

FISHERIES DEPARTMENT, WESTERN AUSTRALIA

MONTHLY SERVICE BULLETIN

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STAFF NOTES

Supervising Inspector Mr. J.E. Bramley and the Relieving Inspector, Mr. A.K. Melsom, last month carried out district inspections in the Bremer Bay and Albany areas and later in the month in the Mandurah district.

Mr. Bramley, accompanied by Technical Officer Mr. J. Simpson, will shortly visit Moora to investigate reports of the presence of 10 inch fish in a dam which has been dry at different times in the last three years.

Inspector H.J. Murray proposes to take his annual leave this month. Mr. A.K. Melsom will assume the Mandurah district responsibilities during Mr. Murray's absence.

Captain H.C.W. Piesse with crew members R.M. Crawford and Cadet Inspector M.J. Simpson sailed on the research vessel "Lancelin" for Exmouth Gulf at midnight on Monday, May 24. C.S.I.R.O. Technical Officer K. Godfrey is also on board and will assist in research work on prawn and other fisheries in northern waters up to Hampton Harbour. The "Lancelin" is not expected back in Fremantle until next November.

Assistant Inspector N.E. McLaughlan and Cadet Inspector J. Milne are patrolling the Rottnest area in the P.V. "Garbo".

Inspector F.A.L. Connell and Assistant Inspector B.A. Carmichael, last month conducted the Minister for Fisheries, Hon. L.F. Kelly, on inspections of the Abrolhos crayfishery.

The Superintendent, Mr. A.J. Fraser, accompanied the Minister to Denmark where they attended a public meeting and discussed proposals concerning restrictions of seine netting in Wilson's Inlet.

TROUT

The Superintendent and the Clerk-in-charge, Mr. B.R. Saville, attended a meeting of the Trout Acclimatisation Council at Bridgetown on May 9. The Council proposes to hold its next meeting at Albany some time in August, and, after the meeting, to hold a discussion with local people interested in trout propagation and the possibility of forming a Trout Acclimatisation Society for the Albany, Denmark and Mount Barker areas.

At a previous meeting on policy it was decided that the Pemberton-Warren Trout Society should be responsible for the maintenance of the hatchery and breeding of fish only. The Council was to accept responsibility for all other matters including sales, distribution, accounts and finance. The Department would, in conformity with Council policy, supervise the distribution of all fish.

Trout Distribution

Technical Officer J.S. Simpson reports that on May 10 he delivered 3,500 advanced fingerlings to Bridgetown and Balingup for the Blackwood Society. On May 19, 3,500 advanced fingerlings were delivered to Jarrahdale and on May 22 a further 3,500 were delivered, these two consignments being for the Serpentine-Jarrahdale Society. All 3 loads were delivered in good condition and with a total loss of only

7 fish. As may be judged from this, Mr. Simpson has the transportation unit functioning in first-class working order.

FAUNA

From the 3rd - 13th May, the Senior Clerk and the Technical Officer, Mr. J. Traynor, carried out a survey on the prevalence of kangaroos and emus in many road districts in the South-West. They were joined at Bridgetown on the 10th by Inspector A.V. Green, who accompanied them through the Bridgetown, Upper Blackwood, Balingup, Preston and Capel districts. Opinions of Road Boards, Farmers' Union Branches, local farmers and Honorary Wardens were obtained on the amount of damage suffered and the pros and cons of open seasons. Wherever necessary, details of the permit system were explained, as it was known that there was, in some quarters, a poor conception of the laws relating to protection and permits obtainable by property owners.

As would be expected, there was a marked difference of opinion even within one section of the same road district, and all opinions will be carefully weighed before any action is taken to have further open seasons proclaimed.

DUCK BANDING

Acting on information received from Inspector G.C. Jeffery at Albany, Technical Officer J. Traynor proceeded to Cape Riche and in less than a week was able to band 134 ducks. This number consisted of 69 black duck, 62 grey teal, one mountain duck and two chestnut teal, the latter being the first chestnut teal banded. These figures bring the total number of bandings for the year to 644 and the grand total to 1819.

Recoveries: Since publication of the last Bulletin the following bands have been returned:-

NO.	Date Ringed	Place Where Ringed	Date of Recovery	Place Where Recovered	Distance Traveled
<u>Black Duck</u>					
2092	7/1/54	Lake Karrinyup	20/4/54	Lake Clifton near Lime Kilns	65 miles
1709	20/4/53	Queen's Gardens	27/3/54	Wokalup	80 "
2481	5/3/54	Wardering Lake	1/5/54	1 mile west Norring Lake	6 "
2108	8/1/54	Lake Karrinyup	4/5/54	Wilson's Inlet	232 "
2504	9/3/54	Wardering Lake	unknown	Brunswick Junction	85 "
2516	12/3/54	do.	15/4/54	Quarbin Lake	10 "
2476	5/3/54	do.	6/5/54	Douglas swamp Woodanilling	8 "
2378	16/2/54	Cook's Farm Moora	2/5/54	Main Chittering Lake	50 "
1595	6/3/53	Queen's Gardens	5/5/54	Zoological Gdns South Perth	2 "
2495	8/3/54	Wardering Lake	14/5/54	3 miles west Norring Lake	6 "
2513	12/3/54	Wardering Lake	7/5/54	Capel District	65 "
<u>Grey Teal</u>					
2052	18/12/53	Watson's Lake Dumbleyung	24/4/54	Cape Riche	100 "

No.	Date Ringed	Place Where Ringed	Date of Recovery	Place Where Recovered	Distance Travelled
<u>Grey Teal (contd)</u>					
1599	19/3/53	Big Bootine Swamp, Gingin	9/5/54	Gundaring Lake, Wagin	170 miles
1500	26/2/53	Lake Karrinyup	not yet known	On a dam near Wagin	130 "

SEA POLLUTION

With the erection of an oil refinery at Kwinana well under way, and progress being made in the establishment of other refineries around Australia's coast, it is indeed fortunate for us that concerted international efforts are being made to reduce oil pollution of the sea.

Britain in 1922 prohibited the discharge of oil within territorial limits of her coast and since 1926 ship owners of many countries have voluntarily refrained from discharging oily waste within a 50-mile limit. Contamination from sea waters comes from two main sources - tankers and oil burning ships. In tankers, during the trip from the point of loading to the port of discharge, an oily sludge tends to form at the bottom of the crude oil tanks and over a long journey this sludge may amount to 20 or 30 tons. After discharging its oil, the tanker has to fill up some of its tanks with sea water as ballast and later at sea all tanks are cleaned and the contaminated water pumped out. The total discharge of sludge contaminated water may approximate 7,000 tons from a single tanker. These crude oil washings spread rapidly over the surface of the sea; prevailing winds and currents can carry them to the shore even though they may have been deposited many miles out to sea.

Oil burning ships, while normally carrying sea water as ballast, often are forced to fill empty oil tanks with water for extra stability. Before the ship is able to refuel, the water must be pumped out of these tanks and, being badly contaminated, forms a greasy film of scum on the surface of the sea which has tragic effects on marine bird life as well as causing extensive fouling of boats, fishing gear, piers, quays, beaches, damage to fish and increased risk of fire in harbour. Birds contaminated with oily waste become most distressing spectacles and suffer a slow and miserable death.

The British Minister of Transport in March 1952 formed a Co-ordinating Advisory Committee on Oil Pollution, and this committee submitted in its report a great deal of information on preventive action that may be taken by international agreement, including fitting of separators to tanks, the refining of oily residue and a prohibition of the discharge of oily wastes in an area extending 1300 miles westward from the British Isles.

Resulting from another recommendation by the Co-ordinating Advisory Committee, the British Government working with the Institute of Oceanography and the Royal Air Force, commenced a few months ago, an investigation of ocean currents. R.A.F. planes dropped 10,000 plastic envelopes, whose buoyancy has been safeguarded by the addition of cork floats, along recorded routes in the Atlantic. Contained in the envelopes are instructions printed in 8 languages and a post card questionnaire, which when completed will divulge information from which can be tabulated detailed facts on Atlantic drifts and currents. The first drift cards recovered have been picked up on the coast of Spain, but the Institute of Oceanography will wait until a good percentage of the cards have been returned before attempting any analysis. The British Government pays 2/6d reward, plus costs to persons finding the envelopes.

Meanwhile representatives of affected and interested nations have held meetings in London to consider ways and means of tackling the many problems and of evolving procedures to eliminate the menace.

State and Federal authorities in this country are keeping in close contact with developments overseas and it is understood that in the very near future representatives from interested State and Commonwealth bodies will meet in the East to discuss measures to be taken in Australia. Our coastal waters are particularly rich in bird life and recreational beaches and it is impossible to believe that in these enlightened days, measures will not be taken to protect our magnificent heritage.

LOSS OF PANDORA

Inspector S.W. Bowler reported last month that on the 20th April licensed fishing boat No. G.19 was wrecked at Horrocks' Beach, 16 miles west of Northampton.

This 22 ft. auxiliary fishing boat had been operated by Mr. Quartermaine in the area for the past three months and at the time of the accident he was endeavouring to assist Mr. Adrian Hayter to get the latter's dinghy off the beach. Mr. Hayter, a New Zealander, had arrived from Djakarta, Indonesia, in his 32 ft. sloop earlier that day. While approaching the beach a large breaker swamped and sank the fishing boat and the waves soon pounded it to piece.

It is understood that the "Pandora", which was valued at \$1,200, was insured.

Wherever men go to sea in ships, mishaps, accidents and tragedies occur, and in spite of all the improvements in safety devices this risk will remain. Along our treacherous reef-bound coast continual sacrifices of boats and men are suffered, but the perils endured by our men receive scant recognition. It is not much comfort for them to know that most of the world's fishermen have to put up with similar public apathy.

JEW FISH AT DENHAM

Inspector R.J. Baird reports that on April 13th, 3 good sized jewfish were landed. He comments that these are the first caught at Denham since he commenced duties there about 2 years ago.

SEINING AT WILSON'S INLET

Accompanied by the Superintendent (Mr. Fraser) and the Inspector of Fisheries at Albany (Mr. Jeffery), the Minister for Fisheries (Mr. Kelly) attended a crowded meeting at Denmark on the evening of May 28 to discuss the possibility of banning seine nets from Wilson's Inlet, as requested by ratepayers of the Denmark district. There were over 100 people at the meeting, which was presided over by Mr. F.J.F. Stahl, Chairman of the Denmark Road Board.

The principal speakers in favour of prohibiting seining were Messrs H.J. Kingston, a member of the Road Board; Evans and Ricketts, members of the Boating and Angling Club; Hollings, Crellin, Clark, Fawkner, G.H. Smith, Bidewell, and Rev. Archdeacon Strugnell, anglers; E.J. Smith, farmer and former fisherman; and E.J. Procter, professional line-fisherman. All stated that the stocks of fish in the Inlet, and particularly those of King George whiting, could not stand up to continuous seining, although none of them objected to set nets which, they said, did very little harm to the fishery. They said much poaching was taking place, and that it was not possible, because of the distance of his headquarters from Denmark, for the local fisheries inspector to provide adequate supervision. Some thought another inspector should be appointed to reside at Denmark, to include Parry's, Nornalup and Brookes' Inlets in his district.

The main protagonists of the seine netters were Messrs Mitchell, an amateur who said he rarely went angling for whiting without bringing home several dozen fish; F. Gomm, N. Swarbrick, L.J. Smith and E. Mayfield, professional fishermen. All these speakers contended that the condition of the fishery was as good today as it had ever been.

All speakers, whether for or against seining, were agreed that the condition of the bar was deplorable, and that something should be done to ensure that the water was allowed to rise to a sufficiently high level in the Inlet to permit of adequate scouring at the entrance when the bar opened. All complained of the action of the Railway Department in building its

track so close to the water that it would be endangered if the water rose too high. It was contended that with the modern earth-moving equipment now available, it would not be a difficult, nor excessively costly matter to raise the level of the railway by a few feet.

Mr. Kelly in his reply said that he had listened very carefully to all the points raised, but the argument that the Inlet was being depleted could not be substantiated departmentally. Quoting figures of catches over 13 years, he said there had been considerable annual fluctuations in the quantities of fish caught, but that in 1953, despite a number of lean years in the late 1940's, the catch was not far short of that in 1941, one of the best years on record. He said he would do what he could about maintaining a good level of water in the Inlet.

The meeting passed resolutions recommending the Minister to appoint a full-time inspector at Denmark, to approach the Minister for Railways in regard to the water level in the Inlet and to move the closed water boundary mark on the southern shore about 3 chains eastward.

MINISTER VISITS ABROLHOS

The Minister for Fisheries (Mr. Kelly) paid a visit to the Abrolhos during May and meetings with local crayfishermen were held at all three island groups. Mr. Kelly travelled in p.v. "Kooruldhoo", which was in the charge of Inspector F.A.L. Connell, with Assistant Inspector B.A. Carmichael as crew.

Upon his return to Perth Mr. Kelly issued the following statement -

"Crayfish grounds at the Abrolhos are probably now being fished to maximum capacity and too much concentration of fishermen is bringing about a poor result for a number of them.

"While the total take of crayfish out of Geraldton is up to the present time in

"excess of last year's figures, it has to
"be borne in mind that there are considerably
"more boats and fishermen operating, and the
"catch per man has shown a decided decrease.

"The loss of crayfish between the
"Island and Geraldton has been greatly reduced
"in the past few years. It is now under 2%
"of the total catch, which represents a sat-
"isfactory state of affairs."

CRAYFISHING IN 1954

Abrolhos Islands Area

The table on page 199 sets out the production figures for March and April, 1954, as compared with the same two months of last year. The figures for March are necessarily lower than those for April because the season did not open until March 16, thus allowing only 16 days' fishing in March as against 30 in April.

The March, 1954, figures show a great increase of production as compared with March, 1953, both in the total catch and the catch per man. The April, 1954, figures reveal an increase in the total catch, but an overall decrease in the catch per man. Had the catch per man in 1954 been the same as in 1953 the total production would have been of the order of 713,000 lb. to the end of April. It will be noted that the greatest decline in the catch per man occurred in the Wallabi Group, where the figure is 2,000 lb. less in April than in the corresponding month of 1953.

The decrease in the percentage of "midget" tails is heartening. The percentage of all tails other than midgets rose from 49.2 in March, 1953, to 72.73 in March, 1954. Although this increase was not maintained during April, the figure of 69.21% in 1954, as against 55.87% in 1953, is still good. Speaking generally, it can be said that while the size of crays taken indicates that the duration of the season is satisfactory, the decrease in the catch per man reveals the intensity of fishing in some areas to be too great.

Another factor to be considered along with the

ABROLHOS ISLAND CRAYFISHERY

GROUP	MARCH 1953			MARCH 1954			APRIL 1953			APRIL 1954		
	Total	Catch per man	No. of men	Total	Catch per man	No. of men	Total	Catch per man	No. of men	Total	Catch per man	No. of men
	lb.	lb.		lb.	lb.		lb.	lb.		lb.	lb.	
Easter	88,550	2,108	42	156,468	3,259	48	219,127	5,096	43	279,877	5,712	49
Wallabi	76,674	2,556	30	120,382	2,799	43	210,696	7,023	30	194,526	4,987	39
Pelsart	51,595	2,149	24	72,230	2,778	26	129,913	4,997	26	127,689	5,107	25
North Is	11,625	1,661	7	39,785	2,652	15	34,740	5,790	6	72,343	5,565	13
Totals ..	228,444		103	388,865		132	594,476		105	674,435		126

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TAIL SIZE PERCENTAGES

CATEGORY	MARCH		APRIL	
	1953	1954	1953	1954
Midget	50.8%	27.27%	44.13%	30.79%
Small	31.5%	50.5%	33.39%	44.46%
Medium	11.8%	12.97%	14.75%	13.36%
Large	4.3%	7.29%	5.85%	7.29%
Jumbo	1.6%	1.97%	1.88%	4.1%

OTHER AREAS

AREA	1951/2 Season (To March 31, 1952)			1952/3 Season (To March 31, 1953)			1953/4 Season (To March 31, 1954)		
	Total Catch lb	Catch per man lb.	No. of men	Total Catch lb	Catch per man lb.	No. of men	Total Catch lb.	Catch per man lb.	No. of men
Block 29 (south of Fremantle)	37,448	3,749	10	289,474	8,271	35	324,480	9,271	35
Block 36 (north of Fremantle)	1,630,564	17,164	95	1,637,747	13,762	119	1,602,498	13,244	121
Totals	1,668,012		105	1,927,221		154	1,926,978		156
Lancelin Island	2,295,023	20,491	112	1,503,280	13,422	112	1,630,957	15,682	104
Green Islets	424,380	16,980	25	216,650	12,332	20	273,025	16,060	17
Cervantes Island	962,599	19,252	50	398,745	14,277	28	302,817	11,647	26 +
Jurien Bay x	-	-		-	-		629,126	10,680	59
Totals	3,682,011		187	2,148,675		160	2,835,925		191
GRAND TOTALS	5,350,023	--	292	4,075,896	--	314	4,762,903	--	347

x In the 1953-4 season, Jurien Bay was fished only from January 1, 1954. In other areas fishing commenced on December 1, 1953.

+ This average is somewhat biased by reason of the presence during December 1953 of a number of men who, while waiting for the Jurien Bay area to open, were fishing spasmodically at Cervantes Island. The real figure would probably be close to 20. In the three months of 1954 only 18 men were regularly employed at Cervantes.

decline in the catch per man is that the weather this year has been more equable than last year, and the catch per man should consequently have been expected to increase. This good weather may also have been to some extent responsible for the general improvement in the size of the crays taken this year. Certainly waters which on account of bad weather could not be fished during the past year or two have been exploited quite freely this year, and fish caught which have had a chance to "grow up".

Prices have declined in the United States. Taking this fact into consideration with the lower catch per man, it will be appreciated that the industry still needs careful management. There is therefore no room for complacency, and instead of easing controls, it looks very much as if they will need to be tightened. It has frequently been pointed out that the maximum number of men required to work the Abrolhos efficiently and to permit of the re-introduction of "farming" procedures common in earlier years, is approximately 65, having regard to the relatively short open season of 22 weeks only in each year. Just now 125 men, or almost twice as many as are really needed, are engaged in crayfishing at the Islands. This is a matter which is causing the Department considerable concern, and one with which we shall be compelled to grapple very soon.

One particularly pleasing development is the reported decrease in the percentage of dead crayfish landed at Geraldton this season. Inspector Bowler states that speedier transport and better organisation have been the cause of reducing the mortality to 2%, an all-time low. It will be remembered that shortly after the opening day this year there was in one consignment a mortality of 50% of the fish transported to the mainland. Had this avoidable loss not occurred, the overall percentage of loss would have been reduced to well below 2%.

Fremantle-Lancelin-Cervantes-Jurien Bay Areas

The table on page 200 sets out comparative figures for the 1951-2, 1952-3, 1953-4 seasons. The catch per man for these areas as a whole has not been worked out. To have done so would have given an unrealistic figure, for as may be seen, the per capita catch south of Fremantle is much less than that in

waters to the north.

The figures for 1953-4 reveal some improvement over 1952-3, but they still fall far short of the record 1951-2 catch. Opening the Jurien Bay area eased the fishing pressure in other adjacent waters and in addition contributed to the increased catch. Jurien Bay will not be open next season.

Not only in the Abrolhos, but also in this region, must the increase in production be to some extent attributed to continued good weather and consequently improved fishing conditions. We cannot therefore afford to be complacent in regard to this fishery either. It too needs very careful management.

DUCK SHOOTING

The attention of all Inspectors is drawn to the fact that the 1953-4 season ended at midnight on May 31 throughout the State. Until the next open season is declared, no ducks may be taken by any person unless they hold a license issued by this Department. Inspectors are requested to pay particular attention, as far as other duties permit, to the policing of the close season, especially in the first few months when clutches have their greatest chance of survival. Shooting in the early winter months causes birds to disperse after which they again have to pair off. This severely delays breeding and nesting and prevents the possibility of double clutches with a marked adverse effect on the duck population.

WHALING SEASON

The season for 1954, as in other years, commenced on May 1, and will close on October 31.

Licenses have been issued to the 3 West Australian stations by the Commonwealth Fisheries Office, who have advised that their whaling officers, Messrs R. Hatten and J. L. Heath will be stationed at Carnarvon and Point Cloates respectively. Inspector G. C. Jeffery will act for the Commonwealth at Albany.

FISHING IN HARDY'S INLET, AUGUSTA

At the invitation of the Augusta-Margaret River Road Board, the Superintendent (Mr. Fraser) accompanied by the Inspector of Fisheries at Bunbury (Mr. Green) attended a meeting held during the evening of May 5 in the Board's office at Margaret River. The Chairman of the Board (Mr. J. Darnell) presided and there was a large attendance of citizens of Augusta, including several professional fishermen.

The meeting had been called to discuss the question of further restricting net-fishing in Hardy's Inlet (the estuary of the Blackwood River), and the need for more constant supervision of the existing closed area.

Mr. C.G. Yann, who owns several tourist camps at Augusta and who was formerly an honorary inspector complained that Hardy's Inlet was being "raked" with nets, and that as a result the hundreds of visitors who went to Augusta each year were unable to enjoy good angling. He said nets were openly and continuously set in the closed entrance waters, and that the Department had consistently rejected demands for more adequate supervision. Augusta was 90 miles from the inspector's headquarters at Bunbury, and it could not be expected, having regard to the size of his district, that he could spend as much time at Augusta as he should. He thought there should be a full-time man appointed, or failing that, that control of the fishery should pass to the Road Board. Messrs Mann, Robinson and Shervington supported Mr. Yann's remarks.

Messrs Arthur Horner and William Overton, professional fishermen, discounted much of what had been said by previous speakers. They said that the total catch of the handful of professional fishermen working in the area did not have any adverse effect on the fish stocks. In any case, if fish were there to be taken by net fishermen, they were there to be taken also by anglers. If fishing were so poor, they asked, why did the fishermen remain there, and why did visitors come back year after year. The suggestion that nets were openly set in the entrance waters was ridiculous, they said, as the strongtide did not allow this.

Mr. Fraser said he had listened carefully to all the points raised, but he had not been wholly convinced by the arguments put forward in support of further net restrictions, nor by those proposing the appointment of another inspector. Production figures had been maintained over several years, indicating that little damage had been done by netting. Concerning the appointment of a full-time inspector, he said that the Augusta fishery was not vitally important from the point of view of the State as a whole, and if funds could be found for additional staff, they could be used to better advantage elsewhere. However, he would give some thought to the representations which had been made, and discuss the whole matter with the Minister, before coming to any definite decision.

THE CLEARING HOUSE

Fishery Experts Fear Radioactivity Danger.

Despite the perhaps over-confident assurances recently given in the House of Commons about the effects of America's Hydrogen-bomb explosions upon Japanese fishermen, their boats and even the fish they caught 750 and 800 miles away from the scene of the explosion, American and other fishery authorities are rather alarmed at the prospects of further experiments, let alone a world war, upon fishlife.

Contrary to popular belief, the recently publicised incident in the Pacific was not the first example of radio-active fish resulting from the post-war atom-bomb experiments. When the atomic bomb explosions at Bikini in 1946 blew all but a remnant of the bathing costumes off the beaches of the New World, it also created the first radioactive fish, but only Dr. David Bradley, one of the American scientists taking part in the Bikini tests, thought fit to draw attention to the fact, which he mentioned in his book, "No Place to Hide."

All Radioactive

Bikini Lagoon measures 20 miles by 10 miles, and it was normally the haunt of prettily-coloured coral-crushing fishes that lived in a colourful world beneath the warm seas of the Pacific.

After the explosions these fish were found to be radioactive. Furthermore, sea-going fish caught outside the lagoon were almost all radioactive for a time.

It was thought at that time that the amount of radiation carried away by migratory fish would not constitute any hazard either to other fish or to fishermen, because of the great dilution factor. But now that explosions have become more frequent and much more violent in their nature, doubts are being raised. It must be remembered that the Pacific Ocean contains the greatest pelagic fishery in the world, and that many of the fish passing through the experimental area consist of species like tuna which migrate in shoals for hundreds of miles, in a season.

The U.S. may ban fishing vessels from the extended area of experiments, but it cannot keep out the fast-moving shoals of pelagic fish - tunny, mackerel, yellowtails, moonfish, sunfish, sharks - and the tiny, drifting plankton upon which other fish feed.

Even before the recent contamination of the Japanese fishermen's catch, Dr. Bradley doubted if the dilution factor would be a safe assumption in the case of atomic war with large numbers of bombs exploding in coastal areas and seaports. "Conceivably the fishing industry would be wrecked, and the fish rendered unsafe for eating at a time when food of any kind was critically needed," he declared. Some years ago the U.S. Government transferred its chief fishing biologist of the Fish and Wildlife Service, to full-time liaison with the Atomic Energy Commission, to make studies with the Bikini experiments and ascertain the effects of the atomic explosions on fish. The recent hydrogen-bomb results seem to have exceeded their assumptions. The Japanese nation depends critically upon its Pacific fishery for most of its protein food, and efforts are being made to tone down the seriousness of the position.

Useful Aid for Research

On the other hand, modern nuclear physics has given the fishery biologist a useful means of studying marine life by "trace-atoming" them with radio-isotopes or trace-elements. These radio-isotopes are atoms of an element like calcium which has been subject to the intense radiation in a uranium re-actor at an atomic pile, and have thus been made radio-active.

Their movements and presence can be detected, even when in minute amounts, by a Geiger counter. By feeding trout, oysters and clams with radio-active foods, American zoologists have been able to trace the minute and harmless amounts through all the complicated chemical and biological processes of metabolism - growth, digestion and so on.

This sort of field work was begun the other year by Dr. W.A. Chapman of the Fisheries Biological Laboratory at Beaufort, North Carolina, working on the nutrition, feeding and growth of the Atlantic oyster. Since then the technique has been extended to this country, and to the study of many more animals. Even migratory sea-birds have been fitted by Professor D.R. Griffin with radio-active zinc on special leg-rings, so that they could be released

in homing experiments and the exact time of their return recorded with a Geiger counter set beside their nests.

The possibility of hydrogen bomb explosions affecting seabirds which later fly through the secret zone in the way that fish have been made radio-active is remote. Experiments in which Dr. J.B. Street flew some pigeons through "raditized" conditions showed that they have a valuable insulation in their plumage, and providing they do not settle upon contaminated objects, their flying abilities were not impaired. But it seems that birds flying for longer periods through even smaller amounts of radiation are likely to become sterile. So too may the fish swimming there.

The chief concern of Japanese and American biologists at the moment, however, is that if fish can carry radio-activity 800 miles from the centre of the H-bomb explosion, they can carry it much further. To give an example of the risks to pelagic fishing one might mention that an albacore or long-finned tuna marked or tagged by the Americans off California in August 1952 was captured 324 days later off the Japanese coast to which it had travelled a distance of 5,000 miles - proof that tuna cross the Pacific from America to Japan.

Huge Catches Made

The Americans alone catch 300,000 to 700,000lb. of Pacific tuna annually, most of which is canned, by 48 canneries in a 113,000,000 dollars pack and the Japanese catch an even greater amount, and also undercut the Californian market with about 1,500,000 cases a year of cheap brine-canned tuna. It is believed that the tuna migrations across the Pacific are closely connected with the warm Japanese current, the Kuro Siwo, and the North Equatorial current.

Meanwhile the Food and Agricultural Organisation of the United Nations, primarily engaged in feeding the world's protein-hungry population, has called for a 47 per cent increase in world fish production, and in Far Eastern waters of 68 per cent. Ten per cent of man's food at present comes from the sea, which mankind is polluting with oil and radio-activity. So the problem is a real one in any contemplation of future war.

("The Fishing News", London, April 9, 1954.)

Bacteria By the Billions - That's What Spoils Fish!

Research by Canadian Scientists

Show How to Keep Fish Fresh

How to reduce the contamination of fish by bacteria is described in "Spoilage Problems in Fresh Fish Production", a booklet published by the Fisheries Research Board of Canada.

Mr. C.H. Castell, of the Atlantic Fisheries Experimental Station, Halifax, N.S., traces the progress of fish from the sea to the retailer, pointing out that it may deteriorate at any point along this line by the activities of large numbers of bacteria.

When conditions are right bacteria reproduce very rapidly he says. To reproduce, a bacterial cell simply splits across the middle and the halves quickly grow into two new individuals. At ordinary room temperature (65 deg. to 80 deg. F.) most fish-spoiling bacteria divide every 20 or 30 minutes. "A little calculation will show the almost unbelievable number of individuals that can develop from one of these bacteria during a period of 24 hours. For example, by reproducing every half hour one individual will give rise to approximately 4,000 in 6 hours; 16 million in 14 hours; and over four billion in 16 hours.

Fillets were Spoiled

"The actual counts are somewhat less. For example, a group of five fresh fillets were held at 77 degrees F. for 26 hours. Each fillet had many thousand bacteria per gram to begin with. At the end of the 26-hour period, the numbers of bacteria on the fillets ranged between 155 million and 1,200 million per gram (about 1/28th of an ounce).

"Incidentally, during this time the fillets had become thoroughly spoiled. From this, one can understand why fish left in a warm room spoils so quickly. Fortunately there are many ways to check this enormous growth rate".

Stressing that during transportation, storage, and in retail stores the fish be held as close to ice

temperature as possible, or even a degree or so below, Mr. Castell points out the difference that a few degrees in temperature makes in the spoilage time. Five boxes of fillets, a selection of fish of good quality, were each stored at temperatures ranging between 31.5 degrees and 77 degrees F. Approximate keeping times were: 31.5 deg. F., 11 to 12 days; 33 deg. F., six to eight days; 37 deg. F., five to six days; 45 deg. F., two to three days; 77 deg. F., 22 to 30 hours.

"The important point is that the reduction in the storage temperature from 37 deg. to 31.5 deg. F. (5½ degrees) doubled the keeping time. Even the reduction from 33 deg. to 31.5 deg. F. made a very significant difference," he says.

While at Sea

Valuable hints are given on care in handling fish in boats at sea to reduce the number of bacteria on the fish before they are iced down in the hold. The fish should not be exposed on the deck for too long a period in warm weather, giving the bacteria a chance to multiply rapidly; in gutting the liver and kidney must be completely removed or they provide an ideal breeding place for bacteria. Even worse, fishermen occasionally fail to remove the last small section of the intestine. This contains many of the worst types of bacteria. Carelessness in cutting open the gut results in slashes in the muscle beyond the poke end. This allows the bacteria direct access to the muscle."

More recent experiments with fish at sea have shown that if the fish are properly and carefully gutted, there is very little added advantage in washing the fish at sea.

Discussing problems relating to the period while the fish are in ice in the hold, Mr. Castell says: "Few fishermen realize that the same ice that preserves the fish may also under certain conditions, hasten spoilage by being a source of contamination.

"Nothing has a longer and better chance of contaminating fish than dirty, contaminated slowly-melting ice in which the fish lies buried for days at a time."

Washing is Necessary

Pointing out that ice picks up large numbers of bacteria from straw, sawdust, and other insulating material used in storing the ice, he says thorough washing before the ice has been crushed eliminates most of these organisms.

Dealing with the manner in which ice is used in stowing, Mr. Castell says that without being separated by shelves the fish at the bottom are often bruised or punctured by the ice. "European fishermen are much more particular than we are in the use of extra shelving to keep the fish from being crushed," he says. Work done at the Torry Station has shown that such fish under pressure are not only softened but also lose a significant amount of weight."

Miss Golden Chance

Stating that many shore fishermen believed that because their fish were landed within 10 or 12 hours of being caught, they needed no special care, Mr. Castell says the result is that the shore fishermen miss a golden opportunity of landing the best quality of fish. "The best fish that have ever come into this laboratory for analysis were shore-caught fish that were iced while they were still alive and kept covered and iced until they were landed at the wharf," he declares.

("The Fishing News", London, April 2, 1954.)

New Fish Preservation Tank

Mr. A.W. Lantz, Director of the Canadian Fisheries Project in Ceylon under the Colombo Plan, has a method of preserving fish without using ice. He has evolved a storage tank for the mechanical chilling of sea water which enables fish to be preserved for at least two weeks.

Mr. Lantz has successfully experimented with local fish at the Fisheries Department. He said the tank could be easily installed in fishing craft and on land. Its working was less expensive than maintaining a cold storage plant and the chilled fish could be kept longer than fish in ice.

An outstanding feature claimed for the tank is that it can be installed in wooden fishing craft without insulating the hull. The tank can be partitioned into compartments to replace the fish pens in the conventional construction. It eliminates carrying ice, so reducing operation and labour costs.

Such tanks could be installed at fishing centres and catches could be chilled before being sent to the markets.

("The Fishing News", London, April 2, 1954.)

Porpoise Meat for First Time

The first catch of 28 porpoises, each weighing about 200 lb. was landed in Colombo from the Fisheries Department motor vessel, the Canadian. They were available for sale through the co-operative fish vans, packed in cellophane paper and priced at 25 cents a lb.

The meat of the porpoise is said to be considered a delicacy in England and America and is claimed to be as nutritious as beef. As this is the first time porpoise meat was available in the local market, recipes for its preparation, if required, were issued with its sale.

("The Fishing News", London, April 2, 1954.)

The Whaling Season ended this week but all activity in the Antarctic has not been devoted to catching. The Scientists have been busy and this article tells

How Whales Are Marked

With a full cargo of whale oil and whale meat, the tanker Orwell of Tonsberg has berthed at Tilbury after a direct passage of 30 days from the island of South Georgia in the Southern Ocean.

On board were three of the four scientists who last October joined in Sandefjord, Norway, the whale-

catcher Enern for a whale marking voyage to the Antarctic.

Professor Johan T. Ruud, of the Norwegian State Institute for Whale Research, led the expedition and Mr. Robert Clarke, of the British National Institute of Oceanography, was in charge of the marking and other records. Mr. W.L. Van Utrecht, of the Netherlands Whales Research Group, assisted in the scientific work. The fourth scientist, Mr. Per Oynes, of the Norwegian State Institute for Whale Research, has remained in the Antarctic on board the floating factory Thorshovdi to conduct experiments on the recovery of whale marks from marked whales.

Over 5,000 Marked

An interesting feature of the voyage was its international character. Before the last war the Discovery Committee, whose work has now been taken over by the National Institute of Oceanography provided for the marking of over 5,000 whales in the Antarctic, largely by the Royal Research ship William Scoresby whose last whale marking voyage was in 1950 in tropical seas. For financial reasons the institute can no longer itself provide for special whale marking expeditions and the running costs of the Enern's cruise are being shared by the British, Dutch and Norwegian whaling companies operating in the Antarctic. The costs of the scientific equipments are shared by the National Institute of Oceanography and the State Institute for Whale Research. The scientific programme was prepared by Dr. N.A. Mackintosh, C.B.E., of the National Institute of Oceanography in consultation with Professor Ruud.

The Enern (Captain M. Marthinsen) is a diesel vessel of 908 tons and one of the largest and most powerful of modern whalecatchers.

The actual period of whale marking began when the Enern reached the edge of the pack ice to the southward of Capetown. Thereafter she steered westerly courses across the Atlantic sector of the Antarctic Ocean during November and December in a series of zigzags from the ice edge into the open sea and back again. She was cruising for whale for 27 days until she reached South Georgia on December 18. During that time she succeeded in mark-

ing 110 whales. A further 40 whales were marked on the run from South Georgia to join the floating factory Thorshovdi where the Enern, her scientific work completed, fitted for the whaling season at present in full swing in the Antarctic.

Whales are marked with a shot-gun firing stainless steel darts which bear serial numbers. Not all of these whale marks are found when marked whales, which later have been killed, are dismembered on the whaling platform. Whale marking, which gives most valuable information on the migrations and life histories of whales, can also be used to study the very important question of the taxation of the whale stocks by the whaling industry. Scientists need to know the proportion captured of all whales marked, and some allowance has to be made for the marks which have been overlooked. Mr. Oynes' experiments in the Thorshovdi are connected with this matter. It is also being approached in another way. Some of the marks fired into whales by the Enern were fitted with long nylon threads or streamers, intended to hang outside a marked whale and so attract the attention of the whale-men dismembering it. The marks returned in the present season may show whether a larger proportion is found of "streamer" marks than of ordinary marks.

The Enern carried out some hydrological work during her voyage. She also operated an echo-sounder and sonic "fish-finder" at suitable times. These detected no concentrations either of the planktonic whale food or of fish, and this is interesting because from time to time it is suggested that attempts should be made to locate and harvest directly the whale food of the Southern Ocean.

("The Fishing News", London, March 26, 1954.)

30 Mile Shoal of Herring

A herring shoal measuring more than 30 miles in diameter, the largest ever seen off the Icelandic coast, was reported from Reykjavik last Sunday. The shoal was swimming between Koetludrangar and Holtos on the south coast.

("The Fishing News", London, March 26, 1954.)

The Story of Nylon Netting

Nylon, the new textile fiber being used in fish nets, trawl lines, and lobster pot funnels from the Maritime Provinces to the Great Lakes to the Pacific Coast, started life in a chemist's test tube more than 20 years ago.

When the late Dr. Wallace H. Carothers began studies in 1928 that led to discovery of the world's first truly synthetic fiber, the furthest thing from his mind was the development of a thread that could be made into strong, light fish nets, or sturdy ropes, or even women's fragile stockings.

Dr. Carothers, then a brilliant young research chemist employed by the Du Pont Company, was interested in fundamental research. Generally his goal was to discover new and fundamental data that would advance the science of chemistry. The discovery of commercial products was regarded always as a pleasing possibility, but never as an immediate objective of the program.

Under Dr. Carothers' leadership, a staff of chemists set out to discover how and why certain small molecules unite to form long-chain molecules, the principal building blocks of such familiar substances as cotton, silk, and rubber.

By 1930 they were able to produce in the test tube certain types of "giant" molecules - made up of small molecules joined together, end-to-end, like a chain of paper clips, and known as "polymers." In 1935 they came up with a superpolymer - a chain of more than 100 molecules of two "chemical curiosities" known as hexamethylene diamine and adipic acid.

These "intermediates" are substances produced from such raw materials as the chemical elements of coal, air, and water. In 1938 the superpolymer was given the name "nylon."

Chemists found the taffy-like substance could be drawn into a fiber and that it could be stretched to three or four times its original length. Stretching, they found, made the fiber strong and elastic. It was here the decision was made to develop the substance as a textile fiber.

But some of the hardest work still lay ahead. Between the invention and commercial production came four more years of research, engineering work, and testing. As the scientists tested the fiber they found, first, that it was strong - weight for weight, stronger than a steel wire. They found it resisted wear and tear and had unusual resilience. They found it dried rapidly because it picked up little moisture, and they found it resisted damage from moths, mildew, and marine micro-organisms.

Once a decision had been made to go ahead with nylon manufacturing facilities had to be built, adding millions of dollars to the bill already run up by research. Only a large company with adequate technical and financial resources could undertake such a gamble.

A complex manufacturing process was devised which begins today in any of Du Pont's three nylon plants with a giant pressure cooker known as an autoclave. Here the combination of hexamethylene diamine and adipic acid, known as nylon salt, is heated until the relatively simple "salt" molecules are united into the giant molecules which comprise nylon "polymer."

Nylon fibers are made by pumping the molten material out through tiny holes in a metal disc about the size of a silver dollar. This is known as a spinneret. The holes are so small they can be seen only when held up to a strong light. The number of holes, which determines, of course, the number of filaments in a given yarn, can be varied to suit the purpose for which the yarn is made.

As the filaments of nylon come out of the spinneret and hit the cool air, they solidify and are gathered together to become a yarn. Next the yarn is stretched or "drawn" through a system of rollers. In this process those giant, or "linear" molecules are changed from a haphazard arrangement to one in which the molecules are lined up parallel to the axis of the filaments. It is in this step that nylon gets its great strength and elasticity.

After thorough inspection, the nylon is shipped in filament form, such as silk, or it is chopped

up into short, uniform-length fibers known as "staple", and resembling wool or cotton. Staple is shipped in bales. Fish nets have been constructed of both nylon filament and staple.

That, briefly, is the background. Today, the fruit of Dr. Carothers' work is produced in millions of pounds annually and used in hundreds and hundreds of applications. Nylon has traveled from the hosiery counter on Main Street, U.S.A., to the very top of the world. Actually, last spring nylon climbing ropes helped Hillary and Tensing scale Mount Everest, the world's highest peak. During the Korean war, nylon in the form of bullet-proof vests helped save American lives.

Shortly after World War II, nylon was introduced into fish nets. Leading netting manufacturers expressed interest in the fiber because of its unusual strength, toughness, and resistance to rot. It was first tested in gill nettings. Today in the gill net fisheries of the Great Lakes nylon is used almost exclusively.

Because of the spectacular success Great Lakes fishermen have had with nylon, use of the fiber is growing in the lakes of Northern Minnesota, in Florida, and in the Pacific coast salmon fisheries where gill nets are used. In areas such as New England, fishermen are finding that Nylon is proving successful for codends and trawl netting. Many fishermen are also testing the performance of nylon in shrimp trawl nets, trap netting and in sections of small seine nets. It is a market of great potential for nylon where proven success in one region inevitably leads to penetration in another.

Fishermen have found many advantages over cotton or linen in their nylon gill nets. The nylon is tougher and absorbs shock better, permitting the manufacture of lighter netting, which tends to balance out the extra cost of nylon. Nylon nets wear longer and require practically no special care. No preservatives or chemical treatments are necessary with nylon, nylon nets will remain in the water for long periods without rotting. Since the fiber resists weakening by mildew, the nets need no drying. After they are reeled in

they may be put away wet. They require less space to store.

But besides all these benefits, according to fishermen, is one important economic factor: "you catch more fish with nylon gill nets." And this means greater profits for the fishermen. There is actual testimony to support this from Great Lakes fishermen, taken when conservation officials held hearings in July, 1949, at Erie, Pa., to discuss possible curbs on the use of nylon on the Great Lakes.

No state felt it necessary to place restrictions against nylon netting other than those concerning mesh size or the number of meshes in the depth of the net.

Fishermen who testified at the Erie hearings agreed that their catches with nylon were greater; from two to 12 times more fish were being caught. One fisherman using nylon estimated that ten boxes of this netting produced as much as 36 boxes of cotton, requiring one-third as much work. Another said he had caught 300 pounds of white-fish with nylon nets and only 30 pounds with cotton nets fished alongside.

There seems to be no scientifically valid reason why, all things being equal, more fish are caught with nylon. The procedure with any kind of gill netting is the same: fish are enmeshed and snared by their gills in the filmy, silk-like cord of the netting, which hangs in the water like sheets on a clothesline, secured at the top by floats and held down in the water by weights.

One explanation advanced by veteran fishermen is that there is an attraction for the fish in the twine itself, not unlike the silvery glint of an unbaited jig that attracts cod and haddock. Whatever the reason, the fact of nylon's efficiency remains.

Great Lakes fishermen buy nylon netting already knitted, but, with a simple needle, fishermen in the Gulf made their own nets from nylon twine. Nylon cord is widely used in trot lines for catfish along the Mississippi, while more and more fishermen in Canada's Maritime Provinces are using nylon for long trawl lines, some of which carry as many as 3,000 hooks. Lobster fishermen have found they can install nylon lobster heads, or

funnels, in their pots that last four, five, and six years as opposed to one year for heads made of conventional fibers. And filmy nets of nylon are finding favor with sardine fishermen in Maine.

For the fisherman contemplating going into nylon, there are several tips on care that have been developed and tested over a period of years. The more important ones:

1. Nylon netting does require some cleaning of scum and slime. Like netting made of other fibers nylon will fish better when clean.

2. Nylon netting is usually quite easy to clean by washing in warm water with a common household detergent. It can be taken off the rack and safely put away wet, however.

3. For repairing nylon netting a weaver's knot, pulled up tightly, is recommended.

4. Nylon will resist damage caused by oils, greases, and most chemicals encountered in the fishing trade.

5. For hanging and rigging twines, it is now possible to obtain them of nylon. The use of these twines insures fishing gear that is resistant to marine rot and requires a minimum of care.

6. Like other fibers used in netting, nylon is weakened when exposed to direct sunlight for long periods of time. Since nylon does not require drying for protection against deterioration, it is both practical and easy to store wet netting in the shade to obtain maximum life.

7. There is no need for treatment by tar or other preservative. Untreated nylon fiber has excellent resistance to marine rot. Marine organisms will not feed on nylon.

("The Fishing Gazette", New York, February, 1954.)

One Piece Boat Building

Traditional methods of boat building are being seriously challenged by new techniques designed for both economy and durability. One of the latest developments is the production of one-piece hulls from a new material which, under test, has proved stronger, weight for weight, than wood normally used. It is a plastic material consisting mainly of a polyester resin reinforced with glass thread. Known as Deborine, it has been evolved by Halmatic Ltd., laminated glass experts, for the mass production of hulls which not only cost less but offer several advantages over wood construction. Being built as a homogeneous structure, a Deborine hull is completely water-tight; it needs no painting or varnishing, any selected colour being impregnated through the laminate; and it is claimed to be fire proof and impervious to marine insects or corrosion.

Yachts built from Deborine to the design of Mr. Uffa Fox have been successfully tested under racing conditions. The Deborine technique has also been applied to a 25 ft. sea-going launch and a 45 ft. hull, designed by Mr. Peter Thornycroft, for completion as a twin-engined yacht. This type of hull could also be completed as an open tender, a pinnace, police boat, or similar utilitarian craft. Deborine has been tested under tropical and Arctic conditions and is arousing interest in Commonwealth countries. Several hulls have already been shipped to Northern Rhodesia.

("New Commonwealth", London, March 18, 1954.)

"Judgment of Solomon"

Halves Herring Quota in S.E. Alaska

Solomon, in the Bible story, sought to settle the dispute between two mothers over a child by having the baby halved, each getting an equal share.

Faced with a dispute over the Southeast Alaska herring fishery - whether the resource should be saved for the salmon, or fished for reduction purposes, - John L. Farley, director of the Fish and Wildlife Service, applied a "judgment of Solomon."

He cut the herring quota in half for 1954.

The regulation probably won't completely satisfy anyone. Certainly, a 50,000-bbl. quota leaves little encouragement for the companies and fishermen to take the risk of an Alaskan operation; and the trollers will feel that any kind of a compromise is a defeat for the principle on which they waged their fight - that conservation of the herring population is necessary to sustain the troll salmon fishery and the economy of Southeast Alaska.

Decision to permit continuation of the herring fishery this year on a restricted basis was reached by the Service on the basis of the findings of its biologists, who reported:

(a) That the lack of herring is not due to overfishing but to varying percentage survival of the year classes;

(b) That the year class entering the fishery in 1954 is expected to show an improvement.

(c) That adequate sampling of the summer herring population requires a substantial commercial fishery.

("Pacific Fisherman", California, April 1954.)

Flying Lobsters

A group of enterprising ex-G.I.s. in the State of Maine, USA., recently formed a company called Air Lanes, Inc., putting two surplus "Martin PBM-5 Mariner" flying-boats to a unique and very profitable use. They transport in these ex-bombers tons of lobsters weekly from Newfoundland to New York City and Boston.

They call their route, which stretches 850 miles as the crow flies, the "Flying Lobster" route.

The leader of the company which "taught the lobster to fly" is Harry Lee, a young ex-bomber pilot, who thinks that the "Martin Mariners" couldn't be more suitable for transferring lobsters through the air if they had been specially designed for this strange operation.

The "Martin PBM-5" flying-boats permit the company to load lobsters literally right out of the fishermen's traps, fly them as fast as possible to a good market and have them back in salt water well before they lose their freshness.

The speed of the "Martin" flying-boats is advantageous to the "lobster-loaders." In well under eight hours the lobsters, in a thoroughly unspoilt state, are on the market. They are caught one day and eaten the next - 850 miles away.

The normal lobster season lasts two and a half months, and during the 1953 season the "Flying Lobster" planes carried no less than 120,000 lb. of fresh sea lobsters. This year ex-pilot Lee and his associates expect to carry during the same period of time as much as half a million pounds of lobsters to their final destination.

In keeping with their flying career, Lee and the other ex-airman call their profitable activities Operation "Claw."

("Fish Industry", London, March 1954.)

"Current" Experiments in Fishing

by Myrtle Hoare

It is becoming more and more difficult for a fish to achieve the distinction of being "the one that got away" in view of the great progress that is being made in developing technical aids to fishing.

Norway has produced a combined deep-sounder and Asdic gear which may completely revolutionize the search for cod and herring. The instrument works automatically with a search direction, for instance from starboard beam to the bow, then jumps to port beam and seeks toward the steering direction. By using a handle, however, it can be used for scanning in all directions; coverage is approximately 2,000 yards. The instrument also performs the function of an echo-sounder by being directed toward the sea-bottom after the "antenna", which emits the ultra-sound and protrudes about a yard

from the vessel's keel, has been withdrawn.

For the use of smaller boats, there is being manufactured an Asdic that can be coupled to the echosounder and used in connection with it. This model can register a body of fish within a radius of 500 yards.

The new "Sea Scanar", an improvement on the well-known depth-sounders, developed by the Minneapolis Honeywell Regulator Co., was mentioned in last month's Fish Industry, as was the "Kingfisher", a Kelvin & Hughes electronic device for the detection of fish at depths down to 240 fathoms, combining echo-recording with echo-vision.

Then there are the German experiments in ocean fishery by means of electro-anæsthesia which have been concluded recently. The specially-equipped experimental vessel "R.96" is now in American hands since the Fishery Institute of Hamburg, which carried out the scientific experiments, lack the necessary funds to carry the matter to a conclusion. The Americans have been informed of their scientific results, methods and procedure and will carry out the necessary practical fishery experiments.

It is reported that the University of Miami Marine Laboratory is carrying out experiments to find out if electrical fishing can be perfected for use commercially, with the important sideline of conserving fish. It has been found that shrimps can be attracted by means of an interrupted electrical direct current. The smaller the shrimp the more current is needed, so the size of the shrimp attracted can be predetermined and therefore immature shrimps can be left until big enough to be worth catching.

While electric trawl fishing is still in the experimental stage, tuna fishing is being carried out increasingly by electrified lines. Some 50 German cutters have specialized in this method, and reports from Sweden state that a number of fishing-vessels have been using it. Danish vessels are to catch tuna in the North Sea by electricity, and application has been made to import the necessary apparatus.

Interesting experiments have been carried out

in Hungary to catch fresh-water fish by the use of electric current, and the method has proved especially successful in water where traditional fishing implements cannot be used because of plants, reeds and similar obstructions.

Apart from these methods of finding and catching fish, better fishing vessels are being designed; new automatic steering-gears are being made; nylon nets are being introduced in more and more areas, and it would seem that the trend will inevitably be towards shorter fishing seasons, fewer fishermen, and even more vigorous campaigns throughout the world to make the population eat more fish.

Chilled-Water Storage

Experiments in Canada on the use of chilled water instead of ice for the transportation of fish have produced favourable results. Officials of the Pacific Fisheries Experimental Station believe that the new method may prove of major importance.

The experiments were conducted in a commercial troller in which were installed special tanks designed to store freshly-caught fish at a temperature of 30°F. in sea-water chilled by a condensing unit. As soon as possible after being caught the fish were dressed, rinsed and placed in the tanks. During the experiment an equal amount of fish from each catch was iced and stored in the refrigerated hold.

It was found that the salmon from the sea-water tank could scarcely be distinguished from freshly-caught fish and, moreover, the skin was not bruised as is often the case with storage in ice.

("Fish Industry", London, March 1954.)

I think that I shall never see
A Billboard lovely as a tree!
Perhaps - unless the billboards fall
I'll never see a tree at all!

- Ogden Nash.

("Australian Wild Life", Sydney, March 1954.)