. Ltd., to construct a landing strip on Rat Island in the Easter group has been approved by the Minister for Fisheries and Fauna. The Minister in reaching his decision considered that the natural resources of this island have been badly despoliated by various forms of use including guano mining and the provision of crayfishing facilities.

Rat Island contained what has been described as the biggest bird nesting colony in the southern hemisphere. Before the turn of the century, one ornithologist estimated that there were more than three million birds nesting there, more than twice as many as he found on Pelsart Island. Man's use of Rat Island has undoubtedly caused the loss of surface soil which made the island useless for the birds. Although some nesting lingered on until the 1930's, virtually none occurs there now.

In its application, the company also sought permission to establish additional landing strips on Pelsart and North Island, but was refused.

The purpose of Pelsart Island (an A class reserve) includes, "Fauna Conservation" and the construction of a strip on Pelsart could not be anything but contrary to this purpose. It has been estimated that well in excess of one million birds nest there, including the rare Red-tailed Tropic Bird. A considerable proportion of the vast flights are Mutton Birds which dig burrows in which to nest. They are persistent in their nesting habits, and it would be out of the question to build anything but sealed runways over their nesting grounds to provide a safe landing strip. The hundred of thousands of terns and other birds which nest over the length of the island, would also be a major hazard to any aircraft operating there. Furthermore, and primarily we don't want Pelsart to become another Rat Island.

In the case of North Island there are scientifically interesting invertebrates in the small salt lake which should be preserved if possible. A great deal of trouble might be caused by erosion and shifting sand dunes if even a strip of the vegetation cover at present consolidating the soil was to be destroyed. There are already shifting sand dunes on part of North Island and additional ones could cover and kill more vegetation and could conceivably overwhelm the fishermen's huts there. This island is richer in flora than other islands, and harbours some fauna well worth preserving.

Considering the rarity of emergencies in the past, the needs of the Northern and Southern Groups, could be reasonably well met from a landing strip on Rat Island and the previously approved application for a strip on East Wallaby Island.

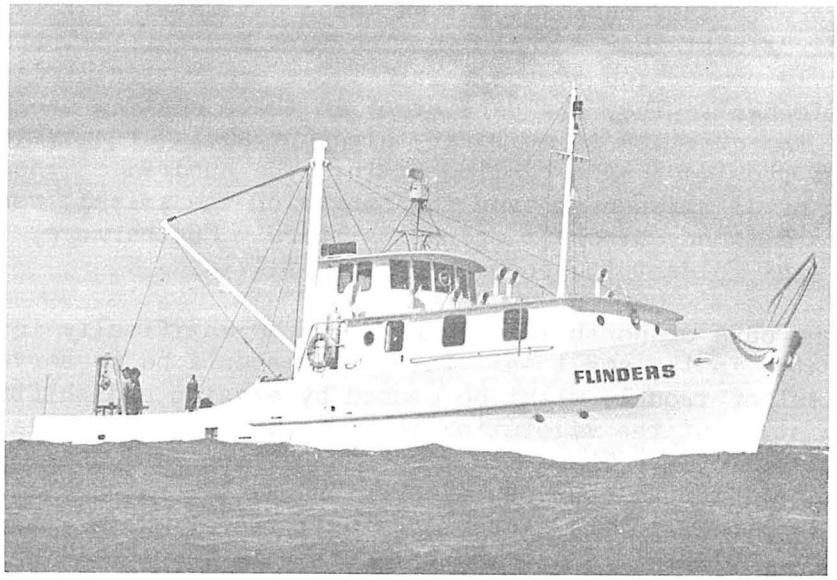
"FLINDERS" RETURNS FROM SUCCESSFUL MAIDEN VOYAGE

The Department's new research vessel returned from its first voyage to the Abrolhos Islands in December. The round trip from Fremantle took ten days, five of which were spent tagging crayfish in the Dongara and Abrolhos area as part of the overall crayfish research programme.

One of the most spectacular pre-season tagging programmes was completed in the Abrolhos resulting from an unusual abundance of crayfish.

The vessel's skipper Mr. C.J. Seabrook, his crew, and research personnel on board, all considered that the facilities left nothing to be desired. On its run from Dongara to the Abrolhos the "Flinders" averaged a speed of 9.3. knots. While on its homeward journey from the Abrolhos to Fremantle it maintained an average speed of 8.25 knots sailing into the teeth of a strong 'nor'-wester'. Mr. Seabrook said that the "Flinders" went kindly in all weather conditions experienced and beside one or two minor teething troubles all was well.

Fauna observations made during the trip included a comment on the abundance and variety of water birds in the Abrolhos Islands and of two seals on Sandy Island.



R.V. Flinders at sea.

A HIGH SPIRITED MESSAGE!

Mr. K. Godfrey was aboard the Japanese vessel "Suruga Maru" while it was anchored just off Doubtful Island, near Bremer Bay on October 25, 1965. After a bottle of scotch became of no further use, Kitch decided to enclose a note and send it on its way.

Now two years later the bottle was found some four miles east of Esperance near Rositer's Beach, by a Mr. Glen Fry of Esperance. The note was none the worse after travelling some 150 odd miles as the crow flies.

WHERE ARE THE SKULLS?

On August 1, 1967 Senior Inspector N.E. McLaughlan sent a parcel of marsupial skulls and bones from Geraldton to the Fauna Officer. The parcel was collected at the airport by the Government delivery service on August 2, and has not been seen since.

The content of the parcel was material collected by Mr. McLaughlan, of a probably previously unrecorded form of kangaroo occuring on Simpson Island situated in Exmouth Gulf.

It seems extraordinary that it could have disappeared - so please chook in all obscure corners, and if you find it, then make no bones about it and take it direct to the Fauna Officer.

FISHING ROUND THE WORLD EAST GERMANY

New Grounds Found

As a result of the finding of new grounds off the coasts of N. America and W. Africa by Soviet and Polish research vessels, the E. German fish catch is expected to take an even sharper rise. The capacity of fish canneries at Rostock and Sassnitz has been increased to meet this.

Efforts have also been made to increase fish consumption by means of propaganda and cookery demonstrations, but without success. Fish consumption per head of population per annum has risen only from 8.7 to 9.1 kg. in four years. However, it is hoped that the new varieties which will result from working the new grounds will stimulate sales.

World Fishing, England September, 1967

THE SCALES OF FISH

The following article by David Gunster published in the September 1967 issue of "Wildlife Review" (Canada) is reprinted, as it should prove of value and interest to all readers. Departmental photographs are included, showing fish scales as viewed through a low-power microscope.

The scales of a fish are the present-day remnants of the heavy, enameled "armor-plate" which the earliest known fossil fish wore. As in the course of their evolution fish became more active and speedier, this continuous mail-like covering was less necessary and had to become more flexible. This was accomplished by breaking it up into small sections. In time, fish also developed more powerful teeth and jaws, so that the need for thick external protection grew less. Even so, a few species with these heavy scales still exist, like the sturgeon and the alligator garfish, whose scales are horny enough to blunt an axe.

Nevertheless, the chief function of fish scales is still protection, which is noticeably evident in those fish like the porcupine fish and the trunk fish which have stiff or spiny points to their scales. And at least one fish, the sturgeon fish, actually has defensive scales modified into the deadly offensive weapons of its two tail scales extended like sharp knives sheathed in skin but ready to flick into action when necessary. All fish have a layer of skin over the scales, usually thin and transparent so as to be almost invisible, though occasionally, as with the brook trout, it is fairly heavy and makes the scales hard to see. In the eels the skin is so dense that the scales are entirely hidden. Only rarely is a fish's skin unprotected by scales, and then it is usually ossified, as in the sea horse. The catfish family, uncommon in Europe, has no scales or ossified skin.

All fish scales are actually dead material, being the chemical products of the skin's activity. They may be formed in either of two ways. In the sharks and rays the skin is blown out into minute papillae, the outer layer becoming enamel-hard by the depositing of chalk, rather like the formation of teeth in animals and human beings. In most other fish the scales are formed as simple plates in the inner layer of the skin, or dermis. They do not protrude and are mostly circular and ovoid in shape. These may be further classified into two distinct forms - the ctenoid, or wavy-edged spiny scales, on such fish as perch and bass, making their bodies rough to the touch; and the more usual evenly-curved cycloid, or smooth scales, found in soft rayed fish like the salmon, carp, trout and herring. But there is no fundamental difference between ctenoid and cycloid scales, for they sometimes both occur on the same fish. For example, the dab, a flounder-like fish, has prickly ctenoid scales on its dark upper surface, and smooth cycloid scales on the underside.

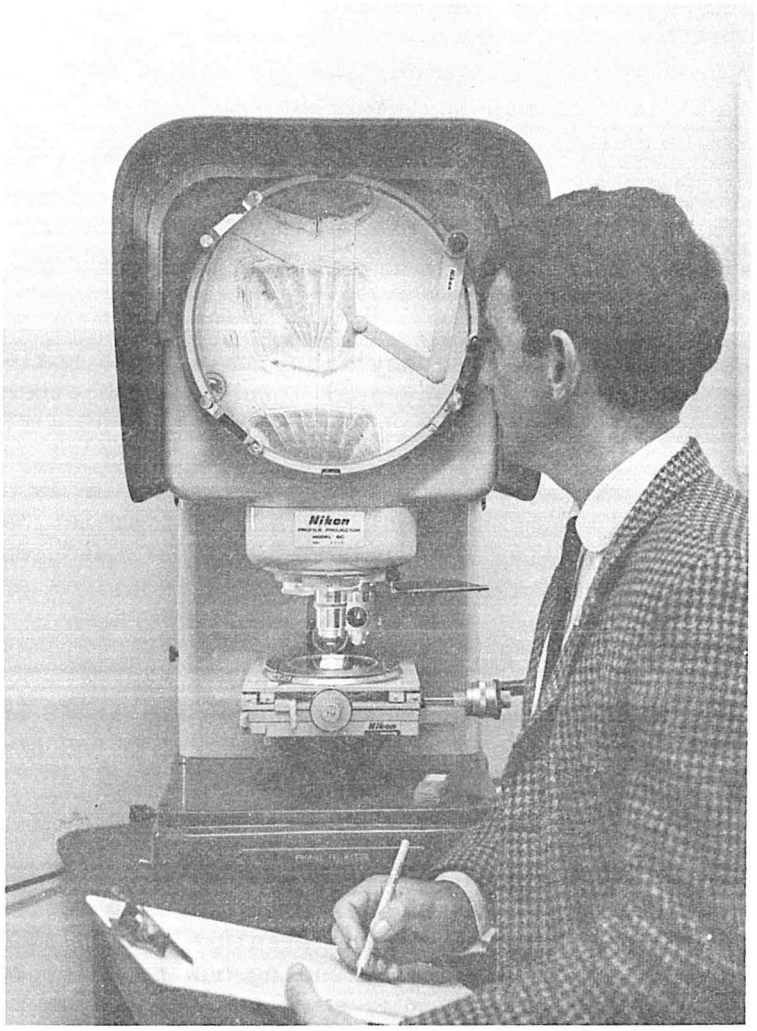
When a fish hatches from the egg it is quite scaleless or naked. One or two species, such as the catfish, remain that way throughout their life, but the majority develop their scales before they are much older, minute plates appearing in the skin and soon forming into a complete covering. Coarse fish have their scale covering when they are between $\frac{1}{2}$ and 1 inch long, whereas salmon and trout are usually from 1 to 2 inches long. A fish's total number of scales is determined early in its life, no new ones appearing later except to replace any lost accidentally.

Regularly at the appointed age of the baby fish, the little scale nuclei are formed under the skin, of such a size that by just touching each other they just about cover the fish. Each scale plate is made up of two layers, a flexible, fibrous lower layer, and an upper brittle layer formed by the deposit of clear bony dentine. The lower layer forms in sheets across the underside of each scale, but the upper layer grows only at its edge, so that whilst its diameter may increase, its thickness never does so. Thus also a scale is always thickest immediately under its original scale plate. The dentine is deposited in ridges and furrows, often irregularly.

The forward end of each scale lies embedded in the dermis, or inner layer of skin, and the free after end so develops that it covers the front end of the scale behind it, rather like tiles on a roof. This means that the free end of a scale is the only visible portion, though it is very much smaller than the complete scale.

As a fish grows, it must continue to be covered in this over-lapping fashion. This is not done by increasing the number of scales but by each individual scale growing to keep up with that small portion of the creature's body which it covered originally. Such growth is achieved by adding new rings of dentine around the edge, somewhat similar to the way a tree grows. Where this new material is added to the after end of the scale, it shows in irregular and poorly marked accretions, but fortunately the larger portion has clearly defined rings on it throughout the life of its owner.

Yet although these facts have long been known, it is only within the last sixty years that we have discovered just how much an examination of these scale rings can tell us about the fish. Whereas a tree adds only one ring per year, a fish scale may add many rings annually, but this ring growth varies according to the seasons, the food supply and the activities of the fish to a considerable extent. So much so, in fact, that a trained observer examining say a salmon scale under a low-power microscope can tell not only its age, but also how long it has spent in the sea, how many times it has spawned, even if it has not yet spawned, what its length was at the end of each year of its life. In fact, no other living creature carries on its person such complete and detailed autobiographical evidence.



Fisheries Research Officer Mr. R.J. Lenanton shown reading whiting scales.

The discovery of just how fish scale rings may be interpreted in this way came from the English and Norwegian researchers, Johnston and Dahl, working independently round the turn of the century. Briefly, it is simply that in summer, when the water is warm and food supplies plentiful, a fish feeds well and grows rapidly. This means that the scales have to grow quickly to keep the fish covered, so the rings are therefore widely separated. In cold weather, however, when food is scarce, the fish lives more sluggishly, eats less, and grows slowly if at all. This result s in a slow rate of scale growth, the rings lie close together, and these make a dark band, termed the annual check, appear. By simply counting the number of annual checks the fish's age can be ascertained.

In addition, with migratory fish like salmon, the summer rate of growth in the sea is very great, with a proportionate wide spacing between the bands, which stand out in contrast to the earlier years of its life spent in fresh water. Further, during its spawning period a salmon or trout temporarily stops eating and lives upon its accumulated fat. This causes an unmistakable wavy line to appear on the scale rings. With salmon, the spawning drain on its body reserves cuts deeply into the edge of the scales. Some rings may be lost completely, and there always appears the heavy, unmistakable "spawning-mark", which cuts across the earlier rings, dividing them from the new.

Of course, other factors like the blurring, scarring and regeneration of scales affects such readings, but the main principles hold good for all fish and are of inestimable value to fishery workers.

Fish scales are therefore revealing as well as highly adaptable features, performing their rather odd task for their highly active, streamlined owners, whilst retaining their basic role as an external skeleton.

RESEARCH VESSEL "HAMELIN" TO BE SOLD

The Department's 60 foot trawler "Hamelin" is to be released for sale by tender and it is proposed that future development work will be continued with the charter of privately operated vessels. All proceeds from the "Hamelin's" sale will go to the Fisheries Research and Development Trust Fund, the fund subscribed to by the fishing industry.

The "Hamelin", formerly the Queensland fishing boat "Settler", was purchased for $34,000 and was sailed north about to Western Australia arriving January 1967.

Due to the very rapid acceleration of theprawning industry in the North-west, "Hamelin" was unable to cope with the volume of research work required. Mr. G.C. MacKinnon, Minister for Fisheries and Fauna, said in a statement to the press that when the Department decided to buy the "Hamelin" it had not expected the fishing industry's interest in the remote northern areas to grow as rapidly as it had.

He also elected not to expand the Department's fleet because of the cost factor involved. The present cost of keeping the "Hamelin" in northern waters is approximately $700 per week and it is possible to charter up to three experienced commercial fishing vessels for a similar monetary outlay.

FISHING ROUND THE WORLD U.S.S.R.

Ships on show

The organisers of the 1968 Leningrad fishing exhibition, "Lenybrom 68" announce that 15 types of Russian fishing and research vessels will be on show, including the large mother ship Vostok now being built.

World Fishing England. September, 1967

PRAWNS LED TO A BOOM

The following article written by Charmian Clift for the Melbourne "Herald", should prove interesting reading.

(Editor)

Karumba is a name on the map of Australia, a dot on the mouth of the Norman River where it flows into the Gulf of Carpentaria and the hawks hang over the mangroves and the sandflies are murder.

Thousands of jelly-fish pulse on the tide, and the opaque, oily-looking water harbours huge coarse repellent fish, mud-crabs as big as large platters, sharks by the hundred and still, they tell me, a few old and sagacious crocodiles.

It is sinister country. Evil to me since I react violently to landscape and am frightened utterly by this one that seems to be saturated with a sort of thick grey heat. The river here is broad, sluggish, yellow-grey in colour. The mangroves are green-grey, dense and heavy. And the blue-grey sky seems to have a tangible skin of heat on it. From the river the baking salt pans and the sparse grey scrub recede into forever.

Community

It is not, one would think, a desirable residential area. Still, I suppose frontier towns never did spring up because of residential qualifications. A frontier is pushed forward because of the commercial possibilities of the terrain - because of gold or minerals or gems or hides or sealskins or ships or apes or ebony or peacocks.

The frontier community of Karumba has mushroomed up in a few months because of prawns. Thousands of prawns, millions of prawns, the whole Gulf apparently teeming with prawns, banana prawns, tiger prawns, endeavour prawns, king prawns. A prawn bonanza whose extent isn't even known yet, although the C.S.I.R.O. is working up here methodically and patiently, weighing, measuring, examining, recording, tabulating, tracking down the breeding grounds and the habits of every variety of prawn hauled in. Among the prawn fishers who have been first in on the bonanza there is a certain exhilaration tinging present jubilance. Prawning grounds have been fished out before. Exmouth Gulf in the West might be becoming, but the East Coast is giving only skimpy pickings, and Moreton Bay has been closed to all prawn fishers.

How long will this one last?

Presently there are only 14 boats working out into the Gulf from Karumba- Cindy, Kotuku, Audrey, June, Rama, Toowoon Bay, Sea Marie, Santa Maria, Ulitarra, Sea Fever, Clan Nellie, Sea Tang, Vixen Star, Troupadour, Silhouette - boats ranging from 36 to 68 feet, privately owned and operated by skippers who were willing and game to pioneer this enterprise, but all of them (except for Kotuku, which is known as the rebel boat) dependent upon the commercial plant which the firm of Craig Mostyn has set up on the river bank to receive and process the hauls, to fuel, water and provision the boats, to supply the ice to preserve the catch at sea, and, importantly, to provide the spotter-plane that is used when the banana prawns run from March to July to pick up the mud boils and direct the boats in.

The Boats

So the boats on the river and the plant on the bank of it are the heart of the matter. Reason enough for a frontier town. Although perhaps you could not call Karumba a town yet. There is the plant-utilitarian, ugly, looking a bit rushed-up and straining at the tin seams, yet, although it is evident that extensions are under way.

On either side of the plant, up the river bank and down the river bank, are the caravans where the fishermen's wives and children are living, at least those wives who were game enough or optimistic enough or gipsy-blooded enough to brave the Gulf to be with their men. Probably more will come later.

Caravan

Behind the plant is a new building to house the male company employees. The women who work in the plant (other than fishermen's wives) live temporarily in a long metal caravan divided into cabins. There is a bungalow for the manager who also has his wife with him, and a very young baby.

But along the bank from all this hurriedly assembled caravan town straggling through scrub and sand, there are raked shell paths, borders of Japanese balsam, hibiscus, poinsettias, bougainvillea tall feathery white cedars, docked bushes of Prince's Crown, Bird of Paradise, young coconut palms, and though this vegetation looks parched it is extraordinary in the setting, and the most extraordinary in that it surrounds an oasis of elegance known as The Lodge.

Bungalow

The Lodge is a complex that includes a big guest bungalow cool and airy and polished, with a private shower and lavatory to every clean, curtained room, and cherry red counterpanes.

Beside the guest bungalow is a chlorinated swimming pool a long, high block on stilts that has living quarters, a big dining-room with cane and bamboo furniture, and a completely modern and rather sophisticated bar. There are storerooms behind, the generating plant, a bungalow for the licensee, and another for the domestic staff.

It is so anachronistic that you could believe it to be a set run up for a film adaptation of a Somerset Maugham story. In fact the Lodge came first, long ago as a Qantas refuelling base, and through the war taken over as a base for the Catalinas and Sunderlands. After the war it was shut up for years and years, until Amsett took it over in 1959, and presumably restored it. The Craig Mostyn Company bought it this year.

Unless you count the pilot station and fauna reserve, or the Pawlowskis' crocodile farm away over the salt pan by the air strip, this is the extent of Karumba. Frontier new style. Part shambles, part luxury. There are more than 150 people living here now. Next year, if the bonanza holds and the company can increase the water supply, there will be more. And the next year more still. In a few years there might even be a real town, kerbed and guttered around separate bungalows.

At the moment water is a nightmarish problem. There is only the original well to supply all the needs of the community and the even more urgent needs of the processing plant. Prawns have to be processed cold and frozen fast. The boats which are still unfrigerated might need as much as 70 baskets of ice every trip. If the place is to expand to capacity there will need to be bores sunk, or a pipeline run from Normanton, the old port, 40 miles away up the river.

In spite of the bonus of bar and swimming pool I suspect that life is tough enough on this frontier. The caravans have power supplied, and the wives have fitted them out as ingeniously and comfortably as possible but they must be cramped quarters at best, and lonely living when the men are at sea. Also expensive living. As with any frontier town, everything- from frozen meat to razor blades to soft drink for the kids- costs more here than it does anywhere else. And there is only the company store to buy from.

Company employees mess very well at the plant, but there is no canteen, no recreation hall, no newspaper, magazines, books, radio, television, and nothing to do out of working hours and nowhere to go but up through the scrub and along the river bank to The Lodge, where drinks are expensive, too, but at least there, and you can sit for hours at the bar under the shells and the turtle carapaces and talk about prawns and prawns again and fishing grounds and boats and engines and the latest gossip. Inevitably there is much gossip, but good-natured rather than malicious. A live-and-let-live attitude prevails.

Amenities

This community, as a community, has only been in existence for a few months. In a place that has sprung up so quickly it is not surprising that amenities have failed to keep pace with commercial growth and consolidation. For instance, there is no school for the children. There are no medical facilities.

The school is not absolutely urgent, yet, since the married group is surprisingly young on the whole, and most of the kids haven't reached school age. The few that have are struggling, rebelliously, with intermittent correspondence lessons. But the medical position is worrying. The Flying Doctor comes in once a month, and if any health worry crops up in between there is Normanton 40 odd miles away.

In fact all the children look very healthy, rampagingly healthy, actually far too healthy and bouncing for good order and discipline in such boring surroundings their young mothers look wan, and tired sometimes coping with their devils and they must worry quite a lot.

The women and girls grading and packing the prawns in the processing plant complain of constant brine rash. Sandfly bites infect easily and turn into pussy sores. So does the slightest scratch. Many of the adults have sores bandadged or healing. And none of the women have been through a wet season yet. The heat is building up now, sticky and enervating in spite of the deceptive breeze off the river. The palms of your hands sweat, and the roots of your hair, and after you have been sitting for a while your clothes stick to your skin. When the wet season comes the community will be cut off even from Normanton by flooded salt pans, and only the plane will be able to get in.

Lifeline

The twice weekly arrival of the old DC3 is the lifeline to civilisation away across the salt pans, and the bleak cattle country and the abandoned gold-diggings and the Atherton Tableland to lush green Cairns on the East coast. One feels a great respect and affection for those old Dakotas that are still flying the wildest, toughest runs after so many years of service.

And there is something gallant about the arrival of the DC3 here, bringing stores and mail and sometimes a stranger to enliven monotony. On Fridays the crew stays overnight, old friends now to everybody, and The Lodge is very gay and lively with news and gossip, and people sing spontaneously, as at an old-fashioned country social.

Pioneers

For there is, evidently a very real feeling of community here. These are the pioneers and they know it and have a sense of pride in accomplishment. Even when they complain it is without real rancour. The boats have had a marvellous season with the banana prawns= one hauled 96,000lb, working only two or three days every fortnight when the double tides were running. Others hauled 40,000lb in the five months. At 25 cents a pound, this is good money, even with deckhands to be paid, food and fuel to be discounted, and ice at 36 cents a basket.

This first year of bonanza has only been restricted by the lack of storage capacity and refrigeration in boats accustomed to working on the East Coast for skimpy hauls, and by the processing capacity of the plant. Presently the quarry is tiger prawns, which are being hauled in at the rate of 500lb to 600lb a night, and sold to the company at 36 cents a pound.

Profits

Most of the season's profits are being invested in more storage capacity, refrigeration to hold the catch longer, better gear, stronger masts and tackle because many boats suffered such an embarrassment of riches that they could not haul in their catches without breaking their masts and gear, or store the prawns if they could.

So there is, in spite of boredom and monotony and heat and sandflies, an air of high excitement about this place. The company's investment and the years of patient survey and exploration has paid off, so has the risk of the boats in coming up here.

So far that is. Now there is constant speculation. Will next season be as good? How many boats will head for the Gulf? Will there be other companies setting up competitive processing plants? Is this bonanza rich enough to be shared out among all the people who will want to be in on it? Next year. What will happen next year?

I expect next year will tell. But beside this inimical river, with the heat rising and the sandflies biting, and the hawks and the gulls swooping down on their own bonanza of prawnheads, and the weathered boats fitting out for sea or steaming triumphantly in-river with their storage tanks loaded, there is an atmosphere of challenge and adventure and high hope and endeavour that is about the most refreshing and exciting thing I have struck in Australia. In this most unlikely place, a town called Karumba is away to a flying start. And Australia is a more exciting country than I ever dreamed.

LICENSING OF FOREIGN FISHERMEN AND FOREIGN FISHING VESSELS

Amendments have been made to the Commonwealth Fisheries Act for licensing of :-

(1) foreign fishermen and foreign fishing boats in the declared fishing zone (within the twelve mile limit)

(2) processing boats of Australian nationality in all proclaimed Commonwealth waters.

A foreign fishing boat is defined as a boat not owned by a resident of, or by a company incorporated in, Australia or a Territory. It does not include a boat registered in Australia or in a Territory or one the operations of which are based on a place in Australia or in a Territory. A foreign fisherman would be a person who was a crewman on such a boat.

A processing boat is defined as a boat which cuts up, dismembers, stores, packs, etc. fish that have not been taken by that boat. Fishing boats which process their own catch would not be defined as processing boats unless they received catches from other boats for processing. Licensing procedures for Western Australian crayfish freezer boats in waters between 24°S and 34°S will remain unchanged. If these boats wish to operate as processing boats on other species outside that area, a processing boat license must be obtained.

All applications for Commonwealth licenses in respect of foreign fishermen, foreign fishing boats and processing boats as defined above must be forwarded to Head Office. Fees received with these applications are to be dealt with in the normal way except that they must be marked as fees for foreign fishermen, foreigh fishing boats, or processing boats.

Also note that Commonwealth licenses must not be issued to fishermen resident in another state. Applications for Commonwealth licenses for fishermen and boats with home ports in another state should be referred to the Fisheries Administration in that state. (Through Head Office).

FISHING ROUND THE WORLD JAPAN

Seven Japanese companies have been granted permission to operate 35 shrimp boats experimentally off the Guianas and in the Caribbean, bringing the total to 50. Some 260 U.S. Mexican boats are already working this area.

World Fishing. England September, 1967

SEEDING THE INLAND SEA

Systematic propagation, rearing, protection and liberation of salt-water fish species in Japan's Inland Sea (Seto) and adjacent waters- now in its fourth year since establishment by the Japan Fishery Agency- is attaining a degree of effectiveness rendering the enterprise notable for its success as well as the boldness of its concept.

"Seto Inland Sea Reproductive Fisheries" is the official name of this project of the Japan Fishery Agency. The Inland Sea is in fact a great strait separating Honshu, the main island of Japan, on the north, from Shikoku and Kyushu on the south. Its coastline is irregular and deeply indented; and its waters are at the same time productive and very heavily fished.

To provide means of re-stocking these semi-enclosed ocean waters by the development of means of increased propagation - high-yield through rearing and feeding techniques - protection of liberated young- these were the objectives of the undertaking established in 1963.

While scientists develop the methodsand administrators direct their application, much of the work of the five reproductive centres is done by actual fishermen during off-seasons. Thus they learn the intricacies of the processes on which their livelihood depends, and the necessity of conservation and the economics of rational and properly timed harvest.

The Inland Sea process differs from that of hatcheries generally- such as those for salmon- in that it involves a considerable number of widely different saltwater species, concerning whose reproductive processes little was known when the project was undertaken.

The planners of the Fishery Agency sought means by which the methods of agriculture could be applied more widely to marine fisheries. In 1963 Japan already was engaged successfully in the culture of laver and wakame, two types of edible seaweed, oysters, pearls, and prawns in salt water; and goldfish, carp and rainbow trout in fresh waters.

In addition, eels and yellow-tail were also reared, but these species were not propagated, the elvers and small fish being captured in nature, impounded and fed on cheap fish or cannery offal until marketable size was attained. Production of protein by this method is reported to be 1 unit for each 6 units of feed.

Intensity with which Japan is obliged to exploit its coastal fisheries to sustain her large population tends to induce depletion, particularly in the once rich and prolific Inland Sea.

Thus the Seto Inland Sea Reproductive Fisheries stations were established (1) to devise means of increasing the numbers of young spawned by artificial propagation; (2) to feed fry and larval forms to the point where the several species can be self-sustaining and relatively free from predation; (3) to release them for natural growth under protection designed to enable them to attain economically profitable size and reach reproductive age; and (4) to develop highly productive species and strains, those which grow rapidly, reproduce readily, and when mature are available to economical fishing methods.

In 1963 when the work was started there were only two stations. These have increased to five - at Hakatajima, Tamano and Yashima, on the Inland Sea proper; Kamiura and Shibushi, on the east coast of Kyushu. These centres are engaged in scientific studies, the development of techniques, and the propagation of large quantities of fry, or "seedlings", as the Japanese term translates most readily. These are distributed in part to prefectural rearing stations, although the greater number are reared and released at the five reproductive stations.

The five governmental stations are owned by the Fishery Agency, and the whole work is directed by its Investigation and Research Division, but the centres are actually managed by an inter-prefectural corporation.

At the rearing level, there are 40 stations, in 16 prefectures, which receive grants or subsidies from government for this work. The young fish generally are fed at the rearing stations for about one month before liberation.

Methods of artificial propagation have been developed for prawns, octopus, red sea bream, and abalone. Of these the bream and octopus were particularly difficult subjects, but recently it has been possible to increase the numbers of successful young to tens and hundreds of thousands. At least 10 species are propagated artificially at the present time, in addition to eels and yellowtail reared from natural young.

In 1967 the combined liberation target is 66,020,000 young fish. This figure is to rise to 113,450,000 in 1968, and to 161,400,000 in 1969. Large increase is planned for 1970 with the release of the previous year more than doubling to 239,500,000 young.

At the outset, the Seto Inland Sea Reproductive Fisheries enterprise was roundly criticized as fantastic, visionary, and at best inadequate; but increased abundance is coming to be credited to the program by informed observers and the criticism has virtually abated.

Shoro Honman, scientist in the Fisheries Agency Investigation and Research Division, informed the author of this article that recapture of prawns liberated in July, 1966, in the Yamaguchi/Fukuoka/Oita area had reached 20% of the number released by November 1966, and that the weight of the individual shrimp had increased 0.02 grams to 15 to 20 grams; while length increased from 13 mm. at release to 12 to 13 cm. on recapture.

Ocean Fisheries (USA) October, 1967

FISHING ROUND THE WORLD WEST AFRICA

Tuna Survey

Results of a survey carried out in the Gulf of Guinea by the U.S. Bureau of Commercial Fisheries have now been published as a paper by Albert C. Jensen. The report is mainly concerned with Tuna, on which little is known in this area, except by some 100 Japanese longliner skippers. The paper is published by the Institute of Marine Science, University of Miami, Florida, U.S.A.

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UNITED KINGDOM

Landings restriction

The British Trawlers' Federation have introduced a restriction on foreign cod landings, which must not exceed 50 per cent of other species. This measure has been taken for the main trawling ports as a result of the serious fall in demand and prices caused by "A grave disequilibrium in all the principal fish markets of the world". Most types of fish imports into the U.K. are unrestricted normally.

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World Fishing England September, 1967