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DEPARTMENT OF PARKS AND WILDLIFE

DEPARTMENT, WESTERN AUSTRALIA
FISHERIES
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STAFF NOTES

The Minister for Fisheries (Mr. Hutchinson) accompanied by the Director, Mr. Fraser, returned to Perth by air from Singapore on May 24, thereby completing a 4½ weeks' tour of the fisheries of the Philippines, Korea and Japan.

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Research Officer R.J. Slack-Smith, after returning to Head Office on May 8, left again for Shark Bay on May 22 to continue the Department's prawn research programme.

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The Supervising Inspector, Mr. J.E. Bramley, visited the Carnarvon-Shark Bay area from May 18 to 28. Besides inspecting the prawn processing works at Carnarvon and Shark Bay, he tested the use of light buoys on the Shark Bay trawling grounds in an attempt to delimit the closed water boundaries. As trawling in the area is carried out at night the necessity has arisen for the provision of navigational marks which are visible in the hours of darkness. Unless skippers are able to see where they are, it is difficult to confine their trawling activities to open waters. Such marks are also needed to guide our own staff in patrolling this fishery at night.

Mr. Bramley commented that although the light buoys were laid during a period of heavy weather and strong tides, the project proved quite successful.

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We welcome to the staff Mr. T.L. Riggert who commenced duty on May 21. Mr. Riggert, who hails from the U.S.A. holds a B.Sc. degree from the University of Montana. He has been temporarily employed in the Fauna Branch to undertake an urgent ecological survey of the coastal lakes

Life History of Mountain Duck with particular reference to its adaptability to salt water environment.

and swamps, and to initiate waterfowl research generally. Before coming to Western Australia, Mr. Riggert carried out wildlife research in both Antarctica and New Zealand.

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We extend our congratulations to those officers who recently gained promotion in the Department.

Technical Officer J.S. Simpson has been promoted to the position of Technical Officer, Grade I (G-II-3), recently vacated by Mr. R.J. McKay on his resignation from the public service. Fauna Warden N.E. McLaughlan will shortly move into the position of Technical Officer, Grade 2 (G-II-1/2) formerly occupied by Mr. Simpson. Inspector D.P. Gordon has been promoted to the position of Inspector Grade I (G-II-2), which became vacant on the retirement of Inspector J. Traynor. Applications have been called in the Gazette to fill the positions of Fauna Warden G-II-1/2 and Inspector Grade 2, (G-II-1) previously occupied by Messrs. McLaughlan and Gordon, respectively.

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The Director has approved of the transfer of Inspector A.V. Green, of Geraldton, to the vacancy in the Perth district created by Inspector Traynor's retirement. The Geraldton position will be filled by Inspector B.A. Carmichael, now of Albany, whose place will in turn be occupied by Inspector D.P. Gordon of Bunbury. Inspector E.R. Hammond, of the Mobile Patrol, is being transferred to Bunbury. It is expected that all transfers will be effected before the end of June.

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Officers who commenced annual leave last month include Inspectors G.C. Jeffrey (Mandurah) and C.W. Ostle (Lancelin) on May 4; Senior Inspector A.K. Melsom (Fremantle) Inspector R. Smith (Lancelin), Mr. G.C. Ferguson (Head Office) and Cadet Inspector D.K. Morrison (r.v. Peron) on May 11; Inspector L.R. Frizzell (r.v. Lancelin) and R.G. Emery (Relieving Inspector) on May 18.

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Mr. D.B.M. Heather, who had been employed as crew member on p.v. Dampier since his appointment last November has resigned from the public service.

PERSONAL PARS

Mr. L.A. St. Leger, formerly Secretary, Fisheries Division, Department of Agriculture, Tasmania, has reached the age limit and retired. He and his wife have now come to live in Western Australia and will probably settle at Rockingham. Their daughter has been living at Mundijong since her marriage some years ago.

Mr. R.H. Scott, who acted as Deputy Controller of Fisheries for Tasmania under the Department of War Organisation of Industry during the war years, and has lately held the appointment of Executive Officer of the Department of Agriculture in that State, has been appointed Acting Secretary of the Fisheries Division in Mr. St. Leger's place.

PREFERENCE FOR LOCAL PRODUCTS

The Premier has issued a directive stating that Cabinet desires all Departments, Boards, public utilities and other Government instrumentalities to give closer attention to specifications to ensure that full consideration is given to the availability and suitability of materials, equipment, fittings, etc., made in the State, with particular reference to such things as are manufactured within the general locality where the project is undertaken.

Where local production is not available, suitable or reasonably economical, consideration for the Australian made product must be given in preference to the overseas product, subject to the suitability, availability and economics of these Australian products.

NEW INSPECTORS' QUARTERS FOR BROOME

Tenders for the construction of new inspectors' quarters at Broome will be called by the State Housing Commission in the near future. The new building will be situated immediately in front of the present quarters which will be demolished as soon as they are vacated.

PROPOSED NEW ALBANY OFFICES DELAYED

The proposed erection of a new fisheries office and store in Albany is still under consideration. The unavailability of suitable land has delayed the commencement of this project. In reply to enquiries made recently from the Public

Works Department concerning Lots 44 and 45, Stirling Terrace advice has been received that a possibility exists of the whole of this being developed for Government buildings.

NEW FISHERMEN'S SECRETARY AT GERALDTON

Due to the resignation of Mr. F.J. Hackett as Secretary to the Geraldton Professional Fishermen's Association Inc., all future correspondence should be addressed to P.O. Box 68, Geraldton. Mr. W.E. Porter has been appointed secretary to replace Mr. Hackett.

TUNA TAGGING OFF ALBANY

The Division of Fisheries and Oceanography, C.S.I.R.O., has chartered the F.V. "Estelle Star", of Port Lincoln, South Australia, for a thirty-day period during May and June to catch and tag young tuna off Albany.

The research officer in charge of the "Estelle Star's" operations is Mr. J.F. Robins, who spent fourteen months in Japan in 1961/2 making a general study of tuna. The research will assist in determining the size of the stocks of southern bluefin tuna besides providing information as to their migratory habits.

A similar tagging programme was carried out by the "Estelle Star" off Albany during June, 1963.

TALKS ON WHALES

At the meeting of the Royal Society of W.A. on May 18, talks entitled "The Australian Humpback Whaling Industry" and "The Sperm Whale Project" were given by Dr. R.G. Chittleborough and Mr. J.L. Bannister respectively. Both these gentlemen are officers of the Division of Fisheries and Oceanography, C.S.I.R.O., currently engaged on whale research in this State. Because of their general interest, summaries of the talks are given below.

"The Australian Humpback Whaling Industry"

by R.G. Chittleborough

For many years the Australian Whaling industry has been based on humpback whale catches. Stocks of this whale have been declining steadily since 1949 and the taking of humpbacks is now prohibited.

Australian humpback whales fall into two distinct populations. One of these feeds in Antarctic waters and migrates to breed off the west coast of Western Australia (known as the Group IV population). The other migrates from the Antarctic to the eastern coast of Australia (known as the Group V population). The main migration is northward in June and July, and southward between August and October, and calves are born almost a year later. It is estimated that 37.2% of the adult females are pregnant at any one time, and the recruitment rate to the adult stock as a whole is 0.12. Humpback calves are approximately 14 feet in length at birth, approximately 29 feet at one year, and reach the legal minimum killing size of 35 feet at three to four years. Puberty is at four to five years.

The best method of aging humpback whales has proved to be the counting of growth layers in ear-plugs. The maximum life expectancy is about forty-six years.

The history of the modern Australian humpback industry dates from 1949. Statistics from the Group IV (west coast of Australia) population show clearly that from 1949 the average length and average age of the whales caught were dropping. The catch per unit of effort (measured as steaming hours of the chaser vessels) dropped from 0.475 whales per hour of steaming time in 1950 to 0.028 whales per hour of steaming time in 1963. Similar trends were evident in the Group V (east Australia) population, the decline being dramatic from 1959.

Dr. Chittleborough outlined the methods used to obtain the natural and fishing mortality rates, and the data obtained showed clearly the large degree of over-fishing allowed, even after a drop in quotas in 1955. The best estimates of the whole of the southern hemisphere humpback whale population during the 1930's are approximately 34,000 individuals. Originally there were 12,000 - 17,000 in the Group IV population. It is estimated that in 1949 the Group IV population contained about 10,000 individuals and the Group V some 8,500 whales. By 1963 the Group IV population was reduced to 600, including approximately 300 adults, and the Group V population to 400, including less than 200 adults.

Estimates of the present recruitment rate indicate that only 18 whales for the Group IV and 12 for the Group V populations could be taken annually without further reducing the populations. At the earlier near-peak population levels the recruitment rate estimates indicate that 390 whales from Group IV and 330 from Group V could be taken annually without

decreasing the populations. The actual 1949 quotas were 1,320 for Group IV and 850 for Group V.

Because of the severe over-fishing, the Group IV population will take from 30 to 50 years and the Group V population from 40 to 60 years to recover to near-peak population levels.

"The Sperm Whale Project"

by J.L. Bannister

Following the 1963 ban on humpback whaling the Australian industry is now based on sperm whales. Until the recent decline of humpbacks, sperm whales formed an insignificant part of the Australian whaling economy.

Charts of the activities of American whale-ships from 1761 to 1920 show that two areas off Western Australia were suitable hunting grounds for sperm whales. One area centred some 300 miles off-shore from Carnarvon was fished in summer and winter, while an area nearer the coast from Fremantle round Cape Leeuwin to Albany was fished mainly in winter.

The world's stocks of sperm whales have been little studied in the past, but investigations are now being made at an increasing rate. In contrast to the near-shore migration of humpbacks, sperm whales rarely cross on to the continental shelf. Males are found in the Antarctic but females rarely move south of latitude 40°S. The project currently being carried out by the Division of Fisheries and Oceanography, C.S.I.R.O., is designed to identify the Western Australian sperm whale stocks and assess the sustainable yield. During 1963 the total Australian sperm whale catch was 655 of which 598 whales were taken off Albany.

An important item of the current project is a programme of aerial spotting which has thus far completed 13 months of a scheduled 24 months. A chartered aircraft is used on monthly survey runs for 150 miles from the edge of the shelf from north of Carnarvon to east of Albany. The approximate area embraced by the survey is 156,000 square miles. Results from the survey are giving information on the density and distribution of whales in this area.

A further important aspect of the present project is whale marking. During 1963, 164 sperm whales were marked and it is hoped to arrange for two marking cruises in the

near future. An autumn marking programme near Port Lincoln in South Australia should give information on the general migration pattern of the westerly and south-westerly migrating whales near Albany. In addition a spring marking cruise off Geraldton and Carnarvon should help to elucidate the movements of sperms which seem to be moving south in this region in November.

Much research is needed on the general biology of sperms, particularly on the breeding-cycle and age determination. The most promising ageing method involves counting growth layers in the teeth.

A programme of blood-typing is being initiated to help identify local stocks and study their relationship with other sperm whale populations in the Indian Ocean.

PROPOSED AUSTRALIA-NEW ZEALAND MEETING
ON DECAPOD CRUSTACEA

Dr. G.L. Kesteven, Assistant Chief, Division of Fisheries and Oceanography, C.S.I.R.O., Cronulla, N.S.W. for some time has been aware of the increasing necessity for a meeting between Australians and New Zealanders engaged in crayfish research.

Research on both crayfish and prawns has been stepped up markedly in Australia in recent years, mainly because of the economic significance of these industries. Research in New Zealand likewise is understood to have been intensified.

The work in progress at present has made important advances, but at the same time it has uncovered a number of major problems whose investigation call for both increased and more diversified research. The range of work required for some of these problems is considerable, and with the expansion of research teams and the initiating of projects in different parts of Australia, it has become obvious that steps ought to be taken to establish communication between these teams to exchange views and results, so that in some measure the programmes will supplement one another.

Dr. Kesteven has put forward for consideration the following draft prospectus -

Purposes: To review present knowledge of selected aspects of the biology and exploitation of decapod crustacea in the waters of Australia and New Zealand; to receive accounts of and to discuss current programmes of research on these organisms; and to consider continuing arrangements for co-ordination of these programmes.

Time: First half of 1965, or such other time as may be agreed upon.

Place: Cronulla or Adelaide, or such other place as may be agreed upon.

Subject Matter: The meeting would deal with pre-determined species; the general arrangement of subject matter will be as follows:-

1. Composition and distribution of Australian/New Zealand decapod crustacean fauna.
2. Larval life.
 - 2.1 Instars, their form and duration.
 - 2.2 Distribution in space.
 - 2.3 Mortality.
3. Juvenile life.
 - 3.1 Distribution.
 - 3.2 Growth; moulting cycles.
 - 3.3 Approach to sexual maturity.
 - 3.4 Mortality.
4. Adult life
 - 4.1 Distribution
 - 4.2 Growth; length/weight relation; moulting cycles.
 - 4.3 Sexual cycles; fecundity.
 - 4.4 Recruitment into fishable stock.
 - 4.5 Composition of fishable stock.
 - 4.6 Mortality.
 - 4.7 Yield characteristics of stocks.
5. Management of fishing.
 - 5.1 Identification of objectives.
 - 5.2 Closures: areas and seasons.
 - 5.3 Legal minimum size; escape gaps.
 - 5.4 Limitations on catch and effort.

The meeting should have before it information on present knowledge in respect of the above matters relating to each of the listed species and groups of species, and on current research programmes aimed at obtaining such knowledge.

It would seek to reach conclusions on some matters - the number and nature of these would be for determination by the meeting itself. On all subject items, however, attention would be directed upon certain methodological problems, such as the use of tagging or marking techniques, the use of aquaria, age determination, the measurement of mortality, the use of underwater observation equipment, and the use of computer equipment.

Documentation: An effort would be made to arrange for compilation of a Species Synopsis for each of the species listed, and for the preparation of a set of Review Papers covering: (a) the principal subjects under discussion (for example: Growth in Decapod Crustacea), (b) methodological problems (for example: Use of Tagging and Marking Methods in Crustacea). Participants would be invited to present papers reporting their research. If possible the Species Synopses and Review Papers would be distributed three months in advance of the meeting so that participants should be enabled, in preparing their own reports, to compose these with some relation to the issues identified in the Review Papers and, of course, to avoid repetition of factual material contained in Synopses and Reviews.

Conduct of the Meeting: The meeting would be invited to decide on and elect its own office bearers and committees (if any). The normal rules of debate would hold. The meeting would be invited to adopt a statement of such conclusions as it might be able to reach with respect to the purposes for which it was convened.

Relation with Other Meetings: Note should be taken of the papers and results of international and major national meetings of recent years dealing with this subject. For example, the Indo-Pacific Fisheries Council has held a symposium on the cultivation of shrimps in Tokyo; C.C.T.A. has convened a crustacean meeting this year; the Gulf and Caribbean Institute usually discusses shrimps at its annual meeting.

FAO will convene a world meeting on shrimps probably in 1965. FAO is aware of the suggestion with which the present prospectus deals and would be invited to assist the Australian

New Zealand meeting; perhaps some of the general papers to be prepared for the FAO meeting could be available for the Australian/New Zealand meeting and perhaps the results of the latter may be of some use to FAO.

JAPANESE FIND AUSTRALIA'S SYSTEM OF
FISHERIES STATISTICS USEFUL

At the meeting of the Indo-Pacific Fisheries Council in Seoul, Korea in October 1962, which was attended by the Director (Mr. Fraser) a report prepared by the Statistics Sub-Committee of the Commonwealth-States Fisheries Conference in September 1962, entitled "The Uniform Collection of Fisheries Statistics in Australia", was tabled for the information of participants.

The delegate of Japan (Mr. Takeshi Nakamura) was particularly interested in the report as were others. Subsequently Mr. Nakamura who is now Chief of the Fisheries Statistics Section of the Statistics and Survey Division of the Ministry of Agriculture and Forestry asked for and was provided with a copy.

During the Director's recent tour of the Far East he called on Mr. Nakamura whilst in Tokyo. The latter said that the sub-committee's report had been found so useful that it had been translated into Japanese, cyclostyled and distributed to the staff.

Mr. Nakamura's second-in-command actually made the translation, and during discussions with him the Director found that the Japan Fisheries Agency was experiencing the same kind of problems in the collection of statistics as we had met with in Australia. In Japan the new system had come into operation on January 1 this year, as had our new system in Western Australia.

One fact which interested the Japanese fisheries people immensely was that in Western Australia the furnishing of statistics by fishermen is compulsory by law. Theirs is a voluntary system, and field officers regularly call on fishermen to collect and tabulate figures of production.

One very interesting feature of the Japanese translation is that they have added a cover and preface. The preface reads:-

"The Australian Government asked the Statistics Sub-Committee of the Commonwealth-States Fisheries Conference to prepare a report about improved methods of collecting statistics.

In the main, the statistics will relate to fish catch and several activities connected with fish production, but we think we can use these for our localities for different types of fish on the assumption that we process the data by a computer. We think the report is very useful for future fisheries statistics so we have printed it.

Director,
Fisheries Agency,
Ministry for Agriculture Forestry"

The Director comments that from an Agency controlling the most highly developed fishing industry in the world - and one has only to see something of it to appreciate this - that preface is praise indeed.

OVERSEAS VISIT BY MINISTER AND DIRECTOR

by A.J. Fraser, Director

During the recent inspection tour by the Minister and Director of Fisheries, which lasted from April 23 to May 24, visits were paid to the Philippines, Hong Kong (transit only), Korea, Japan and Malaysia (Singapore).

The main purposes of the exercise were to learn something of the problems of developing countries (the Philippines and Korea) and to ascertain how these were being met - fisheries-wise Australia is still in the development stage - to see something of the fisheries of the world's greatest fishing nation (Japan), and to discuss the possibility of joint fishing ventures. The visit to Singapore was to enable the Minister, in the capacity of Minister for Health, to have discussions with his opposite number in the Federation of Malaysia.

THE PHILIPPINES

In the Philippines no opportunity occurred to move away from Manila.

Discussions with the Director of Fisheries (Dr. Arsenio Roldan, jr.) elicited the information that there is a programme in hand for the erection at strategic centres in the Philippines of a chain of refrigeration and cold storage plants for fish. Ten such are envisaged, and some at least are being supplied by the Government of Japan by way of war damage reparations. In addition large sums have been made available from the Special Fund of FAO for the introduction of schemes for teaching fishery officers and fishermen new fishing techniques. The educational programme will be applied very largely to the training of personnel for the development of long-lining for tuna. It will involve among other things the purchase or charter of suitable clippers for the training scheme.

A visit was paid to the central fish market. This is established on a strategic part of the beach on Manila Bay at Navotas, a few miles north of Manila. The larger fishing vessels which fish chiefly towards the southern end of the island of Luzon, move about one mile from shore and discharge their catches into former Army amphibious DUKWs. The DUKWs bring the catch ashore. There are no landing facilities in the shape of wharves, jetties, etc., but before being taken from the DUKWs the fish is placed in galvanised iron tubs with a capacity of approximately 35 kg. (= about 16 lb.) or wooden trays measuring something like 2ft. x 1ft. x 3in. deep. These containers are then placed on dunnage laid on the beach. Quite a good quantity of fish came ashore, of many varieties. The market inspector said that perhaps 60% of the catch was what he called "scad". When we left at about 1.30 a.m. after having been on the beach since midnight, there were some hundreds of people, men, women, and children, inspecting the fish on display while waiting for sales to commence about 4 a.m.

In our discussions we learned that fish culturing for food was extensively and intensively practised in the Philippines. The principal kinds are the milkfish (Chanos chanos) - the white mullet of N.W. Australia - and the sugpo (Penaeus monodon), or jumbo tiger prawn. In each case the very young fry, which appear annually in countless millions close to shore, are taken by small-mesh nets and transferred to ponds to grow to marketable size.

The Philippines has a fairly well developed gear technology unit, under the direction of a member of the staff (Mr. Gonzalez Ferrer) who for some years held appointments with FAO, principally in Mediterranean countries. He will very largely control the new FAO-financed programme of fisheries training and education.

KOREA

Although it was only 6.30 a.m. we were met on arrival at Kimpo International Airport, Seoul, by the Acting Director of the Fisheries Bureau (Mr. Cho) and two of his officers. These were Mr. Lee, Kuk Won, Director of the Central Fisheries Inspection Station, and Mr. Ro, Jai Dong, Assistant Chief of the Fish Processing Section. Mr. Cho very kindly agreed that Mr. Ro, who speaks excellent English accompany us during our journeyings in Korea, because of our complete ignorance of the Korean language. Mr. Cho's thoughtfulness was typical of the reception that Mr. Hutchinson and I received wherever we travelled in Korea. In addition it made our visit so much more profitable.

Korea is rapidly developing its fishery resources and extending its sphere of fishing operations. Before leaving by air for the republic's principal fishing and shipping port - Pusan - we had talks with a number of people and learned much of what was going on under the aegis and with the active support of the Bureau of Fisheries and other instrumentalities.

We had discussions with the Chairman (General Lee) and Directors of the Korean Marine Industry Development Corporation, a body with statutory powers. The corporation seems to have much of the responsibility of developing Korea's fishery resources. We learned from them that foreign aid (principally from France and Italy) had been made available for the building (in Korea) of 90 new tuna clippers.

We learned also that there were several plants for converting seaweeds into agar agar. One of these was said to be the largest in the world. We were told that there was now a number of net making plants established in the country all using synthetic fibres - principally nylon.

This kind of development is necessary to enable Korea to establish her economy on a sound and permanent basis. Since the partition of the country at the end of World War II, the southern part (the Republic of Korea) has been left almost entirely without natural resources, such as water, iron and coal. All of these abound in the Communist-held northern part. To pay for her imports of consumer goods, and industrial plants of various kinds for the development of secondary industry, Korea must export. There appears to be much scope for the export of fish and fish products, hence no stone is left unturned and no expense is spared in the drive for the production of more and more fish.

We spent two days in Pusan, the main port of Korea and its principal fishing centre. Unfortunately very heavy rain fell during the whole period of our stay and we were unable to see as much as we would have liked.

However we visited two local shipyards, where we saw 8 steel tuna clippers on the stocks. One or two more had been completed and others recently launched. These comprise portion of the 90 clippers mentioned earlier. It is expected that their field of operations will extend to as far south as American Samoa. Suggestions were made to us that the Development Corporation would welcome the opportunity of embarking on a joint venture with Western Australian interests for the establishment of a tuna fishery in the Indian Ocean.

We also visited the net factory of the Sam Hae Fishing Net Coy. I personally saw this on my last visit in October, 1962. I was greatly impressed with the progress which had been made in the meantime, not only in relation to the range and quality of the nets produced but also in the matter of plant and buildings. This firm has just started to export nylon nets to Australia.

An inspection was made of the new fish market at Pusan. This was completed some 18 months ago, and adjoining it is a concrete wharf where the fishing vessels discharge their catch. The market was built by 5 local co-operatives, with some financial support from the U.S.A. and a guarantee from the Korean Central Government. It has a daily capacity of 1500 tons of fish, and has upwards of 1000 tons of cold storage space. It also possesses a plant capable of making 40 tons of flaked ice each day. On the first floor are the offices of the partner co-operatives, recreation rooms for staff and fishermen, and all the usual amenities. The market building is constructed of concrete.

A visit was paid to two fish processing works, where fish of all kinds (including prawns) were being packaged for export. These were destined mainly for Europe, and advertising matter on the cartons in which they were being packed were printed in the appropriate European tongue. Hundreds of women - chiefly young girls - were working in these processing factories. I was told in answer to a question that lack of foreign currency precluded greater mechanisation, and further that the economy of the country demanded as full employment as possible.

Whilst in Pusan we inspected the Fisheries College, until recently a department of the Pusan National University

but now an autonomous body. The President (Dr. Chung, Tae Yung) received us very graciously and showed us over the whole College. We were told that there are more than 850 students with a faculty of about 45. Five Departments, have been established, viz., Fisheries Technology, Marine Processing, Fish Culture, Fisheries Management, and Ship Building. Each provides a comprehensive course of study. Unless a graduate in one or other of the disciplines mentioned no person may be appointed to either the Central Bureau of Fisheries or a Fisheries Department of any Province. Doctorates and master's degrees are awarded as well as baccalaureates.

We also visited the Pusan laboratory of the Central Bureau of Fisheries. Here technological as well as biological and hydrological studies are undertaken. The laboratory, which is directed by Dr. Lee, Bong Nae, is well equipped and is doing some very useful research. Dr. Lee is highly regarded in international circles and he is assisted by a young and enthusiastic staff.

Before leaving Pusan we were shown over the agar agar plant said to be the largest in the world. There are certainly several buildings occupying an area of several acres overall. It seems to be right up to the minute so far as design, layout and efficiency are concerned, and we were told that the quality of the product, in its many forms, was superior to that of older producing countries like Japan, Spain and Morocco. Agar agar which has very many medical, industrial and domestic uses, is made from two kinds of seaweed, *Gacillaria* and *Gelidium*. The former is abundant in the Swan River, being the odoriferous "algae", as it is called by Perth residents.

Back in Seoul we were taken to the Central Fisheries Inspection Station, a Branch of the Central Bureau of Fisheries. The Director (Mr. Lee) and his staff showed us over this most interesting establishment. It is here that samples of all fishery products intended for export are examined prior to the grant of an export permit. By reason of the stepping-up of fish exports and the greater call on its services, the present building is inadequate and additions are at present in course of erection. All frozen, canned, dried, salted and otherwise processed fish, agar agar, laver (a dried edible seaweed regarded as a luxury in the Far East), and indeed all other marine products, are in one or other of the many laboratories subjected to the most rigorous tests in relation to fitness for human consumption, wholesomeness, taste, compliance with label, and so on.

The Republic of Korea is in many ways similar to Australia so far as its fishing industry is concerned. Firstly, it has fish resources somewhat greater than those presently under exploitation. Secondly, its economy is largely agricultural and it must develop all primary industries to enable it to export. And thirdly, it is on the threshold of much greater fishery activity. In one important respect however, Korea differs from Australia - it is taking vigorous steps to develop its fisheries. We in Australia seem in the recent past to have been merely sitting back waiting for something to turn up, rather than going out and making a start ourselves.

JAPAN

More than a fortnight was spent in Japan, which is without doubt, the leading fishing nation of the world. Her fishermen "roam the seven seas" in their search for fish, her fleets, gear, fishing techniques and know-how are in general superior to anything to be found anywhere else in the world. But it is in the technique of tuna fishing, particularly the "long-line" method which she has brought to such a high level of efficiency, that the Japanese fishermen excel. Our visit to Japan was partly to see something of the tuna fleets and the men who operate them; partly to absorb the atmosphere of a major fishing nation; partly to talk to the executives of fishing companies engaged in tuna fishing; and partly, and this is probably the most important, to explore the possibility of developing some form of joint tuna venture in the Indian Ocean, utilising a combination of Western Australian capital and Japanese vessels, equipment and if necessary, experienced fishermen.

We desired too, to learn something of the artificial propagation of king prawns, which is now being undertaken in Japan, and to give consideration to the possibility of introducing similar processes to this State.

In addition we hoped to see some typical culture pearl farms, fish processing works, canneries, markets and marketing facilities, fishing boat harbours, fish hatcheries - indeed anything which might be useful to the Fisheries Administration in this State.

I personally desired to make contact with the Director and other Senior officers of the Japanese Fisheries Agency to discuss administration, personnel and establishments generally, as well as the collection, collation, tabulation and analysis of fisheries statistics. I wanted also to discuss fisheries extension services, which have reached a high level of development in Japan.

We were met at Haneda International Airport, Tokyo, by Messrs. Toshio Fukuda and W. Mafune, of the Pearl Shell Fishing Company, who had visited Western Australia and called on the Director only about three weeks prior to our departure for the Orient, and by Mr. Tadeshi Nakamura, Chief of the Fisheries Statistics Division of the Ministry of Agriculture and Forestry.

Both the Minister and myself on our second day in Tokyo paid a courtesy call on the Director of the Fisheries Agency (Mr. Shono) and some of his departmental heads. A programme and itinerary for the whole period of our stay in Japan was drawn up, following which we saw Mr. T. Kuribayashi, one of the principals of Pearls Pty. Ltd. which operates at Kuri Bay, Western Australia. Mr. Kuribayashi offered, without cost to us, the services of Mr. Fukuda as our guide and interpreter whilst we were in Japan. This offer we very gladly accepted. Mr. Fukuda spent some 9 years in Broome in pre-war days, and his English is almost word-perfect. He certainly greatly simplified our travels in Japan. As a matter of fact, we do not know how we could have achieved as much as we did without his help.

When Messrs. Fukuda and Mafune visited Perth early in April, they told me they were making preliminary enquiries as to the possibility of a joint venture with Taiyo Fishing Co. Ltd. The status of this concern was therefore looked into before we left Australia, and again after our arrival in Japan. It turns out to be the largest of all the major fishing companies of Japan, with fingers in almost every fishing pie, including a half interest in the Pearl Shell Fishing Co. and a half interest in the firm cultivating prawns.

The Minister consequently decided that we would confine our discussions concerning the proposed joint venture to the one firm, Taiyo. We accordingly visited two of their main fishing ports, at Misaki and Yaizu, inspected several vessels of their tuna fleet, looked at their processing and storage facilities, and discussed with local executives (particularly Mr. Nobutake Miyamoto, Chief of the Tuna Fishery Department and Mr. Mitsuru Sano, Chief of Field operations). We met these gentlemen first at Misaki. (Later we met again in Tokyo at a formal meeting, when certain tentative decisions were taken) In Yaizu we saw the market just after sales had ceased. The market is co-operatively owned, and is capable of turning over the best part of 1000 tons of fish a day.

At Yaizu we visited a tuna cannery. Tuna seemed to comprise most of the fish on the market floor. This was largely albacore. Most had been sold to the cannery, but a large quantity had been sold as fresh fish. We saw this being prepared for human consumption in the raw state. We also saw a quantity of marlin on the market floor. Their "swords" had been sawn off before they were put into cold storage aboard the fishing boat. Marlin was much lower priced than tuna.

Other places visited included Chitose, on the island of Hokkaido, where we inspected a Pacific salmon and trout hatchery. One of the buildings associated with the hatchery contains a museum in which were depicted by photographs, drawings and models the whole of the processes involved at the hatchery. In rather large aquaria in an ante-room were fully-grown live rainbow trout on display.

At Fujisawa we had the opportunity while waiting for a train, to see at the local "seaquarium" the performance of a number of trained porpoises, which jumped through hoops and performed many tricks to the great delight of the very large crowd of school children present. A most attractive aquarium of high educational value, displaying both fresh-water and marine fishes, was situated right next door.

We also went to Toba, which is situated on the Inland Sea, and took a train to Kashikojima, where Mikimoto's principal culture pearl farms are located. It was here he started, about 60 years ago, the industry which in the interim has produced upwards of \$120 million worth of culture pearls. Here we were shown the whole process of culturing and conducted through the "seeding" rooms, where the nucleus is inserted in the live oyster, and the several laboratories.

A day was spent at Takamatsu, on the island of Shikoku. It is close to here, at Ikushima, that the Shrimp Farming Co. Ltd. is artificially propagating prawns for commercial purposes. The technique was developed by Dr. Mitsutake Miyamura, under the direction of a Dr. Fujinaga. The process, which is largely secret is quite fascinating and was explained fully, except for one or two steps, by Dr. Miyamura himself. The prawns after hatching pass through a total of 17 stages in about 28 days before they assume the appearance of true prawns. By this time the young prawns are from $\frac{1}{2}$ to $\frac{3}{4}$ in. long, and it is at this stage that they are sold to the prawn farmers. The farmers have constructed ponds on the coast, and it is there that the prawns are brought

to marketable size. This process takes slightly less than one year. We were both greatly impressed with the process, from which about 100 tons of prawns were marketed in Japan last year. In view of the uncertainty of the position in relation to the prawn stocks at Shark Bay, the Minister and I reached the conclusion that it might be well worth while to introduce culturing practices to Western Australia. The Minister discussed the position at some length with Dr. Miyamura. Dr. Miyamura said that if it were so desired he could accept an invitation from our Government to come to this State to investigate the possibilities. He had already been to Korea for the same purpose. If the project appeared feasible, his company might be prepared to participate by way of joint venture.

Before leaving Tokyo we visited the fish market on Tokyo Bay. This is larger than anything I have seen and is capable of handling and does in fact at times handle, more than 2000 tons of fish a day. This represents just about 5 months' catch of scale fish for the whole of Western Australia.

In view of the nature of our mission, and the scarcity of time, we did not visit any fisheries research stations under the control of either the Fisheries Agency or a University.

During our stay in Japan we covered 2330 miles. This included 520 by rail, 120 by bus 100 by car and taxi, and 40 by hydrofoil. The last named incidentally, is a vessel which lifts when travelling at speed and apparently rides on a cushion of air between the hull and the water. The one in which we travelled, carried 120 passengers at a speed of up to 65 km. (= approx. 40 m.p.h.)

SINGAPORE

While in Malaysia the Minister flew to Kuala Lumpur. I took the opportunity during his absence of contacting the Acting Fisheries Officer (Mr. Lim.) Mr. Lim very kindly showed me the fish market, fish wharves and godowns, as well as a research station where the cultivation of several kinds of freshwater fishes was being investigated. The species included carp, tilapia and snake head.

OSPREY'S LONG FLIGHT

Advice has been received from Dr. D.L. Serventy, of the Division of Wildlife Research, C.S.I.R.O., that an osprey ringed under Australian Bird Banding Scheme and carrying band No. 150-13721 was recovered on the south coast a few months ago.

Marked as a fledgling in its nest at Rottneest Island on November 2, 1963, by Mr. W. Holsworth, of the Zoology Department of the University of Western Australia, the osprey was shot as an "eagle" at Wilson Inlet, Denmark on March 19, 1964. Dr. Serventy comments that this recovery "represents an interesting dispersal from its nesting site and shows that these young birds from various breeding stations must intermingle very greatly."

GERALDTON FISHING PORT

From the standpoint of this State's fisheries Geraldton is in importance second only to Fremantle.

Geraldton's crayfisheries, including those of Houtman Abrolhos, are worth upwards of £2 million annually in prime value. They support some 600 fishermen and approximately 380 boats. There are five processing factories in the town employing many permanent hands. During the peak period of the fishing season employment is also found for a great number of casual workers, principally women. In many other ways the fishing fleet gives employment - to shipwrights and engineers, to ship chandlers and oil companies, to store-keepers and sail-makers, to craypot manufacturers and case makers. Probably the crayfish industry causes £3 million to circulate in Geraldton each year and between two and three thousand people are wholly or partly dependent on it for their livelihood.

The Government has done much to provide facilities for the Geraldton fleet. A Government multi-cradle slip for fishing boats was built many years ago. A year or two ago a large area at the western end of the harbour was dredged, wharfage was constructed, a turning basin was provided and a handsome office for the Fisheries Department (with room for Police and Harbour and Light Department officers) was erected. Just nearing completion are added berthing facilities and cat-walks in the vicinity of the breakwater. Some £90,000 in total has been spent on these facilities.

CLEARING HOUSE

A.F.D. (ACCELERATED FREEZE DRYING)

Food which will keep indefinitely without refrigeration and can be reconstituted in a few minutes with its full flavour and nutritional value is now a commercial reality.

The amazing process which made this development possible, accelerated freeze drying ("AFD"), is based on a simple principle. If wet sheets are hung out in freezing weather, they will freeze hard. But they will dry, because a gentle breeze will evaporate the ice without first turning it into water.

In this way AFD removes water from the food and leaves everything else. After freezing, the food is placed in a vacuum chamber and heated, so that the ice evaporates without affecting the shape, size or nutriment of the food.

Decay Arrested

To reconstitute AFD processed food, all that is necessary is to place it in water for about 10 minutes. It will then be as it was on the day it was processed. Decay is arrested because microbes must have water to live.

Although preservation of food by drying is an ancient process, the result did not taste the same as the original food, and it was only recently that freeze drying began to be recognised as the ideal method of preservation.

Wartime Move

The difficulty with this method was that only tiny quantities could be dealt with at a time, and it was slow and expensive. Some way had to be found to heat the frozen food in such a way that the ice would vaporise and not melt.

The seeds of modern AFD were sown during the war, when fish was dried between two hot plates in a vacuum. Promising though this development was, it did not produce a sufficiently high quality food on reconstitution.

At this stage scientists at the Torry Research Station of the DSIR, Aberdeen, began experimenting to find a satisfactory process. They achieved two major advances - a method of keeping the pressure in the drying cabinet down to the point where frozen food would remain frozen,

and the use of metal mesh between the food and hot plates to speed up heating and vaporisation.

More progress was made, but by 1958 it was decided that the time had come for industry to take over the development of AFD.

After a successful trial, the Irish Sugar Company, through its subsidiary, Erin Foods, became the first in the world to operate a commercial-scale AFD plant, opened in January, 1961, at Mallow, County Cork.

Erin Foods now produce a wide range of dried vegetables and meat and will no doubt add fish to the list in the near future.

The advantages of accelerated freeze dried food to the caterer are obvious. AFD food cuts out preparation and waste, saves storage costs (no refrigerator needed), and enables exactly the right amount of food to be cooked. Since defrosting is not necessary, it is a matter of minutes to reconstitute extra food and cook it.

Most food is up to nine-tenths water, which means that dried food weighs only one tenth of food in its normal state, bringing savings in handling and transport costs.

The caterer can stock up with as much food as he can accommodate, safe in the knowledge that it does not have to be used immediately or defrozen for 24 hours beforehand.

Of even greater importance than its value to the caterer or housewife is the economic significance of AFD.

Even more than with deep-freezing, commodities can be taken off the market in times of glut and released at other times. Thus it may be possible to have a year-round supply of fresh strawberries!

Commodities will be easily moved from parts of the world where they are in plentiful supply to countries with a high degree of under-nourishment. It is just these countries, too, which are unlikely to be able to afford the costly refrigeration necessary to keep frozen foods, but which could easily use existing storage space to accommodate supplies of AFD food.

There is no doubt that the fish shopkeeper will before long be able to buy pre-cut chips which only need soaking to be ready for frying, and fish which can be stored on the shelves and brought down ten minutes before frying time.

He will still need to make his own batter, however.

(Fish Trades Review

Sydney

February, 1964)

ANTARCTIC WHALE STOCKS
DECLINE AS COMMISSION NATIONS ARGUE

Conservation measures cannot be made tough enough to avert the severe decline in stocks of Antarctic whale. Improved equipment such as radar, asdic, explosive harpoon heads and faster boats have thinned the ranks seriously in the past few years, especially the valuable finbacks, blues and humpbacks. The present season started December 12 and will end April 7. Experts in the International Whaling Commission are predicting that the season's end will see a continuation of the trend of recent years and another reduced catch.

The trouble is that the 16 member nation of the commission (Canada is one of them) cannot agree on what conservation measures are necessary. A committee of three scientists recommended that there be a complete cessation of hunting blue and humpback whales in the Antarctic "for a considerable number of years." On this point there was agreement from all commission members and humpbacks south of the Equator are thus being protected and blue whales in the Antarctic are also under a ban except in one small area where the pygmy whale (a small type of blue) predominates.

Disagreement erupted over proposals to slash the annual catch of finbacks to 5,000 or about one third of the present catch so that their numbers could be built up to a maximum sustainable catch of 20,000 a year. Member nations, however, failed to agree to a big enough reduction in the annual overall quota that would have enabled a build-up of finback stocks. The quota for all types of whales was reduced by a third for the current season but even this cutback will take none of the strain off finback stocks. Scientists are fearful that this year's activity will reduce finback stocks to the point at which it will require many years of abstention to repair the damage.

(Western Fisheries

Vancouver

March, 1964)

THE TASMANIAN SCALLOP INDUSTRY

by L.A.St. Leger, Dip. Com.,
F.C.I.S., Secretary for Fisheries

The Scallop Fishery of Tasmania commenced as a commercial venture at the beginning of the century and has developed to a significant proportion of the State's Fisheries production. It ranks third in quantity and in value of total fisheries production and returns some £160,000 to the 100 or so scallop fishermen of the State. The fishery was confined to the D'Entrecasteaux Channel until 1950, when it extended to Norfolk Bay, Coles Bay and the East Coast and to Ringarooma Bay in 1960 and to the Northern part of the East Coast in 1963.

There are three species taken in Tasmania, the principal one being the Commercial Scallop (*Pecten meridionalis*) which represents about 95% of the total catch. There are two other species taken, the Queen scallop (*Equichlamys bifrons*) and the Doughboy (*Mimachlamys asperimus*). Other species of scallops known as the Saucer Scallop (*Amusium balloti*), are taken in Queensland and Western Australia, whilst the scallop taken in Victoria, known as "*Pecten alba*" is closely related to the Tasmanian species.

Since 1950, the total production of the State has expanded from about $\frac{1}{2}$ million lbs. (ex-shells) to the million lb. mark at present. The greatest production was in 1962, when the total reached 1.26 million lbs., of which 36.8% was taken from the D'Entrecasteaux Channel, the Balance being taken from the East Coast. The greatest quantity taken from the Channel was in 1961, when 1 million lbs. were taken out of the total production of 1.01 million lbs. and represented 94.1% of the season's catch.

The number of boats in the fishery in 1950 was 40 and this number gradually increased to 125 in 1960, but decreased to 100 in 1963.

The scallop is regarded as a delectable food and is in great demand particularly during the winter months. The season is fixed by the Minister for Fisheries in accordance with the Fisheries Act, and this is during the winter months May-August. There is a legal minimum size for the different species, Commercial and Queen varieties being $3\frac{1}{2}$ inches across the widest diameter, and the Doughboy, $2\frac{3}{4}$ inches.

Scallops are taken by means of a dredge towed behind a fishing vessel. The width of this dredge is prescribed by regulation at not more than four feet. The scallops are sorted on deck, bagged and then taken ashore at the end of the day's operations. They are then opened (split or

shucked) and the meat - that is the white adductor muscle and the roe - is packed for marketing or cool storage. It takes 20-25 scallops on the average to yield 1 lb. of meat.

The commercial scallop is hermaphrodite by nature, that is both sexes exist in the one fish. The eggs or sperms of one sex matures first and are discharged into the water and this is followed at a later stage by the discharge of the remaining ripe sex product. By this means self-fertilisation is avoided. The larvae are planktonic - that is free swimming near the sea surface - for a period of two or three months. They undergo various changes in form during this period and emerge as tiny scallops about $\frac{1}{8}$ in. in width. At this stage of development, they are known as "spat" and sink to the bottom and attach themselves by hair-like threads, to rocks, seaweed and other objects. After a period they release their attachment and live like the adult scallop, lying on their curved shell on the sea bottom. They reach maturity at the third year of their existence, but it is another two or three years before the legal minimum size of the scallop is reached. An interesting feature in the life of the scallop is the method of swimming. Contrary to expectations, they swim with the lips foremost, the hinge in the rear. On either side of this hinge is a short slip from which water is ejected, giving the scallop a jet-propelled motion which takes it for a distance of up to 15 feet and as high as six feet from the sea bottom. On the whole, however, the scallop usually lives at a fixed establishment and movement is very limited.

There are two principal types of predators - the large eleven-armed spiny starfish (*Coscinasterias calamaria*) and the large welk or band shell (*Fasciolaria australasia*) the former being more destructive. This starfish, which grows up to 18 inches across, uses its strong thick arms, each having numerous tube feet, to envelop the scallop and pull the valves apart. This enables the starfish to protrude its thin-walled stomach into the scallop which is killed and partly digested. The destruction of the scallop stocks by predators is considered to be substantial in certain areas.

Research work by Mr. A.M. Olsen, former Senior Research Officer of the C.S.I.R.O., disclosed that on one bed - Mountain Creek - the mortality from March 1951, to April, 1954, was assessed between 75% and 80%, considered primarily due to starfish. It was also noted that they had a distinct preference to the smaller scallop, leaving only the bare shells.

In order to assess the future potential of the scallop industry of the State, the Government has established a special Committee of the Sea Fisheries Advisory Board to conduct a full-scale examination of the present position and to advise on its future management.

This comprehensive investigation will cover all aspects of the scallop fishery, both biological and economic. The Committee will have as its advisor, research officers of the C.S.I.R.O., Division of Fisheries and Oceanography, the Commonwealth Fisheries Office, Department of Primary Industry and Officers of the Victorian Department of Fisheries and Wildlife.

As a result of this intense research work, it is hoped to establish a stable industry which will be of considerable economic importance in the future development of the marine resources of the State.

Extract from "Tasmanian Journal of Agriculture"

(References: "Underwater Studies on the Tasmanian Commercial Scallop" (*Notovola Meridionalis*: Tate), by A.M. Olsen).

(Service

Hobart

April, 1964)

NEW TRANSISTORISED MARKER BUOY

A new transistorised buoyant marker light for attachment to life buoys and other buoyant apparatus is announced by Wessex, marine and aeronautical emergency pyrotechnic manufacturers in Britain.

Known as the Salvor, it is powered by standard dry cells as used in hand torches, and provides a flashing light for 60 hours. It is approved by the British Ministry of Transport and complies with the requirements of the International Convention for the Safety of Life at Sea.

The Salvor is normally stowed in the inverted position, adjacent and attached to the lifebuoy. The circuit is so arranged that it will not operate in this attitude but it switches "On" immediately when vertical or above a horizontal attitude. It is self-righting in water.

(Shipping News

Cape Town

March, 1964)

SPECIALTY FISH PACKS COULD REPLACE SALMON

Specialty fish items could find a good market in Australia and help to take up the dollar slack caused by the slump in canned salmon sales to that country, according to an official of the Canadian Department of Trade and Commerce in Sydney.

R.L. Richardson, assistant commercial secretary, reported in a recent bulletin of the department that Australians spend about \$22 million a year on fish imports. Salmon and sardines are the major items, and for many years, Canada supplied most of the canned salmon, with an annual volume of 300,000 cases. Since the Second World War, Canadian sales have dropped to an average of 30,000 cases, and Japan has become the major supplier. Russian red salmon is regularly on the market, but that country's sales of pink salmon have been spasmodic.

Canadian sardines have maintained their position with no competitors in their price range. European sardines in oil will always be in demand in Australia, even at a much higher price, by those who prefer them.

There is also a growing interest in other types of specialty fish products, including frozen and smoked varieties, said Richardson. "You can find on the shelves of Australia variety food stores such things as crab meat from Canada, shark fins and frog's legs from Japan, and caviar from Russia. Canadian packers of specialty items could develop an increasing trade," he predicts.

(Western Fisheries

Vancouver

March, 1964)

JAPANESE SUCCESSFUL IN FISHING WITH BIG PUMP

A suction pump has been successfully used to catch fish in Japan, according to a report of the Japan Fisheries Academy in Otaru.

In the course of a survey of modern fishery methods, a team of the Nihon University's Fisheries Department was able to land a catch weighing about 28 pounds in 15 minutes with the aid of a pump. The experiments were conducted from a small 11-ton vessel in May last year.

A suction pump was powered by an electric motor connected to a rubber hose 16½ feet long, with a trumpet

shaped mouthpiece at one end. Lights installed on the ship and fixed to the mouthpiece attracted fish. The technique had been tried before, but on earlier occasions the fish were invariably damaged. It is believed however, that Soviet fishing boats successfully employ the suction pump fishing method in the Caspian Sea.

(Western Fisheries Vancouver March, 1964)

UNIFORMITY GOAL OF FAO STUDY

Experts from a dozen nations met in Rome in February to start drawing up world-wide standards and a code of principles for the fish and fish products industry. The meeting was sponsored by the Food and Agriculture Organization of the United Nations, which is headquartered in Rome.

Fish, the FAO says, is becoming an increasingly important export item for many nations. In 1957 only a fifth of fish catches were exported and five years later the ratio increased to a quarter. Each major fishing country has its own food laws, regulations and quality standards which are applied to the processing of the catch.

The idea behind the Rome meeting was to initiate a world-wide set of standards to eliminate any confusion and uncertainty.

(Western Fisheries Vancouver March, 1964)

SEXTUPLETS

A she-whale of unusual fertility has been caught off the shores of the Antarctic. Sixteen metres long, she was carrying six unborn baby whales of both sexes. The biggest was nearly eight feet long, and the embryos were 170 days old.

The whale was delivered to the factory ship Sovetskaya Ukranina by the whaler Derzky.

Captain Alexei Solyanik said that whales rarely give birth to more than two offspring at a time. He knew of only one case when three were found in a whale caught off the Faroes in 1928.

(Fishing News London February 28, 1964)