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(WESTERN AUSTRALIA FISHERIES

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WESTERN AUSTRALIA

MONTHLY SERVICE BULLETIN

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(Photo W.A. Newspapers Ltd.)

FREMANTLE FISHING-BOAT HARBOUR, SHOWING PART OF THE CRAYFISHING FLEET

Seasonal Greetings

FROM THE DIRECTOR AND STAFF, FISHERIES AND WILDLIFE, PERTH, W.A.

Western Australia's crayfisheries in the immediate post-war years occupied a very lowly position in the State's overall economy. But with an ever-increasing demand from overseas for high quality "rock lobster tails," really remarkable developments have taken place. Present production falls little short of 20 million lb. annually, and is worth nearly £8 million.

Western Australia supplied about 70 per cent. of the crayfish exported from the Commonwealth.

STAFF NOTES

The Director, Mr A.J. Fraser, attended the annual meeting and presentation of trophies of the Western Australian Game Fishing Association, held at the Royal Perth Yacht Club, on November 9, 1962. Mr Fraser gave a short address on the occurrence of marlin, in which the Association is particularly interested. On November 14, Mr Fraser attended a meeting of the Royal Society's Committee on National Parks, which was set up to follow on the work of the similar committee constituted some little time ago by the Australian Academy of Science.

We welcome to the staff Miss Robyn Anne Hall, typist, who commenced duty on November 5, vice Miss M.C. Crofts.

At Head Office, on the eve of her resignation to leave for the eastern States on a working holiday, Miss Crofts was presented by the Director, on behalf of the Staff, with a compendium and photograph album. Miss Crofts sailed from Fremantle on the Oriana on November 7.

Research Officer R.J. Slack-Smith spent a few days on the research vessel "Lancelin" toward the end of November. The "Lancelin", under command of Mr C.J. Seabrook, with Mr C.R.C. Haynes, mate, and Cadet Inspector P.C. Willey, crew member, was on the last of the series of cruises in connection with the crayfish phyllosoma surveys. Mr Slack-Smith was on board to obtain experience in handling plankton nets and in the collection of plankton, as a large part of his prawn research work this year will be the delimiting of juvenile prawn areas in Shark Bay.

We were pleased to see Inspector A.T. Pearce, of the P.V. "Dampier", at Head Office on November 29. Mr Pearce was in Perth on three days' annual leave.

Examination fever was rife in Head Office in the early part of last month. In addition to research cadets J.H. Jacoby and R.C.J. Lenanton, who were engaged in their first year science faculty examinations at the University, Misses H.M. Sivwright and H.M. Gilfellon, and Messrs H.B. Shugg, G.C. Ferguson and P.G. Yewers, all had to sit for

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various examinations.

Both research cadets commenced duty on November 12, Mr Jacoby with the Fauna Section and Mr Lenanton with the Research Section.

Relieving Inspector R.M. Crawford will resume duty on December 5 after leave and will be stationed at Lancelin until further notice.

Inspector D.P. Gordon and Assistant Inspector C.W. Ostle are stationed at Jurien Bay, a sub-district of the Perth district, where they will carry out inspectorial duties during the present crayfish season.

Congratulations are extended to Fauna Warden and Mrs N.E. McLaughlan on the arrival on November 29, of their daughter by adoption, Glenda Kaye.

Officers to commence annual leave after Christmas will include Miss M.A. Bartlett and Mr H.B. Shugg, of Head Office, who will commence one week's and two weeks' leave respectively.

PERSONAL PARS

A visitor to Head Office last month was Mr J.B. Higham, a member of the Fauna Protection Advisory Committee, who had returned to Perth on November 1 after six months' absence overseas. Mr Higham reached Fremantle on the Oronsay, from Sydney, after having made the return journey from London via Canada. Mr Higham, who has been on leave of absence from the committee, will attend the next meeting on December 14.

We were pleased to receive a number of visits from Mr Donald V. Merton, Field Conservation Officer, Wildlife Branch, Department of Internal Affairs, Wellington, New Zealand. Mr Merton timed his visit to Perth to coincide with the first part of the British Empire and Commonwealth Games, arriving on November 4. Previously, he had worked for four and a half months with the Division of Wildlife

Research, C.S.I.R.O., being stationed in Canberra under Research Officer Norman Robinson. Mr Merton spent a week with the Department of Fisheries and Game, Melbourne, and a couple of days with the South Australian Department, before coming to Perth. He accompanied Fauna Wardens S.W. Bowler and N.E. McLaughlan into the field on a number of occasions, visiting amongst other places the straw-necked ibis rookeries in the Gingin district and the sea bird nesting sites in Shoalwater Bay. He also visited Geraldton privately before sailing from Fremantle on the Arcadia on November 26.

KOREA REPORT

by A.J. Fraser, Director

My recent visit to Korea provided me with many surprises. This should not have been so. I really should have taken time before I left to read something of this beautiful land. But other commitments, and the rush of my leaving, determined otherwise. I have admittedly neglected, as have many other Australians, to make myself familiar with what goes on in the countries which lie to our north. Of course, national upheavals like the Korean War of the early '50's, the students' revolution of 1960 and the Army coup of 1961, made the world's headlines. We were kept well enough informed of these happenings, but the everyday life of Korea, and indeed of much of the Far East, is largely unknown to us.

The history, the struggles, the achievements, the great natural beauty of this young republic, and perhaps above all the hospitality of the people, were to me as a closed book until October of this year.

For example, I knew little or nothing of Korea's fishery developments or her fishery potential, of her quite substantial export market for fishery products, nor of the plans at present being laid to step up the annual production of fish from little more than 400,000 tons to 1 million tons a year (Australia's total is about 60,000 tons p.a.). I was unaware that, as a unit of the Pusan National University, there existed a Fisheries college with a student enrolment of between 700 and 800 and a faculty of about 70. I had not dreamed that a new reinforced concrete fish market building, with a capacity of some 800 tons of fish a day, and with nearly 1,000 tons of the most modern freezing and cold storage facilities, was nearing completion in Pusan, the main port. I was not aware that there was a large fisheries research station at Pusan where studies on many aspects of fisheries, including

processing, were pursued. I did not know that there were two large fish hatcheries turning out millions of carp annually for planting in rice fields. I certainly was ignorant of the fact that there were two plants (one at Seoul and one at Pusan) manufacturing braided nylon fishing nets of all descriptions.

These were some of the things which surprised me.

The reason for my Korean visit was to attend the Tenth Session of the Indo-Pacific Fisheries Council at Seoul. The Council comprises the majority of the nations which have fishing interests in the Indian and Pacific Oceans. Although there are in fact 13 member-countries, representatives of only 11 were present. These were Australia, Ceylon, France, India, Japan, Korea, the Netherlands, the Philippines, Thailand, the United Kingdom, the United States of America and Vietnam. In the absence of the chairman and the vice-chairman, Mr Min, Choong Shik, Assistant Vice Minister for Operations, Ministry of Agriculture and Forestry, Korea, was elected to the chair.

Except at week-ends, the Council sat continuously each day, and sometimes at night, from October 10 to 25. The meetings took the form of either plenary sessions, when all delegates were present, or else meetings of the standing technical committees, at which committee members only were present. Australia's leader, Dr G.L. Kesteven, of the Division of Fisheries and Oceanography, C.S.I.R.O., was chairman of Technical Committee I (fisheries biology, oceanography) and I was assigned to Technical Committee II (technology, economics, socio-economics, statistics). Committee II's chairman was Mr Tuanthai Bamrajarinapi, of Thailand.

In addition to the normal meetings, one whole day was set aside for a symposium on "The mechanization of fishing-fleets in the Indo-Pacific region". The convener was Mr Lee, Bong Nae, of Korea, Director of the Fisheries Research Station, Pusan. Mr Jan-Olaf Traung, of the Fisheries Division, FAO, Rome, who it is expected will be visiting Australia next year to advise on fishing-boat design, was rapporteur.

A total of more than 70 papers from all parts of the region was presented, either at meetings of the technical committees or at the symposium. Some of these were of exceedingly high standard and triggered off much useful discussion.

The quality of the papers was also a source of surprise to me. Secluded as we are here in Western

Australia, I had no idea that some of the eastern nations had progressed so far in fisheries matters, either scientifically or technologically, as these papers quite clearly indicated they had. In a fishery sense, Australia lags far behind many of her Asian neighbours. Japan, of course, is well known as being perhaps the best developed of all the great fishing nations of the world. Certainly her fishermen range the seven seas, and some of the techniques she has devised, particularly for tuna catching, are quite revolutionary. Japan supports at least one University of Fisheries, and there are colleges, training schools, research laboratories and the like in almost every part of the kingdom. India too has made remarkable strides in relation to her fisheries. Very considerable sums are spent annually in development and research, both scientific and technological, and fisheries training schools and colleges are spread around the whole of the country. Korea, as already stated, has made real progress in fisheries, and the fisheries of both Ceylon and Thailand, as well as those of the Philippines, are on the march.

Fisheries-wise, Australia obviously has much to learn. The opportunities which meetings of the IPFC provide of discussing and viewing developments in other countries should be availed of without hesitation. Perhaps we are too complacent here. The sums appropriated for fishery research and development by some of our Asian friends are really staggering, and no stone is left unturned to implement decisions of IPFC. I believe we could make a very worthwhile contribution to IPFC, but we should first set our own house in order. I am sure that we in Australia, at both Federal and State levels, could do more to follow up the Council's decisions and findings and thus play a more prominent role in its work. In addition to giving help to the less developed nations, we could learn much from those which have gone much further along the road of progress than we have.

CHRISTMAS AND NEW YEAR LEAVE

In the Government Gazette of November 30, 1962, it notified that the following days will be observed as public service holidays for Christmas and New Year:-

- Monday, December 24, 1962 - Special
- Tuesday, December 25, 1962 - Christmas Day
- Wednesday, December 26, 1962 - Boxing Day
- Monday, December 31, 1962 - Special
- Tuesday, January 1, 1963 - New Year's Day.

FISHERIES ACT AMENDMENT

Advice has been received that on November 30 His Excellency the Governor signified Royal Assent to the Fisheries Act (Amendment) Act, 1962. The highlights of this new legislation were discussed in the last issue of the Bulletin.

OPEN SEASONS

Wild Ducks -

The 1962 season will open at 6 p.m. in the evening of Saturday, December 22, in the south-west corner of the State from Harvey to Manjimup, and at 5 a.m. in the morning of Sunday, December 23, in the remainder of the South-West and Eucla Land Divisions.

Full details of the open season, of the restrictions which apply during its currency, and of the areas remaining closed to shooting, are set out in the duck shooter's guide, a copy of which is attached to this issue.

Quail -

A four months' open season for Stubble Quail commences each year, on December 1 in all that part of the State south of the 31st parallel of South Latitude, that is, from a line drawn from Lancelin Island through Coolgardie. North of that line an open season commences on March 1 in each year and continues until June 30. There is no bag limit for quail nor is there any area specifically exempted from the open season.

Marron -

The annual marron season will open on January 1, 1963, and continue until midnight on April 30. The following restrictions apply -

- * Legal minimum carapace length - 3 ins. from a point between the eyestalks to the end of the carapace, measured dorsally;
- * The use of unattended traps is prohibited at all times;
- * The taking of females in berry is prohibited.

There are no areas specifically exempted from this open season.

PRAWN TRAWLING LICENSES

In view of the general interest in the allotment of prawn trawling licenses, some of a series of questions asked in Parliament by the member for Gascoyne, Mr D. Norton, and the replies given by the Minister for Fisheries, are set out hereunder -

1. Has his Department made any decision regarding the number of licenses it will issue for prawn trawling for the 1963 season in the Shark Bay waters?

REPLY Yes.

2. If the answer is yes, how many trawlers will --

- (a) be licensed,
- (b) operate from shore stations in Shark Bay and Carnarvon,
- (c) be freezer boats operating with or without catcher boats.

REPLY (a) 25
(b) 17
(c) 7 without catcher boats.

One license has not yet been allocated.

3. Have any licenses been granted and if so, to whom?

REPLY No licenses have been granted. The under-mentioned have been advised that they will be permitted to trawl for prawns in the Shark Bay-Carnarvon area.

Nor'-West Whaling Company	10 boats
Planet Fisheries, Shark Bay	5 "
Eureka Fishing Company	1 boat
Poole's Fisheries	1 "
Kingfisher Corporation	1 "
M. de Sousa	1 "
R.J. Phillips	1 "
Ocean Trawling Company	1 "
Tropical Traders Ltd.	1 "
T. Doak	1 "
W.P. & D.I. Goode	1 "

Following on those replies, Mr Norton asked a number of additional questions including the following, the replies to which are also set out serially:--

4. What are the requirements and qualifications for an applicant for a prawn trawling license in the Shark Bay-Carnarvon waters?

REPLY Applicant is required to be the licensee of a registered fishing vessel. Preference is given to boats owned by processing firms established at Carnarvon and Denham. Experience in prawn trawling is regarded as a prerequisite.

5. How many applications have been received for licenses?

REPLY 34.

6. Who decides which applicants are to be granted licenses?

REPLY The Minister, in consultation with the Director of Fisheries.

7. Are any applicants for licenses afforded personal interviews when their applications are being considered?

REPLY Yes - if so desired.

8. Is he aware of the feelings of the Carnarvon Council and the Shark Bay Progress Association in respect to the prawning industry and the proposed allocation of licenses?

REPLY Carnarvon Council - Yes.
Shark Bay Progress Association - No.

* Messrs Goode have now returned to Queensland with their boat, and are prawning from Scarborough. Approval for their license has since been revoked. Messrs Wheeler Bros. and Annear and Mr F. Correia, both of Fremantle, will, subject to compliance with departmental requirements, be permitted to engage in prawning next year at Shark Bay.

BRITISH MUSEUM (NATURAL HISTORY) EXPEDITION

The Harold Hall Australian Expedition organised by the British Museum (Natural History) arrived in Fremantle on November 13. The leader of the expedition, Mr J.D. Macdonald, and Mrs Macdonald, who is medical officer to the expedition, arrived a few days earlier. The other two members of the expedition, Messrs Graham Cowles and Peter Colston, were met at Fremantle by our Fauna Wardens, who paid a number of courtesy calls on the expedition while it was camped at Gooseberry Hill. On November 22, the members of the expedition were entertained at dinner at the King's Park tearooms by a group of local ornithologists, including Dr D.L. Serventy, of the Division of Wildlife Research, C.S.I.R.O.; Mr Julian Ford, honorary secretary of the W.A. Branch of the R.A.O.U.; Mr Angus Robinson, ornithologist and farmer, Coolup, a deputy member of the Fauna Protection Advisory Committee; Mr C.F.H. Jenkins, Government Entomologist and well-known naturalist; Dr G.F. Mees, Curator of Vertebrates in the Western Australian Museum; and Mr H.B. Shugg, Fauna Protection Officer of this Department.

Later that evening, the party attended a meeting of the W.A. Bird Group, held at the headquarters, of the Western Australian Naturalists Club. It was presided over by Dr D.L. Serventy, who, on behalf of the Club and local naturalists, extended a welcome to the members of the expedition. Mr Macdonald, after acknowledging the welcome, gave a talk on the aims and purposes of the British Museum and of the expedition. A resume of his address, which was illustrated by transparencies, appears below. It summarises succinctly why such expeditions are carried out and the benefits to be obtained from them -

"The British Museum was founded in 1753. Its basis was a collection of miscellaneous items amassed by Sir Hans Sloane. The collection contained numerous zoological specimens, including some birds, mainly bones. It was housed in a mansion in Bloomsbury and in the Act of Parliament which brought the Museum into existence it was stated that the collection was to be "maintained for the inspection and entertainment of the learned and curious, and for the general use of the public, to all posterity".

I think that statement adequately covers the main purposes of any museum, except perhaps for the more hilarious aspects of entertainment. Entertainment in its educational sense, or instruction of the curious, is to be found in the galleries open to the public.

"The preservation of specimens for the inspection of the learned only gradually became a distinct purpose in the organisation of the museum for the original idea was that everything should be exhibited. I need not elaborate on that point or say that the distinction is recognized to varying degrees in different museums. In the British Museum the separation is still not complete, but considerable strides to that end have been made in the last 20 years, especially by the formation of a department which deals entirely with exhibition, instructional tours, public lectures and so on.

Specimens preserved for the inspection of the learned, as distinct from those exhibited for the general use of the public, serve two main functions. One is that they are used for reference purposes; that is to say they illustrate named kinds and are used for identifying material which is not named. Their other function is for research purposes; that is to say they form the raw materials for extending knowledge.

It is the latter function which I wish to speak about in particular. Research may be carried out either by members of the staff or by visiting students, mainly the latter. Students from at least a dozen countries worked with us during the past year. The way I look at it is that it is our first duty to help such students by providing them with the material they require. One way to do that is for us to go out and get it, though such opportunities occur all too infrequently. That is why we are here at the moment, but of course although we want to help others we would like to do some research ourselves.

It can be a tricky matter nowadays collecting birds for research purposes. It is well known and understandable that the objections of the specialist are not readily appreciated by those not well versed in his subject, whether he wants to reach the moon, drive a car at suicidal speeds or collect birds. At the same time, of course, the specialist might go off with the bit between his teeth and it is a good thing that he should be pulled up. It is a good thing that there are two sides to any question. Government is strengthened by opposition in Parliament. What value would there be in a penny if it had no obverse and reverse sides.

I can illustrate the research side of our work by the example of a problem raised by Mr C.M.N. White, of Northern Rhodesia. White has been studying larks

belonging to the genus Mirafra, mainly the African species. The genus is represented by one species in Australia which, incidentally, has been the subject of valuable studies, both by Dr Mees of Perth and Mr Alan McEvey of Melbourne. White is interested in the broad view of the genus, a view which started to expand when the original Bush-lark of Australia, M. horsfieldi, was considered to be conspecific with M. javanica. Expansion continued when the African marginata was joined up with the Indian cantillans through the Arabian simplex. Next, cantillans was linked with javanica, and recently White took the matter even further by tacking on M. passerina of South West Africa. This is where I take some personal interest in the matter for I have studied passerina in the field in South-West Africa. It has a very striking and distinct behaviour. I am looking forward to seeing if I can recognise any similarities in the behaviour of the Australian Bush-lark, for behaviour as well as morphology can provide important clues in the understanding of relationships."

At the conclusion of the address, in a lively discussion, members of the Group suggested a number of problems relating to the taxonomy of Australian birds which the expedition might follow up if it had the opportunity.

Later, two Australians joined the expedition in Perth. They were Mr Alan R. McEvey, Curator of Birds at the National Museum of Victoria, and Mr W.G.D. Middleton, Senior Forester of the Forests Commission, Victoria, who is an ecological botanist with a knowledge of ornithology. They will guide the expedition and advise it on ornithological matters during its journey eastwards. The expedition left Perth for Adelaide by road on November 30 and expects to be about fourteen days en route. It will not return to Western Australia for some months, but licenses were issued to the three collectors and also to Mr A.R. McEvey to collect materials subject to the conditions set out in the May 1962 issue of this bulletin. The expedition was escorted as far as Tammin by Fauna Warden S.W. Bowler, who was able to advise on local matters.

WESTERN FISHERIES RESEARCH COMMITTEE

As foreshadowed in the previous issue of this Bulletin, a meeting of the committee was held in the S.G.I.O. building on November 20 and 21. The following research situation reports and background papers were submitted:-

1. Investigation of phyllocoma larvae of Western Australian Crayfish, by R.W. George and P. Cawthorn;
2. Length frequency and growth rate studies of the Western Australian crayfish, by B.K. Bowen;
3. Exploratory fishing and biological studies of prawns, by R.J. Slack-Smith;
4. Catches of Australian salmon in Western Australia in 1961 and 1962, by W.B. Malcolm;
5. Research on humpback and sperm whales in Western Australian waters, by R.G. Chittleborough;
6. Monofilament nets and net selectivity generally, by J.M. Thomson;
7. Legal minimum crayfish tail weight, by B.K. Bowen;
8. Proposals for the establishment of marine sciences institute, by E.P. Hodgkin, of the University of W.A.;
9. A report by the project leader, by J.M. Thomson;
10. The responsibilities of committee members, the organisations represented, the project leader and research personnel, by J.M. Thomson.

In addition, addresses were given by Mr J.A. Gulland of the Fisheries Research Laboratory, Minister of Agriculture, Fisheries and Food, Lowestoft, England, on population dynamics in fisheries, and by Mr A.A. Stark, biometrician of the Commonwealth Bureau of Census and Statistics, who has been seconded to the Division of Fisheries and Oceanography, C.S.I.R.O.

Copies of the reports of the proceedings of the Committee, including summaries of the addresses, will be made available in due course to all members of the staff.

FAUNA NOTES

Following reports of unusual biological phenomena in last month's issue, it is of interest to note that Mr W.H. Miller, of Albany, when applying for a renewal of his professional hunter's license, said that he had recently found twin joeys in a doc's pouch. Unfortunately, he said, they were too immature to survive.

Honorary warden H.C. Atkinson, of Bibra Lake, advised last month that last August he had captured a specimen of the long-tailed dunnart (Sminthopsis murina) at Daveyhurst, a hundred miles north-east of Coolgardie. He said that the animal had been identified by himself and his father before it was released at the point of capture. He also reported that jerboa-marsupials, possibly Antechinomys spenceri, were common in the area between Southern Cross and Lake Barlee. If the identification of the jerboa was correct, it would seem to extend a long way westward the known range of this species.

Senior Inspector J.E. Munro reported last month having observed a flock of five or six galahs in the Yanchepp area and also a flock of 14 to 15 in the Maddington area. The latter had been seen several times in the last few years.

Fleet Maintenance Officer A.J. Bateman advised that on November 25, a hot hazy day, he had observed a large flock of skuas feeding in the vicinity of the Harbour Trust's offal barge, about 2½ to 3 miles outside Fremantle. He estimated that there were between 300 and 400 birds in the flock. He was not able to identify the skuas, which he said he had never seen in such numbers before. They might have been the Arctic skua, which is a summer visitor from the northern hemisphere. Reports from any other sea-going personnel who might happen to sight groups of skuas, no matter how few birds are involved, would be greatly appreciated. If the species cannot be identified a description of their plumage could be given together with a comparison of their size to other well known birds.

On a recent visit to areas north of Dowerin, Fauna Warden N.E. McLaughlan reported having observed four crested pigeons in the Dowerin district. According to two local wardens, the species had not been seen there prior to 1960 but had gradually increased and were now more common than bronzewings.

Mr McLaughlan also reported observing nine white swans (Cygnus olor) on the Avon river in the Northam town-site. Two of the birds appeared to be nesting, he said, on a small island between the traffic bridges. This is one of the few spots in the State in which this species survives. It was acclimatised there many years ago, and

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in one or two other places, but has not yet shown any tendency to increase or to spread.

Last August, Mr R. Coleman, an apicultural officer of the Department of Agriculture, reported finding a mallee fowl's nest in forest country, three or four miles eastwards of the 64-mile peg on the Great Northern Highway. He left explicit directions for finding the mound and on November 15 it was inspected by Fauna Wardens S.W. Bower and N.E. McLaughlan, accompanied by Cadet Research Officer J.H. Jacoby and Mr D.V. Merton, of the Wildlife Branch, New Zealand. Our wardens reported that the mound stood approximately 2 ft. 6 in. high, had a diameter of 6 feet, and was constructed principally of gravel and loam. A hole measuring about 18 inches in diameter was found leading into the middle of the mound and to a depth of 15 inches. Examination revealed about a 5-inch depth of leaf mould and some egg shell. The shell was later compared with mallee hen's eggs in the Museum and appeared to be identical. As the mound was in jarrah forest, it was of particular interest.

SWAN RIVER NOTES

Good Prawn Season Forecast

Senior Inspector J.E. Munro says that although crabs are scarce in the river this year, prawns appear to be very plentiful and he anticipates a most satisfactory season for amateurs and professionals alike. He thinks that the late rains which brought a considerable quantity of silt into the river may be the reason why crabs had not appeared in any numbers, for they usually show up in October.

No Dolphins, None Sharks

Mr Munro added that no dolphins had been seen in the river to his knowledge for two or three years, but that reports kept coming in that whaler sharks were more prolific. Evidence of their presence in the river included damage to fish while being hauled, including a mullock which had its tail chewed off and with a large gash in its throat. A whaler shark was seen in the vicinity by the fisherman who was aggrieved at the loss of the mullock's tail.

Amateur Net Fishermen's Licenses

Staff are reminded that amateur fishermen using prawn nets, or any other type of nets, need to be licensed.

The fee is 10s. a year, but for the period from July 1 to December 31, it is 5s. Amateurs wishing to partake in the prawn harvest before December 31 will need to have a current license.

SHARK TAKE TUNA

The crew of the 240-ton Hoko Maru tuna boat which berthed at Fremantle for repairs early in November, reported that sharks were preying heavily on the catches of 10 Japanese tuna boats which were fishing about 600 miles northwest of Fremantle. They said that the sharks attacked the fish as the long lines were being winched in.

STAFF QUARTERS

At the end of this section is a reproduction of the plans of the new departmental office and residence at Shark Bay. Inspector T.D. Baines reports that the building is nearing completion and that several improvements have been incorporated in the plan. These include the enclosing of the carport, and the provision of an additional water tank.

MARRON DO WELL AT BEVERLEY

During a patrol of duck waters in the Beverley district at the end of October and the beginning of last month, Fauna Warden S.W. Bowler called on honorary warden F.R. Blechynden, of Red Hill, Beverley. Amongst other things, Mr Blechynden mentioned that marron were doing very well in his dams and that he had recently caught some quite large ones. The largest weighed a pound and a quarter, while several others ran to a pound, but the general run was about a half to three-quarters of a pound. In a later interview Mr Blechynden advised that he had stocked his dams about the middle of 1959. He had put large marron in first but they had walked straight out at the far side, so he had tried again with smaller ones and had had greater success. Trout had already been placed in some of the dams in which the marron were planted and in those neither the marron nor the trout did well. The most successful dam as far as marron were concerned was one a little less than 2,000 yards in size and 10 feet deep. The water in it was very milky from a white clay, and visibility was limited to a few inches. About two dozen marron had been placed in this dam in the winter of 1959 and 180 had been taken out of it last year, ranging in size from half inch to the large ones mentioned. No attempt had been made this year

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to catch the marron in it, Mr Blechynden said, but he felt confident there were more. The dam had received no special preparation, although a little wheat had been placed in it once or twice. It was also used by sheep and cattle. Mr Blechynden added that he had donated quite a few marron from his own dams to neighbouring farmers and hoped that they would do equally well elsewhere in the district.

FINANCE FOR FISHING VESSELS

One of the resolutions of the Commonwealth-State Fisheries Officers' Conference, held in Sydney last September, was that the Commonwealth Development Bank be requested to provide financial accommodation for fishermen wishing to purchase second-hand boats, subject to a survey by a competent marine authority.

The conference secretary, Mr A. Spencer, last month forwarded a copy of the Bank's reply to this approach. It drew attention to the Bank's current lending policy that except in special circumstances, it was not able to approve applications which merely involved a change of ownership of land or other assets. As the purchase of a second-hand vessel usually involved only a change of ownership, finance could not be made available for this purpose under the current lending policy. Notwithstanding this, however, the Bank would be prepared to consider cases of special merit and also any in which the purchase of a second-hand vessel from overseas was involved.

The Bank pointed out that the cases which would fall within the scope of its operations were those in which developmental aspects were involved. Thus finance could be made available for a new boat, including or excluding equipment, and for the major reconstruction of any existing one. When considering requests for finance, nevertheless, the Bank had regard to an applicant's total needs and his ability to carry the subject venture through to a successful conclusion. It was unlikely that a loan would be approved unless there was evidence that the loan, together with other expected funds, would cover the total needs.

MARKET RESEARCH

One of the reports received by the Commonwealth-State Fisheries Conference last September, was a progress report on economic research being conducted by the Department of Primary Industry.

The Department advised that research was being

conducted into fish marketing, both in Australia and overseas. The Australian items consisted of two independent projects being carried out in New South Wales. The first was the compilation of a detailed description of the marketing and distribution of fish in that State. This report would be purely descriptive and would not include conclusions or recommendations. It would serve as a background for the second project, which would be the study of price movements in the Sydney market, including supply/demand relationships, and the interaction of different types of fish, including imported products. These projects were being conducted in collaboration with the Chief Secretary's Department of New South Wales, and a joint report would be prepared.

The overseas market research consisted of a comprehensive report on the marketing of Australian tuna in the United States. It is intended to prepare similar reports on the overseas marketing of crayfish and prawns.

SAFETY BELTS IN MOTOR VEHICLES

A circular from the Public Service Commissioner, dated November 20, 1962, advises that the Government has decided not only to fit safety belts to all Government vehicles, but also to approve the purchase, through the Government Stores Department at Government rates, of safety belts for officers who use their cars primarily on official business.

An officer desiring to avail himself of this concession must send a requisition to Head Office in the normal manner. If we are satisfied that the vehicle concerned is used primarily on official business, a departmental requisition will be lodged with Government Stores. The amount paid will be debited against the Treasury Sundry Debtors account of the officer concerned.

NEW PATROL VESSEL TO BE LAUNCHED

At 3 p.m. on December 15, at the Department's boatshed at the foot of Ellam Street, Victoria Park, the new 40' patrol vessel will be christened and officially launched. Mrs Ross Hutchinson, wife of the Minister for Fisheries, will perform the traditional ceremony.

Built by Back Bros. & Co., shipwrights, of North Fremantle, the new vessel was designed by the Naval Architectural Division of the Maritime Services Board of New South Wales. She will replace the p.v. "Kooruldhoo" and her first skipper will be Inspector F.J. Campbell.

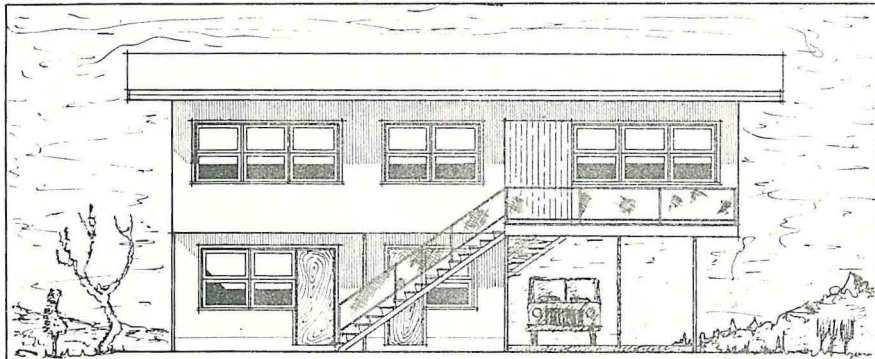
PROBLEMS OF RESERVE MANAGEMENT

Many conservationists are inclined to sit back with a satisfied sigh when an adequate reserve has been set aside for the protection of the habitat of a particular species. They see the creation of the reserve as the culmination of their efforts to ensure that a section of the animal's living space and environment are maintained in perpetuity, as indeed it is -- up to a point.

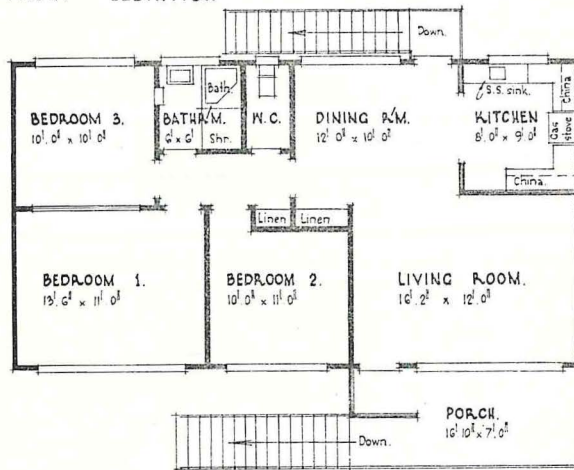
To the Department, however, the gazettal of the reserve means only the beginning of our worries. It then becomes our responsibility. Farmers' eyes search it for arable soil and soon lodge applications for its alienation if they think that the whole, or sections of it, could be tilled or grazed. If it is in auriferous country, mining interests seek to exploit its hidden resources. Local authorities, business enterprises, or sporting organizations seek to lease or to control it wholly for their many purposes. Neighbouring farmers, understandably anxious to protect their own properties, wish to burn it regardless of the effects of fire on the flora and fauna for whose protection it was set aside. There are often complaints that "vermin" have bred up on it and are causing devastation and leading to the ruination of surrounding farms.

All these applications and complaints must be investigated and answered, if possible, or countered. We cannot simply ignore complaints or oppose applications to reduce, alienate, or lease such areas "on principle". Sound arguments are needed to justify our viewpoint and considerable research is needed to substantiate arguments, however sound we believe them to be. For instance, an application to lease parts of Bernier and Dorre Islands could only be answered by a thorough ecological evaluation of their role in and value to the conservation of flora and fauna. A scientific party set up by the Fauna Protection Advisory Committee visited these islands in July, 1959, and carried out a detailed ecological survey of them. The party's report on their work has now been published as this Department's Fauna Bulletin No. 2. Its principal author was Dr W.D.L. Ride, Director of the Western Australian Museum and leader of the scientific party. It runs into 132 pages and is an outstanding documentation of the human and natural history of these two islands. It includes recommendations which were adopted by the committee in toto.

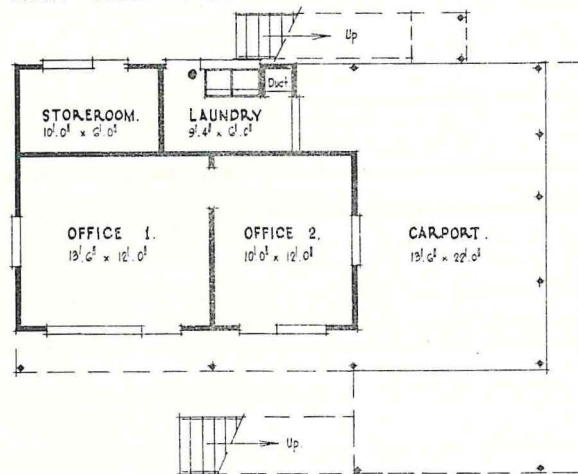
As we have reported in previous issues, problems of management of the important reserves at East Pingelly are under investigation. The first of what will be a series of reports has been compiled by Mr R.D. Royce and Dr A.R. Main and will be published, ultimately, in a series of bulletins.



FRONT ELEVATION

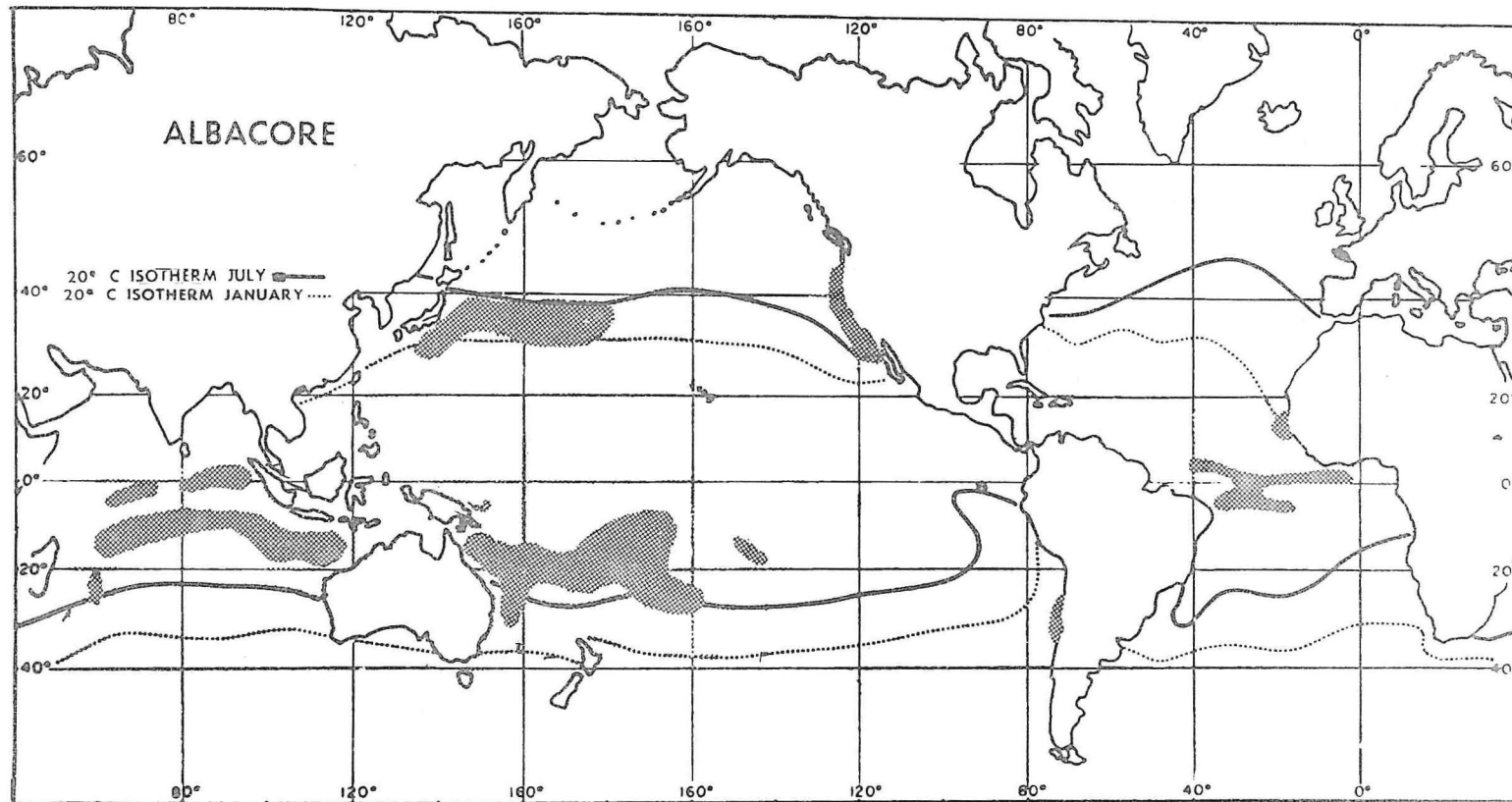


FIRST FLOOR PLAN



GROUND FLOOR PLAN

PROPOSED FISHERIES INSPECTOR'S QUARTERS AT SHARK BAY
 PREPARED BY THE ARCHITECTURAL DIVISION
 STATE HOUSING COMMISSION OF W. A.



World-wide distribution of Albacore tuna is indicated by this chart showing commercial fishing activities. Regions of heavy fishing are shaded darkest. Shown also are the average locations of the 20° Centigrade Isotherms during summer and winter. Chart by Richard L. Neely, U.S. Bureau of Commercial Fisheries, Seattle.

(Reproduced from "Western Fisheries" Vancouver)

CLEARING HOUSE

Methods,
THE TUNA FISHERY: Distribution
and Abundance

Canada's first tuna fishery officially gets under way this month, with the sailing of Bill Logan's "Dominador" and Bob Karliner's "Pacific Harvester" for waters off Mexico and Central America. Many other B.C. fishermen are expressing a lively interest in tuna. The comprehensive and timely article by San Diego tuna scientist Gerald Howard should answer many questions on tuna distribution, fishing methods and the abundance of the resources.

By Gerald V. Howard,
Director, Bureau of
Commercial Fisheries
Biological Laboratory,
San Diego, Calif.

Tunas have long supported important fisheries in the world's tropical and subtropical seas, the tuna fisheries of the Mediterranean and the Japanese Home Islands being of great antiquity. More than a dozen species are caught around the world, the most important being yellowfin, skipjack, albacore, bigeye and bluefin, which common names do not necessarily describe five homogeneous species but, rather, each is a composite of very closely related forms. They are characteristically fishes of similar habits and appearance but vary widely in size although each is commonly represented in commercial landings by specimens of less than 10 lb. Skipjack rarely exceed 25 lb. and few albacore heavier than 60 to 70 lb. are captured, the other three attaining much greater weight. Yellowfin and bigeye as large as 300 lb. are not uncommon and bluefin are frequently even heavier.

The predaceous tunas live in the warm upper layer of the oceans, generally spending all their life far from large land masses, their distribution and migrations being related to changing features of the oceanic environment. Even the so-called sub-surface species of certain tropical regions are found in the uppermost 100 fathoms. What is known of their world-wide distribution largely comes from the location and volume of commercial catches.

Areas of commercial fishing are outlined schematically in the accompanying chart, as are the average winter and summer positions of the 20° C. sea surface isotherm in the northern and southern hemispheres. Three of the five

important species - yellowfin, skipjack and bigeye - are tropical in occurrence and are only found in quantities where water is 20° C. or warmer although skipjack sometimes appear in somewhat cooler water, occasionally in temperatures as low as 15° C. The tropical species respond directly to seasonal temperature changes at the extremes of their ranges and in summers, when the corresponding warm isotherms move unusually far north in the northern hemisphere or south in the southern hemisphere, so do these fish.

Albacore and bluefin are often referred to as the temperate tunas. During summer and autumn, particularly in the earlier years of their life, they are found well to the north or south of the 20° C. isotherm, depending on the hemisphere, as witnessed by such seasonal fisheries as those for albacore in the Bay of Biscay, off the east coast of Japan, and the west coast of the United States, and the bluefin fisheries of the North Sea, California, and south-eastern Australia. Both albacore and bluefin of older age groups are caught the year around in tropical waters of the western and central Pacific, the Indian Ocean, and the south Atlantic, and there is evidence that spawning occurs in these regions.

Within the limits of their temperature tolerance, distribution of the tunas is complex and often varies markedly from month to month and from year to year. It appears to be related primarily to shifting features in the oceanic environment and researchers of the important tuna fishing nations are just beginning to understand this relationship.

Certainly, one important factor is food for tunas are usually found in greatest abundance in regions of high biological productivity. Good feeding conditions coincide with areas of the ocean where the circulation brings nutrient-rich deeper waters into the layer of light penetration. Here, production of phytoplankton is stimulated which, in turn, leads to large crops of forage organisms and, finally, to the concentration of tunas. Variations, within and between years, in the intensity and location of centres of enrichment are known to be an important factor responsible for changes in distribution and relative abundance.

Landings

Although tuna fishing is conducted by almost every maritime country bordering tropical and temperate waters, the tuna fisheries, since the advent of powered boats, have been dominated by Japan and the United States. World landings amounted to just over half a billion pounds

(250,000 short tons) in 1948, a billion pounds in 1953, and a billion and one-half in 1957. They may approach 1.8 billion in 1961.

Japan and the United States presently account for more than 90 per cent of the catch. Japan produces over 70 per cent of the total, presently worth over 150 million dollars annually to her fishermen and her most valuable fishery. U.S. landings are valued at 45 million dollars and are second to shrimp in value. Other important producers are Peru, France and Spain.

Japan, rather than the United States, has been responsible for the dramatic increase in world production over the past decade for with the end of the Occupation in 1952, Japanese tuna vessels quickly spread their activities from around the Home Islands into the western, central, and south Pacific, and the Indian Ocean. In 1956, they moved into the Atlantic, and, more recently, there has been some Japanese fishing in the eastern tropical Pacific. Now Japan's tuna fleets range over all the world's tropical and subtropical seas.

United States production reached a peak in 1950 when 400 million pounds were landed. Since then foreign competition, through increasingly heavy tuna imports, halted expansion and the annual catch has stabilized at well over 300 million pounds. The United States fishery is concentrated in the eastern Pacific, extending from Oregon to northern Chile and offshore several hundred miles, but recently a few vessels have operated in the eastern tropical Atlantic. Only minor attention is given to tuna fishing off the United States East and Gulf Coasts.

Tropical species account for three-quarters of the world tuna catch. Albacore is somewhat more important than bluefin in the temperate catch. Until 1960, the United States tropical fleet caught about equal quantities of skipjack and yellowfin, with the latter presently dominating. Very little bigeye is caught by United States fishermen. The Japanese, because of the great skipjack fishery off the Home Islands, catch nearly as much skipjack as they do combined quantities of yellowfin and bigeye.

It is difficult to identify the catch by oceans since detailed information is published by country of origin with no record of the ocean from which the catch is taken. However, the Pacific and Indian Ocean contribute a greater amount than does the Atlantic, where the tropical fishery is of recent origin, and together were responsible for about 80 per cent of the landings in 1961.

Fishing Methods

A variety of methods is used to capture tuna. Traps, of ancient use but of minor importance, are used in Europe, notably along parts of the Mediterranean coast, and in Japan for bluefin, but are effective only in a few locations where the bluefin seasonally migrate close to shore. Trolling is important for albacore in the Bay of Biscay and off the United States west coast but live-bait fishing, long-lining, and purse seining account for nearly all tropical catches. Longline fishing is responsible for the total Japanese distant high seas catch, except for skipjack for which live-bait is used. The live-bait method also accounts for one-third of the United States albacore, the bulk of the Japanese Home Islands spring and summer albacore, and, until recently, about 80 per cent of the United States tropical landings. Purse seining is used for bluefin off California and the coast of Japan and suddenly has become the dominant method in the year-around United States tropical fishery.

In long-line fishing numerous baited hooks are lowered to desired depths. Two main types are used, one for subsurface fishing at depths of 100 to 200 ft., and the other for depths of 150 to 350 ft. The former is used generally for albacore and bigeye, and the latter for bluefin, bigeye and yellowfin. The basic unit of gear is the "basket" - a length of main line, varying in length from 800 to 2,000 ft., to which branch lines, or droppers, are suspended at intervals. Branch lines consist of a cotton section and a wire leader to which a baited hook is fastened. The main line is suspended horizontally by float lines equipped with glass buoys with bamboo poles serving as markers between baskets. Longline vessels vary in size from less than 100 gross tons to more than 1,000 tons. Larger vessels set out, each morning, several hundred baskets of gear stretching over many miles of open sea and spend the remainder of the day and part of the night retrieving the catch.

Live bait fishing methods have changed little over the years. After a supply of live bait (usually small anchovy or herring-like fishes) is obtained inshore and placed in well aboard, the bait boat proceeds to the fishing grounds. When a school is intercepted, live bait is thrown overboard to attract the tuna close to the vessel. Fishermen then station themselves in racks close to the water. When the school responds to the bait, the tuna become wildly excited in their feeding reaction and strike the feathered lugs, or baited barbless hooks, used by the fishermen. Their lines are attached to short bamboo poles. Disadvantages of the method are that much time is spent catching live bait and there are problems in keeping it alive aboard ship.

United States purse seiners use the one-boat system where the net is carried aboard the catcher-vessel. To surround a school, the large vessel releases a small auxiliary boat, called a "skiff", which is attached to the end of the net. The skiff tows away from the seiner as the latter circles the fish, the seiner joins together with the skiff as the circle is completed and the net is pursed. The net is then pulled aboard until the fish are concentrated for brailing. Tuna seines typically measure 400 to 500 fathoms long by 40 to 50 fathoms deep.

Purse seining is more widely practised by United States fishermen than by others. It began after World War I and, for years prior to 1958, seiners consistently accounted for about 20 per cent of the tropical tuna and all bluefin landed. Then suddenly in the latter part of 1958, there began a mass conversion of the California baitboat fleet to seiners. The conversion took place at an unprecedented rate and by 1961 practically all suitable baitboat hulls had been converted. Almost overnight, purse seiners displaced baitboats as the dominant element in the United States tropical tuna fishery. The event may well have a profound effect on high seas seining throughout the world.

The mass conversion was brought about by the introduction of the all-nylon net and the power-operated block for recovering the seine. The main advantage of the power block is the time saved in making sets, particularly unsuccessful ones which account for about half of the total and now take an hour instead of two. Nylon nets are handled more easily, need less care and do not deteriorate as rapidly as do cotton nets.

The converted baitboats turned out to be about twice as efficient as before and this was a tremendous stimulus to the United States tuna boat owners who had experienced marginal profits, but often losses, between 1953 and 1959, and to fishermen who had seen their earnings slump and employment opportunities drop. This occurred despite the fact that American fishermen were, even at that time, operating much more efficiently than their foreign competitors in terms of catch-per-man-day at sea. However, the margin of efficiency had not been enough to offset differences in living standards. Thanks to the gear improvements, they are again competitive and tuna prices are rising with the increasing world-wide demand. Nevertheless, United States fishermen are not resting easily, for they realize they must keep ahead of their competitors if they are to remain in business. They know this will become more demanding as more and more nations turn to tuna fishing.

Current System

The limitations and advantages of the various fishing methods are related to the distribution and behaviour of the several tuna species which, in turn, are related to features of the environment. Some remarks about the major current systems of the oceans may be helpful in understanding the distribution of tuna and the application of the more important methods.

In equatorial regions, there is a westward transport of surface water north and south of the equator by the North and South Equatorial Currents. These currents turn poleward at their western boundaries, transporting large volumes of warm water into temperate latitudes. In the northern hemisphere, between 30° and 40° N., these currents leave the shore and flow north-easterly, joining the cold counter-clockwise currents, the Oyashio in the Pacific and the Labrador in the Atlantic, and proceed eastward. Processes of mixing and cooling during the eastward flow are such that, when the waters reach the western shores, or eastern side of the ocean, they are no longer tropical. The southward-flowing California and Canary Currents transport cool water well into the tropics where they swing offshore into the equatorial region, completing the circle.

The circulation described gives rise to substantially different conditions on the western and eastern sides of the oceans. The western sides have a broad belt of tropical water offshore and a narrow belt of temperate water inshore. The eastern sides of the oceans are characteristically the opposite. The tropical ocean, simply stated, is a two-layer system of persistent stability. The upper part is referred to as the mixed layer because it is isothermal. This is where the tuna live. The mixed layer is warm. It is separated from the cold water of the depths by a strong thermocline, or sharp temperature gradient. The differences described for the eastern and western sides of the oceans profoundly affect the thickness of the warm upper mixed layer. On the eastern portion of the tropical oceans the mixed layer is thin, from 50 to 200 ft. thick; on the western side, it is much thicker, frequently more than 300 ft.

The size and effectiveness of the principal types of fishing gear for yellow fin and bigeye tuna are directly related to the depth of the upper mixed layer. The eastern margins of the tropical oceans are the only areas where major live-bait and purse seine fisheries for these species occur the year around. Live-bait fishing and purse seining depend on these tunas being near the surface. The long-line method, which was the basis of the great Japanese expansion

in tuna fishing in the 1950's, is the only method presently available which is successful in catching yellowfin and big-eye in the tropics where the mixer layer is deep. These fishes penetrate the entire range of the deeper mixed layer of central and western oceans.

The skipjack behaves differently. Apparently it remains close to the surface, whether the mixed layer be deep or shallow. This appears to be the reason that the long-line gear is not effective in its capture. Catches of skipjack in the areas of the great tropical Japanese long-line fisheries for yellowfin and bigeye are so small and so scattered that they only provide evidence of their occurrence. Live-bait fishing probably would be effective for skipjack in the vast high seas regions of the tropics but is limited by the need for small bait fishes usually found in catchable quantity only close to land. Purse seining techniques have not been tried extensively on the fast-moving skipjack schools in the central and western tropical oceans.

Condition of Resources

When one considers that the major tuna fisheries have, for a considerable period, ranked high among the world's fisheries, it is surprising that, as recently as a decade ago, knowledge of the biology, life history, ecology and effect of commercial fishing on the populations of the several species was almost completely lacking. Some research programmes during the last 10 years, notably the comprehensive programme of the Inter-American Tropical Tuna Commission in the eastern tropical Pacific of Commercial Fisheries Biological and that of the United States Bureau Laboratory, Honolulu, have made rapid progress towards elucidating the ways of these commercial fishes.

For studying the effect of the commercial harvest on fish populations and determining their maximum sustainable harvest, knowledge is needed of the life history and ecology of the species concerned. Furthermore, accurate and detailed catch and effort statistics are required. Most needed are measures of total catch, total fishing effort, and catch-per-unit-of-effort over a series of years at different levels of fishing intensity. All three statistics are essential; not much can be inferred from one alone.

There are data on catch-per-unit-of-effort for many tuna fishing regions, but, among the major fisheries, only that of the eastern tropical Pacific is adequately documented. This is an alarming situation when one considers the rapid and tremendous development of tuna fishing now under way throughout the world. Without proper statistics,

if over-fishing occurs, it will not be detected until too late. Rather, reduced total catch and lower catch-per-unit-of-effort will likely be excused on the basis that natural fluctuations are responsible. This is not to deny that the latter occur but to suggest that they are too often blamed for decreasing total catch, for we see more fluctuations "down" than "up".

The situation in the eastern tropical Pacific, as revealed by the Tuna Commission's analysis of detailed catch and effort data, is this; the skipjack population is very large in relation to the present harvest, so large that the present fishing intensity is having little or no effect on the average population abundance. For yellowfin, things are quite different. Catch and effort data show conclusively that the yellowfin population responds sharply to changes in fishing intensity. The average annual maximum sustainable catch is estimated to lie between 160 and 220 million pounds, with 194 million being the most probable amount. The total yellowfin catch approximated 233 million pounds in 1960 and is expected to exceed that amount in 1961. The tuna Commission has recently recommended to its member nations (the United States, Costa Rica, Ecuador and Panama) a quota for the yellowfin catch in 1962.

Members of the industry are aware that a yellowfin quota will require adjustments in their eastern tropical Pacific operations, but some see these problems as being easier to solve than those which would arise from the alternative situation - over-fishing. They recognize that regulations will be based on sound scientific principles that are the result of many years of careful research. It is hoped that fishermen in other parts of the world will be fortunate when the need arises for management of their tuna fisheries.

The world's tuna fisheries have reached maturity. Nations harvesting these great resources now have a joint responsibility to insure that these valuable fisheries flourish and perpetuate themselves. Our growing populations will need more and more food from the ocean. It is necessary that the maximum sustainable harvest of all our great fishery resources be determined and it is essential that this should not be exceeded.

(Western Fisheries Commission, Vancouver, B.C. June, 1962)

DUCK SHOOTERS' GUIDE 1962/63

OPENING:

The 1962 season will open -

- (a) at 6 p.m. in the evening of Saturday, December 22, in the Shires of Augusta-Margaret River, Balingup, Bridgetown, Busselton, Capel, Collie, Dardanup, Greenbushes, Harvey, Manjimup, Nannup and Preston;
- (b) at 5 a.m. in the morning of Sunday, December 23, in the remainder of the South-West and Eucla Land Divisions, not included in the Shires named.

SPECIES INCLUDED IN THE OPEN SEASON:

Whistling Tree-Duck (Dendrocygna arcuata)
Plumed Tree-Duck (Dendrocygna eytoni)
Mountain Duck (Tadorna tadornoides)
Black Duck (Anas superciliosa)
Chestnut Teal (Anas castanea)
Grey Teal (Anas gibberifrons)
Blue-winged Shoveler (Anas rhynchotis)
Pink-eared Duck (Malacorhynchus membranaceus)
Freckled Duck (Stictonetta naevosa)
White-eyed Duck (Aythya australis)
Blue-billed Duck (Oxyura australis)
Musk Duck (Biziura lobata)
White-headed Shelduck (Tadorna radjah)
Wood Duck or Maned Goose (Chenonetta jubata)
Pied or Magpie Goose (Anseranas semipalmata)
Green Pygmy Goose (Nettapus pulchellus)

PROTECTED SPECIES:

The Cape Barren Goose, the Black Swan and the White Swan are the only members of the family of ducks and geese which are not included in the open season. They are fully protected at all times. The Cape Barren Goose normally occurs in this State but only on the islands of the Recherche Archipelago, a sanctuary for fauna, where all shooting is prohibited.

BAG LIMIT:

15 ducks per person per day.

ILLEGAL MEANS OF CAPTURE:

This season, the only legal method of taking wild ducks will be by the use of a shotgun. All other means of capture,

whatsoever, are illegal. Spotlights are an illegal aid to duck-shooting and will be seized.

CLOSE AREAS:

Duck shooting is prohibited in all the following areas which have been set aside as refuges.

GENERAL AREAS:-

- (a) All municipalities and townsites in the South-West Land Division.
- (b) All State Forests, timber reserves, town reservoirs and other areas where shooting is prohibited under the provisions of any other Act, regulation or by-law.
- (c) The whole of the area within a radius of 20 miles of the General Post Office, Perth.
- (d) The whole of the Rockingham Shire.

SPECIFIC AREAS:-

Albany Shire -

- (e) The whole of the waters of Lake Seppings and all land within 20 chains of its shores.
- (f) The whole of the waters of Nannerup (or Taylor) Inlet and all the land within 20 chains of its shores.
- (g) The whole of the waters of the King and Kalgan Rivers and all land within 20 chains of their banks.
- (h) The whole of the waters of Oyster and Princess Royal Harbours and all land within 20 chains of their shores.

Balingup Shire -

- (i) The whole of the area within a radius of one and one-half miles from the Post Office at Balingup.

Busselton Shire -

- (j) The whole of the waters of Vasse and Wonnerup Estuaries and all land within 20 chains of their shores.
- (k) The whole of the waters of the Vasse River and all land within 20 chains of its banks.
- (l) The whole of reserves 3872 and 3876 (Public Utilities) in the Broadwater.

Capel Shire -

- (m) All that portion of the Capel River between the Capel and Stirling bridges and all land within 20 chains of the river's bank.

Dandaragan Shire -

- (n) The whole of Caro Swamp and all land within 80 chains of its shores.

Dumbleyung Shire -

- (o) All that portion of the Coblinine River downstream from the eastern side of the bridge at the junction of road 3375 and road 323 (Oxley Road) to its mouth at the high-water mark of Dumbleyung Lake and all land within 20 chains of that part of the river's banks.

Gingin Shire -

- (p) The whole of the waters of Lakes Nambung, Bambun and Mungala and all land within 20 chains of their shores.
- (q) The whole of Swan Location 2340 including Wallering Swamp.

Harvey Shire -

- (r) All those waters of the Leschenault Inlet extending southwards from a line drawn south-east from Waterloo Head (Belvedere), on the west foreshore to a point on the opposite foreshore and all land within 20 chains of the included foreshores.
- (s) The whole of the Harvey Catchment area.

Mandurah Shire -

- (t) The whole of the area within a radius of 2 miles of the Post Office at Mandurah.

Mundaring Shire -

- (u) The whole of the waters of Lake Leschenaultia and all the land within 20 chains of its shores.

Murray Shire -

- (v) All that portion of the Serpentine River from road 8629 at the southern end of Goegrup (Willies) Lake to Peel Inlet near the Old Mill and all the land within 20 chains of the river banks.

Rockingham Shire -

- (w) The whole of the shire of Rockingham.

Toodyay Shire -

- (x) All that portion of the Avon River in the Toodyay District, between the northern boundary of Avon Location 3 and a point opposite road number 2069, and all land within 20 chains of the river banks.
- (y) All that portion of the Avon River from Dumbarton Bridge to the Railway Bridge, north of Toodyay and all land within 20 chains of the river banks.

Upper Blackwood Shire -

- (z) The whole of the area within a radius of 2 miles of the Post Office at Boyup Brook.

Wanneroo Shire -

- (aa) The whole of the Yanchep Caves Reserve.

Wickepin Shire -

- (ab) The whole of the waters of Lake Yealering and all land within 20 chains of its shores.

Woodanilling Shire -

- (ac) The whole of the waters of Wardering Lake and all land within 20 chains of its shores.

DATE OF CLOSURE:

The season will close throughout the whole of the Eucla and South-West Land Divisions at midnight on April 30, 1963, unless otherwise proclaimed.

GENERAL:

- (a) Wild ducks are not to be kept in captivity except under special license;
- (b) The sale of wild ducks is forbidden;
- (c) A person shall not drive any bird over shooters by means of motor vehicles, aircraft, power boat or other means;
- (d) A person shall not take more than fifteen wild ducks on any one day.