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STAFF NOTES

Officers who took annual leave and returned to duty during December were Messrs. A. J. Fraser, G. C. Jeffery and J. C. Thair.

Mr. H. B. Shugg, who spent several weeks during November and December in Royal Perth Hospital, finished sick leave towards the end of December and is now on annual leave.

Mr. A. K. Melsom, Relieving Inspector, spent a few days in hospital during December to undergo a minor operation.

Mr. W. R. Robinson has been appointed to the Head Office temporary staff during Mr. Shugg's absence. He will remain with the Department until Mr. I. Bartholomew returns from one month's national service training towards the end of February.

Mr. N. E. McLaughlan is at present on annual leave, and Mr. J. E. Munro will commence annual leave on January 5.

Inspector S. W. Bowler, of Geraldton, paid a flying visit to Perth on private business on Christmas Eve.

The Superintendent, in the capacity of President of the Civil Service Association of W.A., spent three days in Kalgoorlie during December to attend the annual meeting of the Kalgoorlie Branch of the Association.

Mr. J. D. Milne has joined the staff as Cadet Inspector.

Mr. L. G. Smith, Technical Officer, will visit South Australia during January and February to assist C.S.I.R.O. officers in tagging operations at Ceduna and Port Lincoln.

It is expected that the Supervising Inspector, Mr. J. E. Bramley, will enter the Repatriation General Hospital, Hollywood, early in January for further treatment for a disability arising out of war service.

The Minister for Fisheries (Mr. Kelly) and the Superintendent will leave Perth on January 18 for a visit to the eastern States. The purpose of the visit is to inspect at first hand the fish marketing systems in operation in New South Wales and Queensland, and to make contact with officials and others for discussions on the matter generally. Mr. Kelly will return to Perth early in February, but Mr. Fraser will proceed to Melbourne to attend an interstate fauna conference which will be held about February 8. He expects to return to Perth via Adelaide on February 17.

Cadet Inspector D. Wright will proceed to Pemberton early in January for three months' training in trout hatchery practice.

Messrs. Fraser, Saville and J. S. Simpson attended a meeting of the Trout Acclimatisation Council of W.A. held at Harvey on December 12.

#### ROTTNEST BIOLOGICAL STATION

In a previous issue of the Bulletin it was stated that certain disused naval buildings at Rottnest Island had been taken over by the Department as a biological station which would be used conjointly by the Department, the Division of Fisheries, C.S.I.R.O., and the Zoology Department of the University of W.A. Most of the formalities have now been completed and the furnishing of the station is proceeding. The Minister for Fisheries has appointed the following as a committee to control the activities of the

station - Mr. A. J. Fraser, Superintendent of Fisheries (Chairman), Professor H. Waring, University of W.A., Dr. K. Sheard, Division of Fisheries, C.S.I.R.O., and Hon. L. F. Kelly, M.L.A., representing Rottnest Island Board of Control.

Mr. B. K. Bowen, B.Sc., of Head Office, has been appointed secretary to the committee.

TROUT ACCLIMATISATION COUNCIL OF W.A.

The quarterly meeting of the Council was held at Harvey on Saturday, December 12, and representatives from Gingin, Serpentine-Jarrahdale, Murray, Harvey, Blackwood and Pemberton-Warren Trout Acclimatisation Societies were in attendance, as well as Messrs. B. R. Saville and J. S. Simpson of the Fisheries Department. The Superintendent, who is chairman of the Council, presided.

Considerable discussion ensued in relation to the policy which should be followed for distributing to trout societies and private buyers the fry, fingerlings and yearlings produced at the Pemberton hatcheries. It appeared from observations of different members of the Council that there was some dissatisfaction at the way matters were going, and it was decided that at a meeting of the Council which will be held in Perth in March next delegates would come prepared to discuss very fully the future policy of the Council. At the same time it should be appreciated, of course, that no person or organisation would be able to carry out acclimatisation activities to everybody's satisfaction.

It might be mentioned that for some time the Department has undertaken the actual distribution of all fry, fingerlings and yearlings made available by Pemberton, but it is the Council who has the responsibility of determining the prices to be charged and the quantities to be distributed at different centres. In some respects this has worked very well, but there are certain other aspects in regard to which the Department feels that improvements could be made.

Possibly an amendment to the Fisheries Act will be necessary if any alteration of policy is decided on. The Department for many reasons is loth to take over the hatcheries, as it is felt it would bring many almost insuperable difficulties in its train, and it may be that to give the Trout Acclimatisation Council statutory hatching and distribution powers - powers which are at present held by the individual societies - will offer the best solution.

The Department appreciates to the full the very valuable work that has been done in the past by the acclimatisation societies, particularly by the Pemberton-Warren Society, but there are some grounds for the belief that as trout acclimatisation is now becoming a matter of national importance, the transfer of certain powers to a body representative of the whole State, instead of leaving it in the hands of a local body, might produce better results. The Government of course is fully seized with the value of trout acclimatisation generally, not only because of its tourist value, but also because it will ultimately provide another form of social amelioration for country dwellers.

#### FISH TAGGING EXPERIMENTS

A few months ago a table was published in the Bulletin giving details of tagging experiments carried out in Western Australia. Through the good offices of Mr. W. B. Malcolm, Research Officer of the Division of Fisheries, C.S.I.R.O., the accompanying summary of all tagging done in this State since Mr. Malcolm's first appointment here, is published for general information.

SUMMARY OF RUFF (SEA HERRING) TAGGING EXPERIMENTS, W.A. 1951-1953.

Place of Release	Date	Tag Type	No. Released	Total recoveries	Local recoveries	Movements
Cheyne Beach	27/2/51	Operculum	256	13	13	
Hopetoun	<del>20/10/51</del>	Internal	18	1	1	
Cheyne Beach	5/2/52	Internal	98	-	-	
Cheyne Beach	8/2/52	Internal	571	4	4	
Parry's Inlet		Internal	3	-	-	
Cheyne Beach	17/4/52	Internal	112	4	4	
Cheyne Beach	21/4/52	Operculum	222	-	-	
Cheyne Beach	21/4/52	Internal	670	10	6	Bunbury, Whitford's Beach, Albany Harbour, Pallinup.
Garden Island	22/5/52	Internal	6	3	3	
Hopetoun	19/2/53	Internal	5	-	-	
Hopetoun	20/2/53	Internal	44	-	-	
Esperance	24/2/53	Internal	2	-	-	
Cheyne Beach	10/4/53	Internal	989	1	-	Whitford's Beach
Parry's Inlet	14/4/53	Internal	1	-	-	
Bremer Bay	18/4/53	Internal	433	6	2	Pallinup, Nannerup, Hamelin Bay, Fremantle.
Garden Island	26/5/53	Internal	100	9	9	
Dunsborough	14/10/53	Internal	98	1	1	
Dunsborough	14/10/53	Operculum	40	3	3	

SUMMARY OF AUSTRALIAN SALMON TAGGING EXPERIMENTS, W.A. 30/11/49 - 31/12/53

Place of Release	Date	Tag Type	No. Released	Total recoveries	Local recoveries	Movements
Esperance	30/11/49	Petersen	10	-	-	
Esperance	30/11/49	Operculum	5	-	-	
Cape Riche	11/3/50	Operculum	46	8	-	Peaceful Bay (2); Cheyne Beach (6).
Cape Riche	11/3/50	Petersen	1	-	-	
Cape Riche	12/3/50	Operculum	18	1	-	Cheyne Beach
Parry's Inlet	22/3/50	Petersen	20	-	-	
Parry's Inlet	22/3/50	Operculum	1	-	-	
Parry's Inlet	26/3/50	Petersen	29	3	3	
Parry's Inlet	26/3/50	Operculum	20	2	1	Hopetoun
Parry's Inlet	28/3/50	Operculum	35	4	1	Peaceful Bay; Boat Harbour.
Parry's Inlet	28/3/50	Petersen	41	1	-	Middleton Beach
Parry's Inlet	30/3/50	Operculum	39	7	4	Peaceful Bay, Boat Harbour, Albany.
Parry's Inlet	30/3/50	Petersen	56	5	3	Albany, Boat Harbour.
Parry's Inlet	31/3/50	Operculum	37	6	3	Peaceful Bay (3)
Parry's Inlet	31/3/50	Petersen	60	6	5	Peaceful Bay
Cheyne Beach	27/2/51	Operculum	41	21	19	Torbay, Hamelin Bay.
Cheyne Beach	27/2/51	Internal	10	4	2	Torbay (2)
Cheyne Beach	3/3/51	Internal	7	4	4	
Cheyne Beach	3/3/51	Operculum	31	14	14	

## Australian Salmon (Continued)

Place of Release	Date	Tag Type	No. Released	Total recoveries	Local recoveries	Movements
Cheyne Beach	4/3/51	Operculum	19	13	11	Peaceful Bay, Cape Riche.
Cheyne Beach	4/3/51	Internal	100	71	68	Peaceful Bay (2); Nannerup
Cheyne Beach	5/3/51	Operculum	36	14	13	Torbay
Parry's Inlet	7/3/51	Internal	24	5	1	Albany, Boranup, Peaceful, Cheyne Bch.
Parry's Inlet	7/3/51	Operculum	30	2	-	Peaceful, Nornalup
Parry's Inlet	9/3/51	Internal	16	3	2	Hamelin Bay
Parry's Inlet	9/3/51	Operculum	21	1	-	Cheyne Beach
Parry's Inlet	10/3/51	Internal	11	-	-	
Parry's Inlet	10/3/51	Operculum	7	1	-	Peaceful Bay
Parry's Inlet	1/4/51	Operculum	27	-	-	
Hamelin Bay	18/4/51	Operculum	1	-	-	
Hamelin Bay	18/4/51	Internal	18	-	-	
Nannerup Beach	11/7/51	Internal	50	6	1	Cheyne Bch (2), Hamelin, Naturaliste, Dunsborough
Cheyne Beach	17/7/51	Internal	54	5	3	Torbay, Hamelin
Cheyne Beach	17/7/51	Operculum	15	-	-	
Cheyne Beach	9/3/52	Operculum	11	2	2	
Cheyne Beach	27/2/53	Internal	99	28	25	Augusta, Hamelin, Boat Harbour.

General Summary of Ruff (Sea Herring) Releases

Western Australia, 1951-53

	Tag Type	Releases	Recoveries	% Recovery
1951	Internal	18	1	5.6
	Operculum	256	13	5.8
1952	Internal	1,460	21	1.4
	Operculum	222	-	-
1953	Internal	1,672	17	1.2
	Operculum	40	3	7.5

TOTAL RELEASES:

(1951-53)	Internal	3,150	39	1.2%
	Operculum	518	16	3.9%
	<u>Total All tags</u>	<u>3,668</u>	<u>55</u>	<u>1.5%</u>

General Summary of Australian Salmon Releases

Western Australia, 1945-1953.

Year	Tag Type	Releases	Recoveries	% Recovery
1945	Operculum	47	8	17.2
1946	Operculum	265	56	21.1.
1947	Operculum	65	1	1.6
1948	Operculum	274	88	32.1
1949	Operculum	431	18	4.2
	Petersen	10	-	-
1950	Operculum	196	28	14.3
	Petersen	207	15	7.4
1951	Operculum	228	66	28.9
	Internal	290	98	33.8
1952	Operculum	11	2	18.2
1953	Internal	99	28	28.3

TOTAL RELEASES:

(1945-1953)	Operculum	1,517	267	17.6%
	Petersen	217	15	6.9%
	Internal	389	126	32.4%
	<u>Total All Tags</u>	<u>2,123</u>	<u>408</u>	<u>19.3%</u>

CONVICTIONS RECORDED

October 1 to December 31, 1953.

Date	Defendant	Court	Charge	Result
12.10.53	Waters, W.A.	Fremantle	Fish in close waters	Fined £5
12.10.53	Waters, W.F.	do.	Undersize fish	" £5
3.12.53	Rowland, J.	Geraldton	Undersize crayfish	" £2
3.12.53	Smith, G.F.	do.	do.	" £2
3.12.53	Penniment, C.	do.	do.	" £3
3.12.53	Worthington, R.	do.	do.	" £2
3.12.53	McEvoy, E.	do.	do.	" £2

BANDING OF WILD DUCK

On December 2, 1953, the Fauna Warden, Mr. J. Traynor, commenced the Department's duck banding programme for the current season. Three traps were set at Watson's Lake, about 5 miles south of Dumbleyung. This body of water covers an area of approximately 300 acres. Mr. Traynor estimated that there were 600 to 700 birds on the lake. Grey teal predominated, but there were also on the lake mountain duck, black duck and swan.

The number of ducks trapped was rather disappointing. This lack of success was due mainly to the abundance of natural food, which made the food offered by Mr. Traynor less acceptable. The situation was aggravated by the blocking of the entrances to the traps by weed stirred up by persistent strong winds.

In all only 64 birds were trapped, comprising 41 grey teal, 7 black duck and 16 mountain duck.

On December 20 the traps were lifted and two were set at Queen's Gardens, Perth. Here 15 black ducks

were trapped and 13 banded, the remaining 2 being re-traps.

Since the opening of the duck season on December 20 the following recoveries have been reported.

No.	Date Ringed	Place where Ringed	Date Recovered	Place where Recovered	Distance Travelled
<u>Black Duck</u>					
1054	11.6.52	Queen's Garden	22.12.53	8 miles S. of Northam	50 miles
1732	21.4.53	do.	30.12.53	Busselton	135 "
1950	4.5.53	do.	22.12.53	Mandurah	45 "
<u>Grey Teal</u>					
1494	26.2.53	Karrinyup Lake	20.12.53	Roelands Swamp	97 "

Mr. Traynor proposes to start at Karrinyup Lake early in the new year.

FREMANTLE FISHERMEN'S CO-OP. SOCIETY LTD.

This Co-operative is reconstructing the old fish markets building at Fremantle which it acquired under lease from the Public Works Department three years ago. Structural alterations and additions to the existing building are estimated to cost £25,000. Provision has been made for the processing of crayfish and other fish, quick-freezing and holding rooms, a merchandise store, a retail shop for fresh and cooked fish, a machinery room and office. Deep sewerage has been connected to the building and the necessary approval to process fish on the premises will be granted when the constructional programme is completed. It is anticipated that the building will be finished and the plant installed by the end of March.

Government assistance to the extent of £15,000 by way of guarantee against overdraft has been granted

to the Society. The balance required has been subscribed as share capital by the members of the Society. The subscribed capital of the Society is now £13,000.

The spirit of optimism that now prevails among the Fremantle fishermen augurs well for the future of the Society. The Management Committee is confident that all debts incurred in connection with the building and plant will be liquidated by December 1955.

The Society is to be commended for its enterprise and forethought.

#### REFUSAL OF APPLICATIONS FOR LICENSES

By direction of the Minister under section 17 of the Fisheries Act licensing officers are now required in certain circumstances to refuse applications for licenses. This matter was mentioned at the annual departmental conference in November last, and inspectors instructed in all cases in which an application was refused to report forthwith to the Department the full reasons for such refusal. This is merely to serve as a reminder to the staff generally that the furnishing of these reports is of No. 1 priority. As inspectors are aware, applicants have the right of appeal to the Minister in relation to any refusal, and unless the facts on which the licensing officer's decision was based are available to the Minister, he will not be able to give proper consideration to any representations made to him by an appellant.

#### ABROLHOS ISLANDS CRAYFISH SEASON

The Minister for Fisheries, in pursuance of section 17 of the Fisheries Act, 1905-1951, and following a recommendation by the Fishermen's Advisory Committee, has issued a directive to licensing officers that the licenses of fishermen who elect to engage in crayfishing at the Abrolhos during the 1954 open season shall be endorsed to the effect that they shall not during the currency of that open season engage in crayfishing elsewhere, and that the licenses of fishermen who elect to engage in crayfishing elsewhere between parallels

28°S and 30°S during that open season, shall be endorsed to the effect that they shall not during its currency engage in crayfishing at the Abrolhos.

The committee's recommendation followed its meeting in Geraldton in November when evidence was taken from a number of Abrolhos fishermen.

The position is that for a number of years - although the practice has grown in more recent times - some fishermen have commenced crayfish operations at the Abrolhos when the season opened, and when fishing is normally good, and after a few weeks, during which time they have taken the cream of the fish, have returned to Geraldton to fish in onshore waters. The Abrolhos men by and large are dependent on these onshore waters for their livelihood during the 7 months close period at the Abrolhos, but if any number of men return from the Islands before the open season is finished, they will to some extent fish the onshore areas "dry" before the general body of fishermen return at the close of the season. It was felt by the Committee that the interests of the men who were prepared to spend 5 months at the Abrolhos, where conditions are far less favourable than at Geraldton, should be safeguarded, and this was the reason for its recommendation.

The open season at the Abrolhos in 1954 will be the same as it was in 1953, i.e., from March 15 to August 15.

#### WEST AUSTRALIAN WHALING

Though Western Australian shore-based whaling activities for the current season commenced some time after the official opening of the 1953 humpback season on 1st May, full quotas were taken by all companies for the first time since the industry began operations in 1949. The season normally extends over six months, but with sightings numerous, operations at sea were completed in little over three months. Activity at shore stations was maintained near to full capacity by the catching of 1300 whales, the average length of which was 40 ft.

The quantity of high grade edible whale oil produced, together with the by-products of whale meal and solubles are shown hereunder -

	<u>1953</u>	<u>1952</u>
	tons	tons
Whale oil ... ..	11,000	10,383
Whale meal .. ...	3,200	2,200
Solubles ... ..	1,809	3,205

The latest figures suggest a small decline in the average quantities extracted. An average of 8.5 tons of oil per whale was realised from the 1953 catch as compared with 8.7 tons in 1952.

Oil prices remained comparatively steady during the year, varying between £A90 to £A93 per ton whilst solubles averaged £A25 per ton. The Australian market price for whale meal ruled at about £A41 per ton in comparison with £A60 in overseas markets. On the basis of these prices and with the production of whale meal distributed equally between the local and export markets, the average return per whale was £A900 to £A925.

Due to the irregular visits of suitable vessels, the shipment of whale oil has presented many difficulties. However, arrangements were made for the bulk of this year's production to be shipped to the Continent and Sweden whilst the remainder will be absorbed on the Australian market. In past years, owing to a shortage of suitable stock foods and fertilisers, whale meal has been retained on the local market, but improved supplies of competitive products have permitted limited exports of this year's production. Whale solubles, with a high protein content are used mainly for stock feed purposes. Sales have been made on the Australian market whilst useful exports have been made to the United Kingdom, New Zealand and Singapore.

The whaling industry is also conducted on the east coast at Moreton Bay, Queensland. A full quota of 700 whales was caught and processed at the Tangalooma shore station during the season.

TROUT ACCLIMATISATION IN W.A.

On November 9, 1953, an experimental planting of 1,000 yearling trout from Pemberton hatchery was made in a pool of the Hotham River at Pumphrey's Bridge, near Pingelly. Conditions in this pool are very similar to those in Brand's Dam, Pingelly, where there is good weed growth and an abundance of natural food, particularly shrimps. A parcel of 3-inch fingerling trout had been released in this dam on December 18, 1952, and by November, 1953, fish weighing up to 3 lb. were being taken on spinners. If the growth rate in the river is as good as in the dam, anglers should grass some good fish before the river starts running again.

Fifteen thousand fingerling were successfully transported to Beverley on November 11. Fifteen parcels varying from 250 to 1,000 each were counted out to farmers for planting in their private dams; the remainder were liberated in the Dale River.

During December two loads of fingerling trout were delivered at the Dale and one each at Narrogin and Pingelly. The fish taken to Narrogin and Pingelly were for private buyers, while the two loads for Dale were planted in river pools on account of the Serpentine-Jarrahdale Trout Acclimatisation Society.

Transport of the young fish was done in the transport unit recently transferred to the Department from the Pemberton-Warren Trout Acclimatisation Society, and Inspector J. S. Simpson was in charge of operations. During the November transplantations he was assisted by Assistant Inspector V. J. Sinclair, and by Assistant Inspector J. L. Gallop with the December operation.

It was found necessary, when delivering to private buyers, to leave the transport unit in the sun for periods up to two hours to raise the water temperature to that of the water in the buyers' containers. During these periods the engine was continually pumping water through the aspirator to give the fish sufficient air. It was noticed on these trips that some of the buyers were taking delivery of their fish and then doing their shopping, leaving their fish standing in the sun for hours in water with

a relatively high temperature without aeration, with the result that the mortality was very high. The sooner the fish are liberated, the greater the survival rate.

Early reports from the societies indicate that angling was good during the first month or so of the open season. The report from Serpentine that good fish are being grassed by anglers using both wet and dry flies, is most encouraging as it has always been claimed that trout would not rise to artificial flies in our waters. Anglers in the Pemberton and Blackwood districts have had good takes, but as in other years fishing is expected to deteriorate during the hotter summer months.

### THE RESOURCES OF THE SEA

#### (iii) Fisheries of Western Australia

by Keith Sheard

(The third of a series of talks recently broadcast by the A.B.C.)

Where are our fishing grounds?

From Eucla, by Esperance and Albany to the Leeuwin our southern coastline runs a thousand miles. The western passes north from the Leeuwin and the Naturaliste, by Fremantle and Geraldton, Shark Bay and Carnarvon, to North-West Cape for 1400 miles. Then comes the trend of the North-West from North-West Cape past Onslow, Port Hedland, Broome and Derby to Wyndham and beyond, with about 3,000 miles in that part alone. The whole lot measures out a coastline of something more than 5,000 miles.

More than that; it represents a strip of coastal shelf 30 to 100 miles wide in the south, 30 to 50 miles in the west and 100 to 150 miles on the north-west coast and rather more than 3,000 miles long.

The shelf is broken by the Archipelago of the Recherche, by Garden Island and Rottneest, by Houtman's Abrolhos, by Dirk Hartog and Bernier and Dorre Islands; by the Muirons and the Montebellos,

the Dampiers and the Buccaneers Archipelago, and by scores of small islands and reefs.

It does not slope evenly to its edge but in most places it drops away in a series of ledges, many running for very many miles. One, the 25-fathom ledge is so well marked, and so long, that the fishermen call it the "Road".

The whole of the long and quite narrow ribbon of sea bottom starting from the shoreline and clearly marked to about 100 fathoms is our Continental Shelf.

There are our fishes. And there, in some places, are our fisheries.

But there are our problems as well. Distance; weather; high temperatures in the north; a scarcity of harbours; mounting costs, all constitute problems.

Distance - sheer distance - is one of the worst. Of course the direct sea routes are less than the shoreline mileage but even so the snapper boats fish 500 to 700 miles away, and that takes them only to the base of the North-West Cape Peninsula. Why, the chief pearling grounds at Broome are fifteen hundred miles by sea from Perth, and there are still 600 miles to go to the State border!

In the south the salmon fisheries are 200 to 400 miles away, and stretch 150 miles or so on each side of Albany.

Actually the straight line distances in Western Australian waters total about 3,000 miles. The grounds that are fished extend northerly 700 miles from Perth - south and east they go about 800 miles. That covers about half the distance; but even that is not fished contipuously along its length.

What kinds of fishery are they?

The crayfishery, a pot-fishery - which is a story in itself - stretches intermittently from off Mandurah to the Murchison River, about 350 miles.

Hook-and-line fisheries are the snapper and jewfish, while the salmon, ruff, and mullet constitute the net fisheries, beach and small boat netting mostly. Of large-scale purse-seine, lampara or drift-net fisheries we have none. There is no intensive trap industry comparable with the New South Wales leatherjacket fishery, although leatherjackets are present in good quantity along the south coast. Sufficient steam trawling has been done to show that the Bight area is fishable, but little is known of danish seining possibilities.

What are the future prospects?

It might help to look at the overall picture. First of all what kind of fisheries could we develop on a world comparison? Well, our continental shelf throughout its entire length lies in the warm subtropics, with more north of the Tropic of Capricorn than south.

That rules out concentrations of fishes on the Northern Hemisphere pattern in shoal of thousands of millions; it rules out fishes with a very high oil content, because food reserves like that in fishes would be out of place in warmer waters.

It rules in quite fair concentrations of white-fleshed or only mildly oily fishes of many kinds, and it means detailed exploration and research.

Except in this way it is rather difficult to make a comparison. So long as we realise that the "vast potentialities" and "illimitable resources" of the fanciful confidence trickster are simply not there, but that instead we have quite useful resources that must be carefully explored, rationally exploited, and properly managed, we shall find ourselves in possession of an industry or no mean value.

I think that the world in making comparisons - or, for that matter, man trying to assess the fishery resources of his own country - rather forgets that the great fisheries have a thousand years of learning and tradition behind them, generation on generation of patient endeavour and understanding of when and where the fishes run, and of how to process them to the best advantage.

We, in our State, can have very little of that kind of age-old knowledge. We know something of fishes that pass over the well-fished grounds. A good jewfish fisherman, for example, knows how to follow them down the "Road". Similarly, the snapper men know when to go to Shark Bay and to Red Bluff, and where to find the snapper when they get there. We are slowly understanding the great migrations of the salmon and the sea herring, and are putting together the crayfish story. But all in all it is for our children to benefit and they will still be trying to make sense of the pattern for their children.

We are fortunate in having the knowledge of the old world as a guide, but not as something to follow slavishly - I think we are gravely mistaken when we do that, because our fishes are of a different kind and living under different circumstances - but we are fortunate in that we can survey the world, and select the knowledge that fits us best, and so find many short cuts to our own knowledge.

The problem is no simple one. It is how to make the best use of this coastal shelf running for 3,000 miles, and of its slope waters, containing a number of kinds of fish each with its own habits, and also each with its own processing requirements.

What are we up against? What are the difficulties? Perhaps the most embracing is distance, distance that requires either refrigerated transport in the north or of small far-distant canneries in the south, and demands for economy's sake filleting, packaging and freezing, either aboard the catcher boats, or in small, mobile mother ships.

Distance, that demands good harbours, and refuelling and rewatering facilities, is quite a limiting factor. Yet even here we are fortunate; the winter is quite fair fishing weather in the north as is the summer in the south, so that the larger vessels can work for most of the year.

Distance, that involves very specialised knowledge of fish habits and migrations, and demands a pioneering spirit, a restless curiosity and plenty

of imagination in the fishermen, in the processors, in the men who man the Fisheries Department, and in those who carry out research work.

Those long miles to the next fishing ground bring two other difficulties; dangers rather -

One is the peril that the nearer grounds will be worked so hard that they will become unprofitable before others have been established either to replace them, or to be used to ease the burden on the nearer ones.

The other is the danger that fishing grounds far away will beckon as an El Dorado, too often leading to ill-prepared and costly ventures foredoomed to failure, and by their very failure holding back development. There have been too many such mistakes in Australian fisheries which require above all things determination, and courage, and knowledge of the risks.

These are some of the difficulties - what have we on the credit side?

I think that one of the most important is something quite intangible, and yet is so real that it gives a promise that this great area can be exploited in a reasonably rational manner. This advantage is not matched in so many places and it consists of a quite deep-seated and understanding liaison between fishermen, processors, State Fisheries officials and research workers of the C.S.I.R.O. Division of Fisheries. This achievement is largely due to the approach and effort of the State Department of Fisheries, and it results in a high level of understanding of the problems common to all and permits of a rather remarkable degree of combined action, even where very considerable degrees of difference of opinion exist.

On the immediately practical side is the policy of both the fishermen and the Fisheries Department to explore patiently out from their main bases consolidating their gains behind them. We have already seen the fisheries extend eastward along the south coast and northward along the west. At the same time refrigeration methods and fishing aids are being progressively installed.

The fishing industry has realised that when it comes to bedrock its success depends on its markets, on the presentation of an attractive pack, and processing methods are changing to meet this.

Even in the nearer waters there is still considerable room for exploration. The slope waters of the west coast have not been properly tested for pelagic fish - the far-roaming tunas and spanish mackerels - while the deep bottom 60 to 100 fathoms down and forty to fifty miles offshore should be searched with small trawls for bottom-living fishes.

There are other items on the credit side - the enterprise shown in both the salmon and snapper fisheries is really worth much more than a brief mention; but there is time for only one more. That is the existence of the crayfish industry.

On a short-range view this would seem to be acting against the development of a successful scale-fish industry, since it absorbs so much of the energies of the fishing personnel. Yet, on a long-range basis it is the sturdy backbone of the whole system - it has enabled the fleet of refrigerated ships to develop; in its best aspects it has given incentive and training and helped in creating a self-respect for the industry; it has played a major part in raising fishing to a professional level.

And after all, on the strictly practical side, it is no small thing for the fishing industry of Western Australia that small craft have fished in Exmouth Gulf and at the Montebellos, over a thousand miles away.

It has often been said that the Australian, whether New or Old, has very little interest in the sea or in fishing, or in the fishing industry. I don't think that's true; not in Western Australia anyway. Here we have no shortage of recruits to the fishing industry, and wherever you travel within a thousand miles of Perth, you'll find track after track winding away to some fishing spot, and as often as not a small boat or two, home made perhaps, is tucked away waiting for the fisherman. And you see the sails of our small ships in bay after bay on desolate and dangerous coasts.

And as far as public opinion in general is concerned; well, recently a Perth man, not a fisherman himself, proposed that a fishing industries fair be held as a yearly event covering all aspects of the industry. The response to this suggestion leaves no doubt as to the genuineness of public interest in our fisheries.

OPEN SEASON FOR WILD DUCKS

The open season for wild ducks throughout the State commenced at 5 a.m. on Sunday, December 20. In 1952 there were two opening times, 5 p.m. on the Saturday immediately preceding Christmas Day in the South-West and 5 a.m. on the following day in the balance of the State. There has been discontent, particularly in the Busselton-Capel district, in regard to the altered time, it being held that shooters have not the same opportunity of making good kills when the opening occurs in the morning.

In the following areas there is no open season. These have been maintained as sanctuaries.

- (a) The whole of the area within a radius of twenty miles of the General Post Office, Perth.
- (b) All municipalities and townsites in the South-West Land Division.
- (c) The whole of the Rockingham Road District.
- (d) The whole of the waters of Lakes Leschenaultia, Yealering and Seppings, and Bambun, Wagin, Nambung, Mungala, Nannerup and Wardering Lakes, and all land within twenty chains of their shores.
- (e) The whole of the waters of Leschenault, Vasse and Wonnerup Estuaries and all land within twenty chains of their shores.
- (f) The whole of the waters of the Vasse, King and Kalgan Rivers, and all land within twenty chains of their banks.
- (g) All that portion of the Capel River between the Capel and Stirling Bridges and all land within twenty chains of the river bank.
- (h) The whole of the waters of Oyster Harbour and Princess Royal Harbour and all land within a radius of twenty chains of their shores.
- (i) The whole of the area of the Yanchep Caves Reserve.
- (j) The whole of the Harvey Catchment area.
- (k) The whole of the area within a radius of two miles of the Mandurah Post Office.

THE CLEARING HOUSE

Where to Fish?

World Search for New Waters

Where to fish? This has been the cry of the world fishing industry for a whole generation. Twenty years ago Dr. J. Travis Jenkins was writing about the need for British deep-sea trawlers to explore more and more distant fishing-grounds, to look farther north and to try greater depths - 100-500 fathoms down.

European trawlers turning to a winter cod fishery off eastern Greenland to compensate for lost Iceland waters may lead to future over-fishing of those cod and halibut grounds. Japan's search for new waters, however, involves as many political as economic considerations, for going north in the Pacific she is unpopular with the Russians, and going south she upsets the Australians.

This summer Japan had 30 tuna clippers fishing with an 11,000-ton mother-ship around the Solomon Islands where the estimated three months' yield is 12 million pounds. And she is making plans for really big tuna-fishing in the Pacific, for the American Embassy at Tokyo reports ten large tuna-chasing ships of 240-370 tons under construction with American aid, to operate east and south-east of the present fishing-grounds in the Pacific.

The American (Californian) tuna fishers don't like this at all, because the Japanese often undercut their canned-tuna market. The Australians, after new blue-tuna grounds themselves, don't like it either, because tuna aren't so very numerous in the South Pacific. Even the experimental tuna cannery established by the Americans at Fiji the other year had to close down for lack of consistent supplies.

Meanwhile much of Japan's pre-war fishing grounds in the Sea of Japan and the Yellow Sea is to be fished heavily by the resuscitated Korean fishing fleet, no longer annexed to Japan and only awaiting American and UN aid and equipment.

Before the war Korea had the sixth largest fishing industry in the world, and its annual catch slightly exceeded Norway's. It took 6.3 per cent. of the world catch, Britain having 6.4 per cent. and Norway 5.6 per cent. Japan had 22 per cent. - and she must have more nowadays to meet the protein needs of her population. China, with the world's fourth biggest pre-war fishing industry, taking 7.9 per cent., can be expected to take a much bigger catch in the Pacific once the problem of Formosa is settled.

The Pacific is not the only future cock-pit of political fishing rights. Israel's economy in the Middle East has now reached the state when not only is there a compulsory lowering of the standard of living in order to approach independence of foreign aid, but the necessity for finding new fishing grounds is becoming urgent. Her present fishing fleet has grown larger than her present fishing resources and local waters are being over-fished.

In view of the furore of trouble which Syria and the Arab nations have raised over the canalization of the River Jordan waters for agricultural irrigation, and the present Arab-Jewish tension in Middle East politics, it is very likely that her ambitions to expand her fishing into areas of the Red Sea and off the Libyan coast of North Africa will bring strong protests from Egypt and the Arab states. The British influence in Libya may temper these, but Egypt, fired by the example of the Norwegian and Icelandic interpretation of territorial waters, may join with Saudi Arabia to keep Israel out of the lower Red Sea. Anything can become the Sarajevo of conflict in the smouldering flames of race rivalry in the Middle East today.

"The need to find additional fishing-grounds had been felt as a consequence of our enlarged fishing fleet and the necessity of developing this branch of our economy further," stated an Israeli official in October. Haifa Bay is suffering from over-fishing and for the past two years its yield has fallen greatly, despite the use of electric-light lures for night fishing.

Other offshore waters along the Palestine coast showed such small catches in June, July and August that her fishery biologists are worried about the

obvious effects of over-fishing and the need to rest present waters. Her fleet and equipment are mostly for fishing in water under 200 fathoms. The few fishing-grounds of this nature available off the Israeli coast are being exploited to the utmost - and the yield is not always what a Grimsby or Aberdeen merchant would bid for in his fish auctions.

Preliminary investigations, under Professor Haas, the biological authority, have already determined the species of fish found in the Red Sea, and a shipment of frozen fish has been sent from Eritrea in order to find the best way of marketing fish caught in the southern Red Sea. Another fishery expedition is to set out for the Libyan coast where there are sardine, mullet and bonito interests previously fished chiefly by Arab and Italian fishermen. With an unemployment figure approaching 16,000 and an acute meat shortage, there is little else the Israeli authorities can do.

("Fish Industry", London, November, 1953.)

#### Fishing Development Abroad is Worth Helping

##### Position in Ceylon

A survey of all fishing vessels in Ceylon is being made by 70 inspectors of the Fisheries Department to see whether the boats conform to the standards required for registration.

The Registrar expects that 15,000 fishing vessels will be registered. Registration will enable the Government to check the entry of unauthorised boats from India; minimise accidents as only vessels which are seaworthy will be allowed to operate; identify boat owners, fishermen and fishing craft; facilitate the grant of relief to fishermen during periods of distress; ensure the smooth working of the insurance scheme for fishermen; and check illicit immigration.

The fishing season in the south-western coast of Ceylon has begun and Jaffna's fourth mechanised fishing craft has been launched by Mr. K. Somasunderam, Divisional Inspector of Fisheries.

Mr. Somasunderam stressed that in spite of varying views, Ceylon was "suffering a change into something rich and strange." It had taken Mr. Alan Glanville, fisheries expert from Great Britain, nearly one and a half years to convince the conservative fishermen of Ceylon of the benefits of mechanisation.

In fact, two of the six Danish motor fishing boats purchased by the Department are lying idle as they have been damaged beyond repair. The vessels were purchased 19 months ago and cost Rs.11,000 each.

Two other vessels employed in fishing on the east coast are also said to have proved a failure. Fishermen who volunteered to use them are now in a sorry plight having had no catch for three weeks. The opinion of the hirer of the vessels is that these boats are unsuited for fishing in open waters.

Meanwhile, the Fisheries Department trawler, which involved the Government in a loss of Rs.1,750,000, has left Colombo on her last voyage - under tow to Goa in South India. The vessel was sold for scrap to a firm in Goa by the Government for Rs.10,000.

Ceylon needs about 150,000 metric tons of fish a year. As conditions are at present, approximately 40,000 tons only are available. Ceylon provides the best market for fish in the south, but the major consumption is centred round Colombo where, besides having to meet local internal demands, there is a large market from foreign shipping which call for stores and provisions.

Besides fresh fish, Ceylon has to import considerable quantities of dried and salted fish from West Pakistan, the Laccadives and the Maldives and the Malabar ports in India.

Though an island gifted with an extensive seaboard, Ceylon's fishery resources are comparatively poor. The continental shelf skirts close to the coast - scarcely more than eight miles. River discharges are insignificant while the high percentage of salinity discourages the more palatable species.

The Ceylon Government's deep sea fishing schemes have not as yet been a commercial success. There are no suitable trawl grounds while round Mannar and Jaffna the waters are too shallow and the bottom too thick with coral.

Under the supervision of European Master Fishermen, two trawlers occasionally work on the Wadge Bank which is much closer to the Indian coast than to Ceylon.

Development schemes include the establishment of a national fishing corporation and large scale marketing of fish through co-operative fish sales societies and the provision of modern equipment under Colombo Plan aid, such as the Canadian Gift Scheme.

#### Tons of Fish go Waste

While people are clamouring for fish in Ceylon, the faulty distribution system of the Fisheries Department has been responsible for thousands of pounds of fish going waste and being thrown into the refuse dump.

A mechanical defect in the cooling system and unusually long periods of stockpiling were responsible.

While large quantities of fish thus go waste, Ceylon spends annually considerable sums of money on fish imports. Last year, for instance, 682,293 cwt. of dried and salted fish costing Rs. 47,583,448; 262 cwt. of frozen fish costing Rs. 40,618; 55,220 cwt. of tinned fish costing Rs. 4,075,670; and 19,610 cwt. of other varieties costing Rs. 293,850 were imported.

The Department's cold rooms were installed by the British Admiralty Works Department and are maintained by them. The Fisheries Department has a lease of space in the cold rooms.

A spokesman of the Department blamed "a mechanical defect in the cooling system for this waste of food." But it is pointed out that there is nothing wrong with the refrigeration plant. The fish went putrid because of bad handling and insanitary storing.

("The Fishing News", London, November 28, 1953.)

Collectivist Control  
Of World's High Seas Fishing Asked of U.N.

Startling proposals for international control of the high seas fisheries of the world by an all-powerful "authority", to be created by a treaty drafted by the Food and Agriculture Organization, were submitted to the United Nations General Assembly this fall by the International Law Commission of the U.N.

The proposals came in the form of three "draft articles" - comparatively brief - which were accompanied by several pages of legalistic discussion.

Similarly, the I.L.C. submitted to the U.N. a set of eight separate draft articles dealing with the Continental Shelf; and a separate single article concerned with the "Contiguous Zone".

What is this Law Commission?

By way of background: the International Law Commission of the United Nations was set-up by the General Assembly two years ago. It consists of a group of about 15 recognized authorities on international law, representing as many different countries. The United States member of the I.L.C., it is understood, has been ill during much of his incumbency and has participated but little in its deliberations.

The "draft articles" on Fisheries, and the argument supporting them, appear to have been the work of two European professors, particularly Professor Francois of Belgium, with the assistance of the British member.

Text of the Fisheries "draft articles" follows in full:

Article I - A state whose nationals are engaged in fishing in any area of the high seas where nationals of other states are not thus engaged, may regulate and control fishing activities in such areas for the purpose of protecting fisheries against waste or extermination. If the nationals of two or more states are engaged in fishing in any area of the high seas, the states concerned shall prescribe the

measures necessary by agreement. If, subsequent to the adoption of such measures, nationals or other states do not accept the measures adopted, the question shall, at the request of one of the interested parties, be referred to the international body envisaged in Article III.

Article II - In any area situated within 100 miles from the territorial sea, the coastal state or states are entitled to take part on an equal footing in any system of regulation, even though their nationals do not carry on fishing in the area.

Article III - States shall be under a duty to accept, as binding upon their nationals, any system of regulation of fisheries in any area of the high seas which an international authority, to be created within the framework of the United Nations, shall prescribe as being essential for the purpose of protecting the fishing resources of that area against waste or extermination. Such international authority shall act at the request of any interested state.

#### Existing Treaties Attacked

Early in its discussion of these Fisheries "draft articles", the I.L.C. acknowledges that the "drafts go beyond existing law" and says further that they fall within the category of "progressive development of international law."

"Existing law", under which the halibut, Sockeye salmon, tuna and North Atlantic international treaties operate, was castigated by the commission in these words:

"It is generally recognized that the existing law on the subject, including the existing international agreements, provides no adequate protection for marine fauna against extermination."

The I.L.C. majority acknowledged opposition, saying: "Certain members (unnamed) of the commission were opposed to the adoption of the text of Article 3, on the ground that there was no real need for creation

of an international authority, since the fisheries could be regulated, as in the past, by means of agreements between states. They contended that the proposal to give an international authority power to issue regulations binding on the nationals of states is in conflict with the basic principles of international law."

#### Fisheries Urge Delay of Action for Study

The I.L.C. report created a furore in the fisheries when it was submitted, with the recommendation that it do pass the General Assembly of the United Nations, and that steps be taken forthwith for consultation with the F.A.O., looking toward the drafting of a treaty setting up the world fisheries authority visualised in Article III.

It appears that the State Department either had not been cognizant of the studies of the I.L.C., or had chosen not to participate in them. Consequently, there was not available an announcement of official position of the Department of State with respect to the I.L.C. proposals.

Thoughtful elements of the fisheries of the Pacific were ready to recognize the complicated character of the entire subject. They felt that the industry and the Department of State should scrutinize the entire matter very closely - and that it would be necessary to defer action in the General Assembly of the United Nations until the industry and the Department of State could examine the matter intensively.

In line with this position, the executive committee of the Pacific Fisheries Conference initiated studies of the report and requested the Department of State to ask the United States delegation to the United Nations to move that the report be referred to the I.L.C. for further study.

In the meantime it is anticipated that the Department of State will consult with representatives of the American fisheries of all coasts with a view to development of the American policy with respect to the proposals.

American Support Lacking

It is not possible at the present time for the Pacific fisheries to express fully their reaction to the proposals. Discussion with a number of persons failed to reveal any American support for the I.L.C. recommendations.

Objections were several, and included:

1. The United States has had little or no voice in framing the proposals;
2. They appear to have been drawn by theoreticians with little or no background of understanding of fishery problems;
3. The terms "waste and extermination" disclose utter ignorance of basic principles of conservation, and actually represent vastly different things.
4. Why turn an area problem over to a world authority; and why to one sponsored by the F.A.O. in particular?
5. It represents utter abrogation of the traditional American position.

Could Cancel Conservation Treaties now in Operation

Preliminary study of the effect of the I.L.C. proposals shows how utterly destructive they could be of the halibut and Sockeye salmon enterprises.

For example, under Article I, of another nation sought to participate in either, or both, the halibut or Sockeye fisheries outside territorial waters of the United States and Canada, they could do so. Furthermore, it is provided that such a nation, as an "interested party", could refer the matter to the world-wide authority provided for by Article II, which would then take over the regulation of the halibut and Sockeye salmon fisheries beyond territorial waters.

("Pacific Fisherman," Los Angeles, California, November, 1953.)

### The Next Fishery

With the South African pilchard, rock lobster and trawling industries all settled down to a period of steady production, the search is now starting for new and untouched fish resources. One of the greatest advantages of the fishing industry lies in its appeal to the business adventurer. Only a decade ago a few men pioneered the pilchard industry. It was one of the greatest business gambles in South Africa and the factories of the West Coasts are monuments to their business courage and foresight, Today others are searching for new fisheries. Already a thriving abalone industry is operating on the coast around Hermanus and Gansbaai and in this issue we describe the oyster farm in the Knysna lagoon. It is still too early to predict the next fishing enterprise in South Africa, but we have heard talk of shrimp grounds off the coasts of Natal and the Transkei. With the example of the West Coast pilchard boom behind us, we cannot afford to discount any possibility. The demand for shrimp is almost insatiable and a shrimp industry would be assured of a rick market. Perhaps the rise of the Union's next fishing enterprise might even eclipse the fabulous pilchard boom of the past seven years.

("The South African Shipping News and Fishing Industry Review," Cape Town, November, 1953.)

### Australia Starts Pearl Oyster Industry on Lonely Island.

by T.A.G. Hunderford

Thursday Island is a barren grain of dirt fretted by the sea from the sharp point of Cape York Peninsula, ultimate northern tip of Australia's vast land mass. Pearl oysters are its main concern and in a sheltered bay on its western side investigations are being made that could revolutionise the shell and pearl industry, one of Australia's important sources of dollar income.

The Fisheries Division of the Commonwealth Scientific and Industrial Research Organization, a body that has a finger in so many of Australia's development pies, has established there a field station where the oyster is being put under the searching eye of the microscope.

Japan pioneered the culture of oysters for pearls, but in Australia the big, lustrous gold and silver lipped shells are the mainstay of the industry that provides most of the world's pearl buttons. The aim of the C.S.I.R.O. undertaking is to raise colonies of oysters in the warm waters of Australia's tropical north almost as casually as the suburban dweller raises fowls in his backyard . . . with the accent on shell production.

### Gems Welcome

Any gems recovered will, of course, be welcome, but, contrary to popular opinion, tons of shell are opened usually for the discovery of one good pearl.

In their work the scientists began almost from scratch. While most people have heard that Cleopatra made a fascinating cocktail by dissolving priceless pearls in wine, that the Chinese consider powdered pearls a sovereign remedy for various ills and similar snippets of information of the type that gather like lichen around all precious gems, few have given any thought other than gustatory to the habits and nature of the unassuming bivalve that does the work. It was to raise the curtain on the private life of the pearl oyster that the C.S.I.R.O. began its operations.

Six varieties of pearl oysters are found in Torres Straits waters, but only the gold or silver lipped shell - the "mother of pearl" - is commercially marketable. Naturally it is the type under investigation.

The infant oyster, a tiny, almost transparent fleck of life, is perhaps no more vulnerable to misfortune and total eclipse than most marine infant life, which means that comparatively few reach adulthood. However, the astronomical performance of the female in egg production, which runs into millions a season, ensures the survival of sufficient to perpetuate the line and maintain a flourishing industry.

In its larval stage the infant oyster floats at the mercy of the tide and current, partly guided on its way by the cilia, a web-like growth that gives it a certain independence of movement. If no suitable bottom is available when the time comes for it to settle

down, it dies; if it locates a good pitch with adequate supplies of food it is reasonably safe to enter upon its curious career of being an oyster, and, perhaps, of mothering a pearl to grace an Ethiop's ear . . . although stingrays, some fish and the crunching jaws of predatory turtles continue to thin the ranks.

The scientists at the field station keep the oysters under observation at all stages and much of their work consists of collecting and preserving records on the rate of growth. They also sex the adult oysters used in the breeding project and carry out investigations into the artificial production of diatoms, microscopic plants that are the oysters' natural food.

### Growth Rings

In a manner remotely resembling the annual growth rings in a tree, the growth history of the oyster is written on the rough outside surface of the shell, along with any injuries and attacks by borers and other natural enemies which it has survived. The measurements taken are, on the outside, the depth and breadth of the nacre surface and the heel width, the heel being the thick butt of the shell.

The weight of each valve, or side of the shell, is taken, along with the weight of the live animal and all measurements correlated to further knowledge of the creature's biology and add to existing data on the relation between the size and the quality of the shell to determine the growth rate and the size to be expected at any particular age.

These measurements also tie up with the sexing of the oyster, since its age and size bear direct relation to its sex. To determine the sex of an adult oyster, which is necessary to the plan to cultivate them, the scientist merely examines a smear of its gonads for traces of sperms or ova. But the simplicity of the operation is complicated by the fact that from time to time the oyster can, and does, change its sex.

In the first year of maturity, when the oyster is from two to three years old, 95 per cent. mature as males, but in the next year about 50 per cent.

of those change to females.

The reason for this is not known; nor is the actual method of reproduction. Either the sperms are ejected from the male, and floating into the mantle cavity of the female, induce it to spawn, or the spawn of the female, entering the mantle cavity of the male in the same way, causes it to sperm. Whatever the method, the sorry fact emerges that the oyster gives birth to millions of offspring without ever having seen the father.

So far no method has been discovered of forcing the oyster to deliver sperms or ova as is done when, in breeding trout, the fish are "milked" by hand of ova and milt. In the wet method of fertilisation, as practised by the C.S.I.R.O. station on Thursday Island, fragments of the gonads of dissected male and female oysters are agitated in ordinary sea water to which a little ammonia has been added to activate the sperms.

Although there are always "ripe" oysters available with which to conduct these experiments, it has been revealed - in itself a significant discovery - that the oyster undergoes spawning peaks, periods of maximum sexual activity. As these take place regularly in the spring and autumn it is considered they are allied to water temperatures.

### Tests

Fortnightly tests are made with adult oysters to investigate gonad maturity and continuous temperature records are kept. Quantities of spat (immature oysters) are suspended on fibro plates in natural conditions from a raft in deep water and records are made of their survival rate in all conditions; the adult oysters used in research in the laboratory are kept in baskets suspended from the same raft.

The correlation of all this material knowledge is aimed at one thing.- production of gold and silver lipped shell. If the spat can be raised and kept in concrete tanks until after the critical larval stage and then moved in millions to places where conditions have been proved to be suitable, a major battle will

have been won in the war to maintain the world supply of shell.

Although the production of culture pearls is a secondary consideration in this venture, the laboratory staff is familiar with the technique brought to perfection by the Japanese Mikimoto at Ago Bay, Japan.

The oyster used (Pinctada vulgaris) is an almost universal type - it has been fished for centuries in the Bay of Manaar, Ceylon, which had produced some of the world's finest pearls; it is the variety used in the artificial culture of pearls in Japan and it occurs freely in the waters around Thursday Island. For the insertion of the nucleus of the cultured gem a small peg of wood is inserted between the opened lips of the oyster, which is then fastened in a clamp on the laboratory bench.

With the nucleus, which is a small bead manufactured in Japan from the shell of the Mississippi fresh water mussels, is inserted a  $\frac{1}{8}$  in. square skin graft from the external body surface of the oyster. This being the surface that secretes the pearl-forming nacre, the graft, if successful, forms a sac around the nucleus and in time coats it with nacre to form the pearl.

There are several difficulties arising from the use of Torres Straits shell for the production of culture pearls so it is not expected that Australia will, for many years, match the pre-war Japanese production. However, there is no doubt that eventually the Australian jewellery trade will have access to stocks of Australian-grown culture pearls and, moreover, no fear is entertained that this would in any way depress the market for natural pearls. In any case, it could have no effect on the price of shell, the mainpin of the industry.

#### Boat Used

The 45-ft. ketch "Gahleru" obtains all the shell used at the C.S.I.R.O. field station. She carries a European skipper-diver, a European engineer

and four Torres Straits islanders as crew. Since, if it is possible, biological investigations are carried out in the field, she is fitted with a laboratory. On shore, two scientists, two technical assistants, a labourer and a part-time typist handle the entire output of work.

Apart from assuring a constant supply of shell and, possibly, culture pearls, their investigations could well make unnecessary the dangerous profession of diving and give constant employment to a growing population in a region strategically most important to Australia. When the possible results are considered, the establishment at Thursday Island is neither large nor costly.

("The South African Shipping News and Fishing Industry Review, Cape Town, November 1953.")