

FISHERIES DEPARTMENT, WESTERN AUSTRALIA

MONTHLY SERVICE BULLETIN

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November, 1957

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STAFF NOTES

The Superintendent (Mr. A.J. Fraser), accompanied by the Clerk-in-Charge (Mr. B.R. Saville), met representatives of the Waroona branch of the Murray Trout Acclimatisation Society on Friday, October 25. In the evening of that day they attended a meeting of the South-West Licensed Fishermen's Association at Busselton. Mr. A.J. Buchanan, of Head Office, spent from October 22 to 26 in the Bunbury district and also attended the meeting at Busselton.

The Superintendent, as a member of the Agriculture Protection Board, will accompany other members of the Board on its tour of the South-West from November 4 to November 8. Meetings have been arranged with local authorities at Busselton, Margaret River, Augusta, Donnybrook, Bridgetown, Manjimup, Boyup Brook and Pinjarra.

Officers at present on annual leave include Mr. B.K. Bowen, Research Officer; Inspector R.M. Crawford, of Geraldton, and Mr. J.M. Mitchell, of Head Office. Mr. Bowen will resume duty on November 18, Inspector Crawford on November 19, and Mr. Mitchell on November 21.

Assistant Inspector S. LaRoche will go on annual leave this month and the Clerk-in-Charge (Mr. B.R. Saville), Fauna Protection Officer (Mr. H.B. Shugg) and Inspector B.A. Carmichael, of Albany, will commence leave in December.

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We welcome to the staff Mr. S. Stokoe, who was appointed Inspector, on October 14. Mr. Stokoe, who had lengthy service with the R.N. and R.A.N., will take command of the p.v. "Misty Isle".

Mr. Ray Emery will commence duty as Cadet Inspector on November 4.

Technical Officer J.S. Simpson will start 3 months' long service leave on November 1.

Cadet Inspector K.R. Dickson has resigned from the Service.

The Fauna Warden (Mr. S.W. Bowler) will leave for the South-West and Kojonup Districts on November 5 to investigate complaints of out-of-season duck shooting and marron fishing.

Assistant Inspector K.L. Brooks will return to the metropolitan area from Geraldton on November 2. He will assist Inspector A.K. Melsom in the Fremantle District.

Assistant Inspector D. Wright, who will return to Perth on the research vessel "Lancelin" on November 1, will leave for Geraldton on November 11 to assist in that district. He will commence annual leave in December.

Assistant Inspector M.J. Simpson has submitted his resignation. He will be replaced by Assistant Inspector E. I. Forster, a new appointee, who will take up duty on November 18.

After Inspector R.M. Crawford resumes duty in the Geraldton District, Relieving Inspector G.C. Jeffery will be posted to Lancelin. He will be assisted by Assistant Inspector R.J. McKay. It has been decided to maintain two inspectors at this centre for the time being.

Technical Officer J. Traynor will this month be trapping in the Dowerin District, where big flocks of ducks have been reported.



MOVEMENTS OF DEPARTMENTAL VESSELS

The p.v. "Misty Isle" is now in commission under command of Inspector S. Stokoe. Assistant Inspector E.I. Forster will act as crew member when appointed. The "Misty Isle", together with the p.v. "Silver Gull", commanded by Inspector A.J. Bateman, with Cadet Inspector G. Hanley as crew member, will patrol the Safety Bay-Rottnest-Fremantle and Lancelin areas.

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The r.v. "Lancelin", under command of Captain H.C.W. Piesse, with Inspector C.R.C. Haynes mate, and crew member D. Wright, is due to arrive at Fremantle on November 1.

\* \* \* \* \*

The p.v. "Kooruldhoo" will leave Fremantle on November 12 for continuous patrol of the Lancelin-Cervantes-Jurien Bay crayfisheries. Inspector G.H. Lyon will be in command, and Cadet Inspector E. Barker will act as crew member.

PERSONAL PAR

Mr. A.J. Ratcliffe, Officer-in-Charge, Wildlife Survey Section, C.S.I.R.O., called on the Superintendent during last month. While in Perth, he called on the Chief Vermin Control Officer (Mr. A.R. Tomlinson). After inspecting his Section's research centre, at Woodstock Station in the Pilbara District, Mr. Ratcliffe returned direct to Canberra.

PEARLING FATALITY

Advice was received of the death at Broome, on October 10, of an Indonesian diver, Lamadoe Selawatoes, while pearl diving. The deceased left a widow and two children.

FISHERMEN'S ADVISORY COMMITTEE

The above Committee held its annual Geraldton meeting on October 16 and 17. Over thirty fishermen were interviewed and voiced their opinions on matters relating to the conservation of the Geraldton-Abrolhos and Shark Bay crayfisheries.

The recommendations of the Committee in respect to the matters discussed, will be considered in due course by the Minister.

MINIMUM AGE AND SIZE OF FISHES AT MATURITY

For a period of almost two years (November, 1954, to November, 1956) Technical Officer L.G. Smith was engaged in collecting gonads from fish taken principally in estuarine and inlet waters. The sampling was done in the Swan River (Perth), Peel Inlet (Mandurah), Leschenault Inlet and Collie River (Bunbury), Broke (or Brookes') Inlet, Wilson's Inlet (Denmark) and Oyster Harbour (Albany). With the exception of December, 1955, the sampling was carried out at more-or-less regular monthly intervals. One visit was also made to Shark Bay. In addition to securing gonads, measurements of the fish sampled were recorded and a few scales from each retained for examination.

Mr. J.M. Thomson, of the Division of Fisheries and Oceanography, C.S.I.R.O., Cronulla, N.S.W., has now completed an analysis of the material collected by Mr. Smith. Mr. Thomson has submitted two papers dealing with different aspects of his findings. These are at present in press.

In one of his papers Mr. Thomson sets down the minimum observed length at maturity of some of the species studied. The following table shows how these lengths compare with the minimum lawful sizes prescribed by the Second Schedule to the Fisheries Act. All lengths shown are total lengths, i.e., from tip of snout to end of tail, except in the case of garfish, which are measured from tip of upper jaw to end of upper half of tail.



Species	Minimum size at maturity (Thomson) (females)	Minimum lawful size (Second Schedule) (both sexes)
	ins.	ins.
Black bream	7	9½
Cobbler	17¾	-
Flathead	12	12
Garfish	9	9
Hairback herring*	7½	-
Perth herring*	9	5
Sand whiting	8½	8½
Tailor	15	9
Yellowfin whiting	9	+
Yellowfin bream	14½	10
Yellowtail	7	7
Sea mullet	13	9½

\* I.S.R. Munro, of C.S.I.R.O. Division of Fisheries and Oceanography, has separated these two species. It had always been thought that the hairback herring (so named by Munro), a more tropical species, was identical with the Perth herring. They are very similar in appearance, but differ in other characteristics, as the next table shows.

+ G.P. Whitley, of the Australian Museum, Sydney, has established the yellowfin whiting of Shark Bay and northwards as a different species from the silver or sand whiting. As such it is not mentioned in the Second Schedule to the Act.

Mr. Thomson's studies give extremely interesting data in relation to fecundity (number of eggs produced) and size of eggs, as well as the ages of different fishes at first maturity. This is a subject which frequently comes up for discussion, and on that score we offer excuses for this preview of Mr. Thomson's analysis.

It must be borne in mind that the difference in fecundity in fish of the same species shown

in the following adaptation of Mr. Thomson's tables results from the fact that Mr. Smith's sampling was made completely at random, and that gonads were taken from fish in more than one age-group -

Species	Fecundity (eggs produced)	Size of ripe egg	Age at maturity
	No.	mm.*	years
Bream	13,000-612,000	0.5	2+
Cobbler	780- 3,000	8.0	?
Flathead	115,000-550,000	1.2	3+
Garfish	1,280- 3,000	1.5	?
Hairback			
herring	32,200- 57,400	0.75	?
Perth herring	250,000-480,000	0.9	1+
Sand whiting	30,000- 70,000	0.9	2+
Tailor	375,000-500,000	0.75	2+
Yellow-eye mullet	125,000-630,000	0.5	3+
Yellowfin whiting	170,000-217,500	0.6	2+
Yellowfin bream	325,000-500,000	0.5	3+
Yellowtail	20,000- 72,250	0.5	4+
Sea mullet	1,275,000-2,781,000	0.5	3+

\* 1 mm. (millimetre) is very slightly less than one-twentyfifth of an inch.

We are most grateful to Mr. Thomson, and to his Chief (Dr. Humphrey) for the assistance rendered by their Division in these investigations.

#### GERALDTON FISHERMAN CONVICTED

In the Geraldton Police Court, on October 14, Joseph Grubba, a licensed fisherman of Bluff Point, was fined £25 with £10.15. 0. costs. He had been convicted of stealing crayfish from another fisherman's pots. Subsequently the Minister directed that Grubba's license as a professional be cancelled.



DEFINITION OF A PROFESSIONAL FISHERMAN

The Fishermen's Advisory Committee, the W.A. League of Professional Fishermen's Associations and the Mandurah Licensed Fishermen's Association have all recently made representations to the Minister concerning what they call the indiscriminate issuing of professional fishermen's licenses.

It will be remembered that the existing Ministerial directive requires that licenses, other than seasonal licenses, be granted only to persons who derive a substantial proportion of their income from the catching and sale of fish.

These three bodies suggest that the directive is not being closely followed and in any case that it is not sufficiently embracing.

After an interview with the Advisory Committee, the Minister directed that the whole position should be reviewed by -

- (1) obtaining from inspectors a list of men holding licenses who are not, in the strictest sense, full-time professional fishermen (this will not include men whose licenses have been endorsed for seasonal fishing only);
- (2) securing from inspectors reasons for the granting of such licenses; and
- (3) examining the monthly returns of such licensees to endeavour to arrive at a conclusion whether a substantial proportion of their income is in fact derived from the capture and sale of fish.

The Minister has directed that the review be made with the least possible delay.

### WILD LIFE SHOWS

The photographs opposite show two views of this Department's exhibit at the Wild Life Show held at the Perth Town Hall from September 9 to 14. The Show is an annual one conducted under the auspices of the W.A. Naturalists' Club and the Gould League of Bird Lovers. The Show was a great success, and the number of visitors, particularly of organised groups of school children, was higher than at the 1956 Show.

A similar display was taken to Mandurah for that District's first Show, which, particularly as it was an initial effort, was an outstanding success. Considerable interest was shown by visitors in the various activities of the Department.

Though some of the material was taken to the Australian Inland Mission's Annual Exhibition at the Kalgoorlie Town Hall from September 25 to 28, more specimens were, through the co-operation of the Director of the W.A. Museum (Dr. W.D.L. Ride), included in the Department's display there.

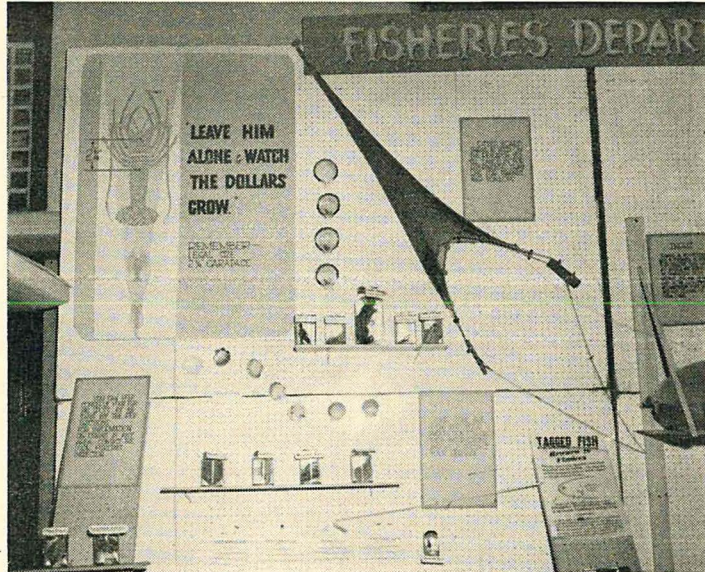
Our belief that these shows are excellent media for publicising the Department's works and aims, was again proved by the interest excited by our exhibit and the talks given by Inspector J.E. Munro and Mr. A.J. Buchanan. Letters of appreciation have been received from the organisers of the two main shows, who paid special tribute to the work of Inspector Munro, and to him and to Mr. Buchanan we extend our sincere thanks for their excellent efforts.

### WHALING

The Nor'-West Whaling Company completed its quota of 1,000 whales on September 19 this year, 3 days earlier than last year. On September 21, however, advice was received that the Commonwealth Fisheries Office had permitted this Company to take an additional 18 whales, as the Cheynes Beach Whaling Company had



# Wild Life Show Exhibit



TWO ASPECTS OF THE DEPARTMENT'S EXHIBIT AT THE RECENT WILD LIFE SHOW



HUMPBACK WHALING - 1957

STATION	WHALES TAKEN				AVERAGE LENGTH		P R O D U C T I O N				
	Males	Females	Total	%age of Males in Total	Males ft.	Females ft.	O I L			Meal etc. tons	Solubles tons
							Total barrels	Per Whale barrels	Per Whale- foot barrels		
Carnarvon	524	494	1,018	51.47	39.93	41.7	51,500x	50.6x	1.24x	2,837x	1,910x
Albany	58	43	102*	56.86	38.57	41.1	5,034	49.4	1.26	171	Nil
Total - 1957	582	537	1,120*	51.96	39.81	41.61	56,534	50.5	1.24	3,008	1,910
Total - 1956	676	444	1,120	60.4	40.34	42.31	55,996	50.0	1.215	3,193	1,952
Total - 1955	577	539	1,120 <sup>6</sup>	51.51	39.9	41.8	54,532	48.7	1.19	2,708	1,002

\* Includes 1 sex unknown.

<sup>6</sup> Includes 4 sex unknown.

x Figure subject to confirmation.



PEARLFISHERS - RATES OF PAY, 1957

Shell Production	Divers		1st Tenders		Crews	
	Wages - £13 per month, plus Lay		Wages and Lay		Wages and Lay	
Up to 10 tons	£51	per ton	£32. 0. 0.	per month	£17. 0. 0.	per month
" " 11 "	£54	" "	£33. 5. 0.	" "	£17.15. 0.	" "
" " 12 "	£57	" "	£34.10. 0.	" "	£18.10. 0.	" "
" " 13 "	£60	" "	£35.15. 0.	" "	£19. 5. 0.	" "
" " 14 "	£63	" "	£37. 0. 0.	" "	£20. 0. 0.	" "
" " 15 "	£66	" "	£38. 5. 0.	" "	£20.15. 0.	" "
" " 16 "	£72	" "	£39.10. 0.	" "	£21.10. 0.	" "
" " 17 "	£77	" "	£40.15. 0.	" "	£22. 5. 0.	" "
" " 18 "	£82	" "	£42. 0. 0.	" "	£23. 0. 0.	" "
" " 19 "	£88	" "	£43. 5. 0.	" "	£23.15. 0.	" "
" " 20 "	£95	" "	£44.10. 0.	" "	£24.10. 0.	" "
All over 20 "	£125	" "	increasing at £1. 5. 0. per ton		increasing at £0.15. 0. per ton	

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Engineers receive £1 per month less than 1st Tenders.  
2nd Tenders " £2 " " " " " " " " " " " "

indicated that it did not intend to complete its quota. After taking 102 humpbacks, the latter Company decided to concentrate on the taking of sperm whales and up to October 31 had secured a total of 69.

A table showing the humpback catch and production figures of each station for 1957 may be seen on page 153. For comparison, the total figures for the two previous years are also shown.

#### PEARLFISHERS - RATES OF PAY

It may be of interest to inspectors not acquainted with the pearling industry to learn something of the average remuneration of pearlfishers. The labour force of the luggers is divided into five grades - divers, first tenders, engineers, second tenders and crew. As might be expected, divers are the best paid, while the rates paid to the other groups decrease in the order quoted. Additional benefits also accrue to pearlfishers in the form of various perquisites, which include free board and free medical attention.

The table at page 154 has been prepared from information received from Inspector R.J. Baird, of Broome. It shows the average emoluments currently being paid at that centre.

It will be seen that the "lay", as it is called, is a system of incentive payments rewarding efforts to increase production, and as such follows a long established principle in the pearling industry. The actual rates are fixed each season by agreement between the master pearlman and the men, before the latter are signed on. The agreement is made in writing in the prescribed form and sets out all the conditions of employment. It is signed by both employer and employees, and then by the pearling inspector when he is satisfied that the men understand their terms of employment and that it meets all other provisions of the Pearling Act. His signature renders it a legal and binding contract.



A RARE ANGLER FISH

Inspector B.A. Carmichael, of Albany, last month forwarded a fish taken from the stomach of a sperm whale at the Cheynes Beach Whaling Station. It was identified by the Director of the West Australian Museum, Dr. W.D.L. Ride, as a female of the species Ceratias holboelli. Only 43 specimens of this fish are known to science and this was the first to be taken in Australian waters.

It is thought that the species lives in the depths of the ocean and was probably caught by the whale far below the surface. In common with other angler fish, this species catches other fish by attracting them by means of a luminous bulb on the end of a long appendage which dangles over the mouth.

The specimen taken was black and was covered with short spines. It was 21" in length. The species is blind and is of particular interest to science as, in addition to its unusual feeding habits, the males are completely parasitic and actually attach themselves to the females.

TYPHOID WARNING

The Commissioner of Public Health, Dr. L. Henzell, issued a warning to the public last month against gathering shell fish at Robb Jetty. He said that sewage effluent polluted the water at the base of the Jetty where the piles were encrusted with mussels.

After the third case of typhoid, which was thought to have been caused by consuming mussels taken from the Jetty, the Commissioner ordered that swabs be taken for bacteriological examination.

Bi-lingual warning notices (in English and Italian) have been erected by the Department of Public Health at the Jetty.

OPEN SEASON FOR WILD DUCKS

On the recommendation of the Fauna Protection Advisory Committee, the Minister (Mr. Kelly) has announced that the open season for wild ducks this year commences -

- (a) at 6 p.m. on the evening of Saturday, December 21, in the Augusta-Margaret River, Balingup, Bridgetown, Bunbury, Busselton, Capel, Collie Coalfields, Dardanup, Greenbushes, Harvey, Manjimup, Nannup and Preston road districts;
- (b) at 5 a.m. on the morning of Sunday, December 22, in that part of the South-West and Eucla Land Divisions not included in the road districts mentioned.

The open season will not apply in any of the following areas, which have been set aside 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 the Vasse, King and Kalgan Rivers and all land within twenty chains of their shores.
- (f) The whole of the waters of Vasse and Wönnorup Estuaries and all land within twenty chains of their shores.
- (g) All the waters of the Leschenault Inlet extending southwards from a line drawn south-east from



- (g) Waterloo Head (Belvedere) on the west foreshore to a point on the opposite foreshore.
- (h) All that portion of the Capel River between the Capel and Stirling Bridges and all land within twenty chains of the river bank.
- (i) The whole of the waters of Oyster Harbour and Princess Royal Harbour and all land within a radius of twenty chains of their shores.
- (j) The whole of the area of the Yanchep Caves Reserve.
- (k) The whole of the Harvey catchment area.
- (l) The whole of the area within a radius of two miles of the Post Office at Mandurah.
- (m) The whole of the area within a radius of two miles of the Post Office at Boyup Brook.
- (n) The whole of the area within a radius of  $1\frac{1}{2}$  miles from the Post Office at Balingup.
- (o) All that portion of the Avon River in the Toodyay road district, between the northern boundary of Avon Location 3 and a point opposite road 2069, and all the land within twenty chains of the river banks.
- (p) All that portion of the Avon River from Dumbarton Bridge to the railway bridge north of Toodyay, and all land within twenty chains of the river banks.
- (q) All that portion of the Serpentine River from road 8629 at the southern end of Goegrup (or Willies) Lake to Peel Inlet near the Old Mill, and all land within twenty chains of the river banks.
- (r) 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.

The close season, which extends right up to the week-end before Christmas, will be actively policed this year. This State has the longest open season of any in Australia, which makes even more indefensible the poor sportsmanship of those who try to beat the gun. Any such person who is apprehended can expect seizure of his firearm and prosecution. A strong effort will also be made to stamp out the illegal practices of using spotlights and capturing ducks in traps.

"An interesting outcome of the Department's duck research programme is the consideration at present being given to the proclamation of a long open season in outback areas where shooting intensity is low," said Mr. Kelly. "It is expected that a decision on this suggestion will be reached in the next few weeks. The research programme is being continued and, on opening day, departmental officers will examine as many ducks as possible on the shooting grounds before they are plucked and drawn. Every shooter is requested to co-operate in the programme and to return all bands recovered as soon as possible. They are also asked to keep a careful record of the ducks shot during the season and to complete a scorecard, supplies of which will be available from the Department and all gun clubs.

"Reports indicate," Mr. Kelly concluded, "that the season has not been a very good one for breeding, and shooters might not have things all their own way later on when surface water is expected to be at a minimum."

#### FAUNA PROTECTION ADVISORY COMMITTEE

A special meeting of the Committee was held on October 21 to make recommendations concerning the 1957/58 duck shooting season. The recommendations, which were accepted by the Minister, are reported elsewhere in this issue.

At the next meeting of the Committee, to be held on November 15, consideration will be given to extending the open season in outback areas where shooting intensity is low.



FREMANTLE-LANCELIN-CERVANTES-JURIEN BAY AREA

AREA	1953/54 Season (20.11.53 - 31.5.54)			1954/55 Season (20.11.54 - 31.5.55)			1955/56 Season (20.11.55 - 31.5.56)			1956/57 Season (20.11.56 - 31.5.57)		
	Total Catch	Average Catch per Man	No. of Men	Total Catch	Average Catch per Man	No. of Men	Total Catch	Average Catch per Man	No. of Men	Total Catch	Average Catch per Man	No. of Men
	lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.	
Fremantle	2,301,532	15,656	147	2,570,729	18,362	140	3,006,893	18,223	165	2,472,369	10,891	227
Lancelin Is.	2,096,619	20,555	102	2,408,763	18,966	127	2,109,394	13,970	151	1,516,786	9,599	158
Green Islets	405,025	23,825	17	495,192	19,045	26	230,420	13,554	17	206,651	15,896	13
Cervantes Is.	416,708	18,941	22	1,054,183	19,167	55	633,384	17,118	37	1,144,254	20,804	55
Jurien Bay	919,667	15,587	59	748,167	18,704	40	590,653	15,964	37	785,791	19,645	40
TOTALS .....	6,139,551	17,952	347	7,277,034	18,734	388	6,570,744	15,776	407	6,125,851	12,426	493

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FREMANTLE-LANCELIN-CERVANTES-JURIEN BAY CRAYFISHERY

The table at page 160 sets out crayfish production figures for all areas south of the 30th parallel during the 1953/54 to 1956/57 seasons. As was the case last year, the most striking aspect of the table is the decrease in the average catch per man for the season just concluded. This is again allied with a decrease in the total catch and an increase in the number of men fishing.

The greatly reduced total catch and average catch in the Fremantle and Lancelin Districts gives cause for concern, and it can only be hoped that they will serve as a warning to men contemplating entering the industry.

The position will be even more closely watched during the next season when additional staff will be made available to police the areas and to ensure that the restrictive measures aimed at conserving this valuable natural asset are respected.

INDONESIAN PRAU INTERCEPTED

In the Police Court at Derby on October 23, Pa Rahwiji, skipper of the Indonesian prau "Si Untung Slamet", was fined a total of £15 with £25.10. 0. costs.. Pa Rahwiji had been charged with having used an unlicensed boat and taken fish (trochus) for sale, contrary to Fisheries Act Regulations 2 and 3.

In view of the international nature of the case, an outline of events leading up to it is recorded here for the information of departmental personnel.

The prau first put into Cockatoo Island on October 5, and after obtaining supplies of food and water, sailed from that Island on October 8. On October 11, Mr. John N. Smith, Acting Customs Officer, of Cockatoo Island, was advised by Sunday Island natives that they had seen the prau fishing for trochus near Cleft Island on October 9. After an exchange of 'phone calls with the Commonwealth Departments of Navy, Customs and Primary Industry, Mr. Smith was instructed to intercept the vessel and escort it to Derby. At the same time arrangements were



made for a search to be carried out by air and for a launch to stand by at Cockatoo Island. On October 15 the prau was sighted at 7 a.m. from Cockatoo Island and Mr. Smith, aboard Australian Iron and Steel's launch "Balga", intercepted her about 20 yards from the reef at McIntyre Island, her position then being at 123°32'E. and 15°59'S. A search revealed a quantity of beche-de-mer and approximately 1 cwt. of live trochus shell under the floor boards, and the prau was taken in custody to Derby. On October 17 at 6.15 a.m., Inspector R.J. Baird, of Broome, accompanied by two Customs officers and an interpreter, went on board and later charged the captain with a breach of the Commonwealth Pearl Fisheries Act. This charge was later withdrawn when it was shown that the vessel had been in State territorial waters, and the alternative charges were laid under our own Fisheries Act regulations.

Inspector Baird and Mr. Smith (who, interestingly enough, is the son of our Technical Officer L.G. Smith) are to be commended for their handling of this case, particularly in view of the number of complications which arose.

#### SET NETS AT MANDURAH

Last month Mandurah fishermen appealed to the Minister for a review of the restrictions imposed on the use of set nets and their mesh size in the waters of Peel Inlet. They argued that set nets with mesh smaller than the prescribed minimum were essential for them to catch sufficient fish to earn a living. They claimed, too, that their Association's and the Department's figures proved that from 1914 the production of fish from Peel Inlet had increased, which demonstrated that stocks had not been depleted.

The opinion has long been held by departmental inspectors that set nets during the winter months are most destructive of undersize fish. However, to settle once and for all which point of view is right, the Minister has agreed that tests should be carried out at fortnightly intervals for four months next winter to examine the actual effects of 2"-mesh set nets (and above) in the Inlet. The Association has agreed to assist in the experiment in whatever manner is possible, and to abide by any measures based on the findings. At present the minimum mesh allowed by law for set nets in Peel Inlet is 2½ inches.

## THE CLEARING HOUSE

### Growing Problem of ATOMIC WASTES Confronts Fisheries Scientists

By Dr. D.B. Finn,  
Director, Fisheries Division,  
FAO., Rome.

The use of uranium as a fuel to develop electric power is becoming more widespread as the supply of coal and oil in some parts of the world rapidly diminishes due to heavy exploitation or economic pressures. Nuclear generating plants involve the disposal of large quantities of radio-active wastes. The only suitable place to dump this dangerous material is apparently the sea. Scientists have mapped out a research programme to find out how seriously this will affect fisheries.

The disposal of radio-active wastes in the seas and oceans, which is of much concern to world fisheries, poses problems which oceanographers, biologists and other scientists are now trying to solve.

These problems are serious, although at present the danger is potential rather than actual. But it is necessary to have the fullest international collaboration now to acquire knowledge and experience on how and where to dispose the radio-active wastes so that when the time comes we can be sure of the safe disposal of great quantities.

#### Big Developments

At present only Canada, Russia, the United Kingdom and the United States of America are actually disposing of a substantial quantity of radio-active wastes, but it will not be long before other nations will be doing the same. But this is only the beginning of the problem. Throughout the world industrialisation is proceeding apace and it is estimated that the energy consumption of human society is doubling every 30 years.



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Coal and oil, from which so much of the present energy is generated, are limited resources. There is also a limit to the water power which may be harnessed to produce energy. There is, however, a large amount of uranium in the earth's crust, and it is possible that many other radio-active elements may be in time used for controlled fission. Nuclear fission as a source of energy is a million times more efficient per unit weight than coal or oil or water.

We must assume, therefore, that nuclear fission will be a very important source of energy in the future and that the huge increase in energy consumption will continue unabated.

The radio-active wastes must be disposed somewhere. If they were just dumped in the ocean, there would be an increase in the radio-activity of the seas.

There is no doubt, though, that the oceans must be the place to dump radio-active wastes. They can absorb the wastes without any great hazard providing we avoid concentrating radio-activity in any one area and that the methods and means of disposal are scientifically controlled and technically efficient.

At the moment, however, any estimate of the magnitude and speed of increased use of nuclear fission for energy is guesswork. It may grow far faster than we anticipate. It has, in fact, already done so. As you will recollect, not many years ago the estimate was 10 or 20 years before industry would have the use of nuclear fission, yet it is already being used for peaceful purposes and atomic reactor plants are being built for export to various countries. The quicker this development goes on, the more acute becomes the problem of disposal of radio-active wastes.

#### Long-Life Isotopes

The United Kingdom and the United States are disposing of radio-active wastes in their adjacent seas, under, of course, the most rigid and exacting safety controls. So far as is known, no dangerous concentration of radio-activity has taken place in the



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the disposal areas. But as more and more radio-active wastes accumulate, safe and sure methods of their disposal will have to be devised.

The problem centres on the long-life isotopes.

Short-life isotopes can be dealt with quite easily in storage and can be discharged harmlessly into the oceans. But some isotopes in the wastes have a relatively long half-life. For example, strontium 90 has a life of about 28 years and caesium 137 has a life of some 33 years. Obviously any method of disposal must more than safely cover the life period of such isotopes.

#### Mystery of Deep Water Movements

A variety of methods of disposal have been discussed. One is that the wastes should be buried deep in the earth in isolated areas, such as dis-used mines, but there are various objections to this proposal. Strongly advocated is the disposal of the wastes in the deepest parts of the oceans, but there are a great number of technical difficulties in the way of putting this proposal into effect. Furthermore, although it has been suggested that these very deep bottom waters are rather stagnant, recent investigations tend to show that a good deal of vertical and lateral movement occurs at great depths.

In considering this proposal, we are lost in our search for a rational answer because of our ignorance of the ocean depths.

We have many theories but little fact regarding the age and direction and speed of movements of such waters. Some oceanographers believe that the exchange in great depths is so slight that they remain stagnant for several hundreds of years, while others point out that this cannot be the case because living organisms, which require some oxygen, have been fished up from great depths.

Apart from any gradual change which may take place in the deep waters, there is also the possibility of a cataclysmic change, such as may occur in



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underwater earthquakes. Again, it has been proposed that radio-active wastes should be dumped in deep trenches and canyons which we know exist in some of the oceans, but these canyons are subject to mud slides every few years which keep them scoured. Even if dangerous radio-active wastes were encased in concrete or other material, there could be no guarantee that the activity in the canyons would not smash the containers.

#### Fish Concentrate Radio-Activity

The sea has, of course, natural radio-active properties. It contains such elements as potassium 40, ionium, radium, uranium and other radio-active substances. The natural radio-activity of the oceans is only about a tenth of the natural radio-activity on land, which comes from the cosmic rays of the sun as well as the elements in rocks. Fish and other living organisms in the sea concentrate radio-active elements in their bodies. The concentration in living tissue may range from 1,000 to 10,000 times more than in an equal amount of surrounding sea water.

This propensity of fish and living organisms to concentrate radio-active elements is one of the dangers inherent in the disposal of radio-active wastes at sea. If the radio-activity of the water was heavily increased, it could result in the death of marine life, or it might be sufficient to cause a dangerous concentration of radio-active elements in fish and in other marine fauna and flora which are eaten by man.

#### Mobility Complicates Problem

When we look into the problems associated with the disposal of radio-active wastes, the picture becomes more and more complex. Phytoplankton and other marine plants and seaweeds accumulate radio-activity rapidly. Fish and other animals which feed on such plant life would take up the radio-active elements with food even though the water they were swimming in was not radio-active itself.

Then, again, there is the danger that fish swimming through an area where radio-activity is high may



become contaminated and then, perhaps, may themselves be eaten by bigger fish hundreds of miles away from the contaminated waters. The fish which had eaten them would become radio-active.

Take the case of the deep sea eel which lives at great depths and may become contaminated. This, perhaps, would not matter so much if the eel stayed at great depths but it comes up to spawn on the surface. If it was charged with radio-active elements, perhaps the eggs would be radio-active. Many of the eggs and larvae of these deep-sea eels are eaten by other fish.

There is also the case of ordinary eels and such fish as salmon. These creatures move from the rivers and streams to the sea so that if they become contaminated they would carry radio-activity from the sea to the streams or from the streams to the sea. The Pacific herring is another example. This fish spawns in the coastal areas and in the estuaries where it might become contaminated and carry contamination on its migrations. Other roaming fish, such as tuna and swordfish, could easily carry radio-activity over thousands of miles of ocean.

It will be remembered that following the atomic explosion at the Bikini atoll it was found that the sea had temporarily become more radio-active as far as 2,000 kilometers west-north-west, and 1,000 kilometers west-south-west, from the atoll, but after a time the waters were so mixed that this increased activity could no longer be detected.

This enormous spread of radio-activity provides an example of what might happen if heavy concentrations of radio-active wastes disposed in limited areas of the oceans got free to spread.

These are some of the difficulties connected with the problem of disposal of radio-active wastes. In particular, there arises for fisheries the possible contamination of the waters of the continental shelf and of the shallow marginal seas. These are the most dangerous areas in which radio-active wastes could be



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dumped because of the concentration of fisheries in them and their closeness to the shore.

It must be assumed that greater quantities of radio-active wastes will be dumped in coastal waters. The questions to be answered are how, where, and how much radio-active wastes are to be disposed of in these waters without danger. These are questions to which man must find the right answers in the near future.

As I said earlier, the most rigid and exacting safety controls are exercised over the discharge of radio-active wastes into the sea. The most exhaustive investigations have been made to ensure that neither the fishing resources nor man himself are harmed. In this connection I would like to point out that the health physicist of the United Kingdom Atomic Energy Research Authority recently testified at a public inquiry on plans for establishing an atomic energy station, that he personally was far more afraid of the discharge into coastal waters of the biological organisms in crude sewage than he was of radio-activity.

#### An International Problem

The problems posed by the disposal of radio-active wastes into the oceans must be viewed objectively and unemotionally. Mankind has always been exposed to a certain amount of radiation and radio-activity, without adverse effect.

The Governments already operating atomic energy programmes have put their outstanding scientists on the work of investigating fundamental biological and physical principles in relation to atomic energy and the whole question of the biological effects of atomic energy has been referred to the United Nations Scientific Committee on the Effects of Atomic Radiation.

I do not think it an exaggeration to say that this question of the disposal of radio-active wastes is to-day among the most important facing the oceanographers, biologists and other scientists of the world. We must do an enormous amount of research and



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investigation to ensure that we find the right answer to the problem so that as the volume of radio-active waste material grows we shall be able to dispose of it safely. This is not a national but an international problem. It is essential that it should be tackled on an international basis.

A great deal of work has already been done on the problem. There was evidence of this at the International Conference on the Peaceful Uses of Atomic Energy which was held in Geneva in August 1955 and, more recently, at the meeting on oceanographic information with possible bearing on the sea and ocean disposal of radio-active wastes, which was held at Gothenburg in January this year. This meeting was attended by 24 scientists from nine different countries and organisations. The present state of progress was reviewed and the way signposted for future research and investigation. FAO, of course, participated in both meetings. The Organisation will continue to do all it can to focus attention on this problem and recently established a section, headed by Dr. R.A. Silow, an atomic energy specialist, to deal with the applications of atomic energy in agriculture.

("Western Fisheries" Vancouver, B.C. August, 1957)

NEW-Flash-Freezing Tunnel Installed at SeaPak Corporation  
St. Simons Island, Ga. Plant.

Now in full operation, the new flash-freezing tunnel of the SeaPak Corporation, St. Simons Island, Ga., gives this frozen seafood processor the greatest shrimp production potential in the United States, they state. The new tunnel alone has a freezing capacity of 3,000 pounds an hour and, when added to SeaPak's other freezing systems, allows the plant to process more than 4,500 pounds of shrimp an hour.

To flash-freeze shrimp at a temperature of minus 50 degrees Fahrenheit (well below that of other processors), the tunnel is refrigerated with a "two-stage" refrigeration system, composed of a 15 by 10 inch Frick



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ammonia compressor which is used as a booster, and a 9 by 9 inch upright FAC for the second stage. The cooling capacity of the two compressors acting in tandem is 52 tons. The system is so designed that other compressors could be added if considered desirable.

There are three Frick blowers to circulate the frigid air through refrigerator coils, across the roof of the tunnel, and back through adjustable louvres across the tunnel. The position of the louvres sets both direction and velocity of air flow.

After the raw shrimp have been washed down, graded, peeled, and deveined, they are individually pinned by the tail on special steel racks. The shrimp are then immersed into batter up to the tail joint, and coated with a special blend of breading. The shrimp-filled racks are then loaded on freezer carts and lined up in the first ante room, which is kept around zero. The carts are then pushed through the tunnel doors. Opening automatically, they cut down refrigeration loss and the forming of ice in the tunnel. A hydraulic pusher carries the product-laden carts through the tunnel which can hold 10 freezer carts in line. An automatic conveyor belt is being added.

The biting cold flash-freezes and seals the surface of the shrimp in an unbelievably fast three minutes, preventing dehydration and possible weight loss. In ordinary quick-freezing, for example, the weight loss of shrimp is five per cent. According to John M. Blackshear, the refrigeration specialist who designed this tunnel for SeaPak, after more than 30 years of experimentation on his own, this flash-freezing tunnel cuts weight loss down to less than two-tenths of one per cent. Freezer carts are usually left in the tunnel about 13 minutes before release through automatic doors into the second ante room. The solidly frozen shrimp are then depinned from the racks, and are ready for packing.

The SeaPak technique of flash-freezing individual shrimp is designed to preserve the quality that starts with top-grade raw shrimp. In ordinary quick freezing, which often takes two hours or more, the moisture inside the shrimp forms into ice crystals which

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rupture the delicate cell walls, permitting both flavour and nutrient value to escape in "drip loss". The SeaPak system, however, drops the temperature down so fast through the critical freezing zone with bitter-cold air that ice crystals remain minute, and there is the least possible breakdown of cell structure. Flash-freezing literally seals in the fresh-caught flavour and nutrient value.

SeaPak packs the individually flash-frozen breaded shrimp as Breaded Shrimp In-A-Jacket and Breaded Shrimp, Butterfly Style for the retail trade, both in 10 ounce packages. For the institutional trade, breaded fantail shrimp are marketed in 3 pound cartons in four shrimp sizes, Colossal, Super Jumbo, Jumbo and Premium Large.

Other seafood products marketed by SeaPak include peeled and deveined glazed shrimp (a 7 ounce Quik Cook retail package and a 3 pound PDQ institutional package), scallops, oysters, crab sticks, deviled crab, fish fillets, and both pre-cooked and raw frozen fish sticks.

("Fishing Gazette"                      New York                      August, 1957)

#### Mullet in a Cow Paddock

The Fisheries Department untangled one of the queerest problems ever presented to it recently when thousands of baskets of deep sea mullet were discovered in a water-logged paddock 30 miles from the sea at Cessnock (NSW).

It is believed the mullet were trapped in the paddock when the Hunter River broke its levee banks in a big flood a few years ago.

The paddock about five miles long was formerly part of the river bed, but for many years had been used for cultivation and to graze dairy herds.



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The levee banks were built up again after the flood subsided and the water-logged paddock was left to dry up of its own accord.

Then somebody discovered the mullet.

Fishermen from Newcastle and Dora Creek carted their boats overland to the paddock and started netting the mullet in ton lots.

Dairyfarmers, who are paying rates on their water-logged property, wanted a royalty but fishermen claimed they were licensed to take fish anywhere.

Then fishermen got cagey and refused to bring the mullet to market. It was not under Government jurisdiction because it was caught on private land, they claimed.

The Fisheries Department sorted out the tangle without treading on anyone's toes.

Now the Department's ichthyologist, Dr. Racek, is going to unravel the mystery of how the deep sea mullet lived all these years in a cow paddock.

("Fish Trades Review" Sydney October, 1957)

#### Largest Artificial Lobster Pool

George Pisacano of S. Pisacano Fish Market, 470 South Broadway, Yonkers, New York, states that his company will soon be operating the largest live lobster pool in the New York area, if not in the nation. The new tank, being installed by Brandano Live Lobster Pool, Inc., Bronx, New York, will have a minimum capacity of 8,000 pounds and will take up to 10,000 pounds. The tank will be housed in a store which will sell only lobsters, nothing else, which makes it a unique operation in itself. The Fishery Council is co-operating with Mr. Pisacano in publicising the new venture when it is ready for business in a few weeks.

("Fishing Gazette" New York August, 1957)