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DEPARTMENT OF PARKS AND WILDLIFE

MONTHLY SERVICE BULLETIN

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Number 8

August, 1952

STAFF NOTES

Inspector R. M. Crawford and Cadet Inspector M. J. Simpson are at present patrolling the Abrolhos crayfisheries in M.V. "Garbo".

M. V. "Lancelin" left Geraldton on July 20 for an extensive cruise to Broome. The crew comprises Capt. H. C. W. Piesse, Skipper, and Inspector A. J. Bateman and Cadet Inspector N. E. McLaughlan. Inspector S. W. Bowler made the trip as far as Shark Bay, where he spent a couple of days with Inspector Baird.

Assistant Inspector R. J. Baird has been promoted to the rank of Inspector as from July 10, 1952.

On August 4 Mr. J. Traynor, Fauna Warden, will leave by air for the Kimberleys. He will make a comprehensive investigation in relation to the finches and wild turkeys in the Wyndham, Derby and Broome districts. On his return trip he will be met at Derby by the Deputy Chief Inspector (Mr. Brownfield) and Supervising Inspector (Mr. Bramley), who will leave Perth by Land Rover on August 7 for the purpose of inspecting all districts and activities north of Perth. Mr. Brownfield will return to Perth by air from Derby, and Mr. Traynor will accompany Mr. Bramley on the overland trip south.

The Superintendent (Mr. Fraser) during July visited the Abrolhos, Dwellingup, Pemberton and Mandurah. The visit to the Abrolhos was made in the company of the Hon. J. J. Dwyer V.C., M.H.A., Tasmanian Minister for Fisheries, and the Supervising Inspector.

At Dwellingup he attended the annual meeting of the Murray Trout Acclimatisation Society and at Pemberton the annual meeting of the Pemberton-Warren Society.

Mr. Ian Bartholomew, Clerk, Head Office, who was due to commence National Service training with the Navy on August 4, had the misfortune to break his wrist on July 26 while playing football. His call-up has consequently been deferred.

Cadet Inspector Brian Carmichael is still at Pemberton trout hatcheries assisting with the season's operations. He should return to Perth about mid-August.

Mr. David Wright has been appointed Cadet Inspector. He is stationed in Perth.

PERSONAL ITEMS

Mr. Keith Sheard, Officer-in-Charge, Branch Laboratory, Perth, C.S.I.R.O., Fisheries Division, will leave on August 1 by road for Point Cloates Whaling Station. He will be accompanied by Mr. R. G. Chittleborough, of the same Division, who until recently was engaged in whale research at the Commonwealth Whaling Station at Carnarvon. Mr. Sheard will be absent from Perth for about a fortnight, but Mr. Chittleborough will remain at Point Cloates until the end of the current season.

Dr. D. L. Serventy, of the Wild Life Section, C.S.I.R.O., is at present in the Eastern States on official business.

Mr. W. Burton has recently been appointed Chairman of the Geraldton Fishermen's Co-operative Ltd. in succession to Mr. W. Newbould.

The Superintendent (Mr. Fraser) has been re-elected unopposed to the position of President of the Civil Service Association of Western Australia. He has just vacated the chair of the Royal Society of Western Australia after holding office as President for the year 1951/2. A copy of his presidential address, which was delivered on July 8, will in due course be sent to each member of the staff.

The sympathy of the entire staff is extended to Mr. John Barakonski, of the Head Office staff, on the death of his mother.

DRIFT NET GIVES GOOD CATCH

Officers of the C.S.I.R.O. Division of Fisheries caught 1900 pounds of tailer, a dozen sharks and a few bonito and sand crabs in 900 yards of drift net off Moreton Bay, Queensland, during the last week in June. This catch, taken in a relatively short length of drift net, suggests that drift netting on a commercial scale could prove a very profitable method of taking school fish such as tailer and mullet.

The fish were caught between Pt. Lookout and Amity Pt. on the seaward side of the bar, off Moreton Bay, by members of the staff of the Dunwich Fisheries Research Station. They were attempting to catch mullet travelling along the coast as part of their investigations aimed at discovering the spawning grounds of the sea mullet.

GOOD SNAPPER CATCH

The auxiliary Ketch "Sonoma" returned to Geraldton during the first week in July with 25,000 lb. of snapper aboard. The whole of the catch was made in the Shark Bay area. Actual time engaged in fishing was about 15 days.

WELL-KNOWN FISHERMAN DIES

The body of Mr. George Nelson, one of the best-known of the Geraldton fishermen, was found in Geraldton Harbour on June 28. The late Mr. Nelson was a particularly successful crayfisherman who right up to his death had worked consistently at the Abrolhos. In earlier years he operated as a net-fisherman at Shark Bay. While skipper of the "Theo Christie", he on one occasion landed 23 tons of mixed mullet and whiting in one shot. This stands as a record to the present day.

WEST AUSTRALIAN WHALING

Whaling is proceeding according to plan at all three stations in Western Australia, Point Cloates, Carnarvon and Albany. Just as we go to Press we learn that the Commonwealth Minister for Commerce and Agriculture (Mr. McEwen) has approved of the Albany quota being increased to 75 humpbacks for the current season - it was originally fixed at 50.

To July 26 the take at each place, and oil recoveries, were as follows -

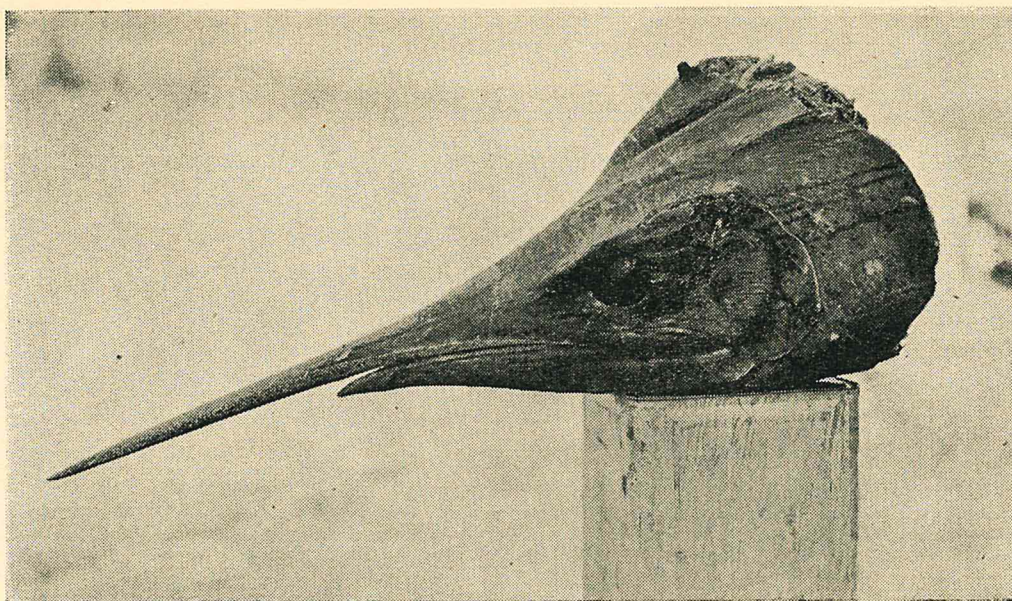
STATION	1952 QUOTA	NUMBER TAKEN	OIL PRODUCED	
			Total	Average each whale
	Whales	Whales	Barrels	Barrels
Point Cloates	600	160	8,740	54
Carnarvon	600	321	17,990	56
Albany	75	39	2,094	53
	1,275	520	28,824	55

The 28,824 barrels of oil produced represent approximately 4,800 tons, valued at approximately £A100 a ton, or a total value of £480,000.

SHARK BAY MARLIN

In the July issue of the Bulletin reference was made to the capture of a marlin at Shark Bay. As proper identification was not possible locally, photographs (of which one is published in this issue) were sent to Mr. G. P. Whitley, of the Australian Museum, Sydney, Australia's leading fish taxonomist. Mr. Whitley, who is well known to the majority of the staff, has now written as follows -

"Thank you for your letter of July 11 and the photos of the head and tail of the marlin taken last May near Dampier Reef by Axel Bertelsen, whose



BLACK MARLIN IN SHARK BAY

This picture shows the head of the black marlin recently landed by Mr. Axel Bertelsen, of Geraldton.



DUCK TAGGING AT QUEEN'S GARDENS, PERTH.

Left to Right: Dr. D. L. Serventy, Wildlife Section, C.S.I.R.O.; Hon. A. V. R. Abbott, M.L.A., Minister for Fisheries; Mr J. Traynor, Warden of Fauna; Mr. A. J. Fraser, Superintendent, Fisheries Department.

notes are of much interest too. It is evidently a Black Marlin, Istiompax australis, already recorded from Areas 2, 3 and 4 of the coastline in my 'List of the Fishes of W.A.' I wonder whether it is a resident or perhaps an annual visitor - and, if the latter, where does it come from? Madagascar? Wouldn't the game-fishermen, as well as the mere ichthyologists, like to know!"

TROUT HATCH AT PEMBERTON

The present season, reports Inspector J. S. Simpson, has exceeded all expectations. It opened on May 23, when the first ova were stripped from pond-held rainbows, and to July 26 the total take was 1,032,000 rainbow ova. From a few wild brown trout taken in the Lefroy Brook trap a total of 35,000 ova were stripped and fertilised.

At the date mentioned the hatchery holdings were as follows -

	<u>Uneyed ova</u>	<u>Eyed ova</u>	<u>Alevins</u>
Rainbow	130,000	371,000	380,000
Brown	9,000	8,500	15,500

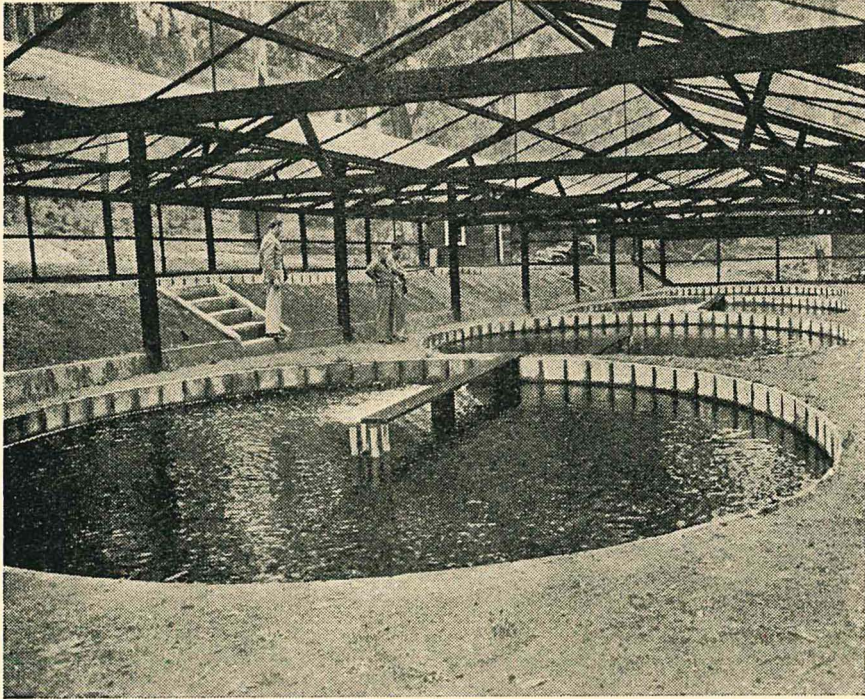
The percentage losses in ova were as follows -

	<u>Uneyed ova</u>	<u>Eyed ova</u>
Rainbow	8%	13.7%
Brown	9%	15%

A few pond-held rainbows remain to be stripped, but as there is evidence of disease among the eggs now being taken, no attempt will be made to incubate any which may be taken from now on. The hatchery has worked extremely well, despite the fact that it has been necessary to overcrowd the ova trays and hatching troughs. The hatchery was designed to take only half a million ova.

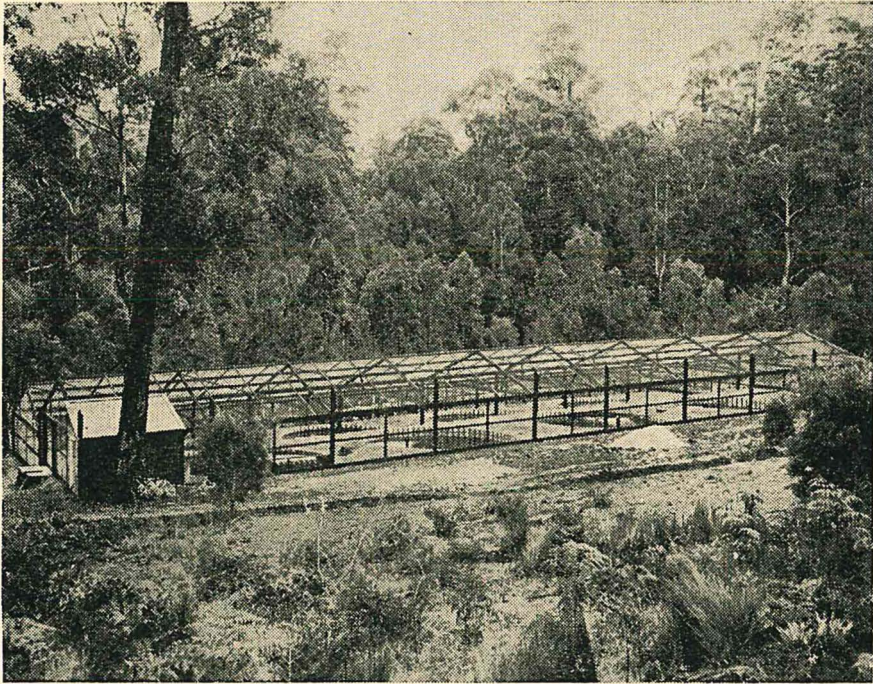
BASIC WAGE INCREASES

As a result of the quarterly Declaration of the W.A. Court of Arbitration, the following basic



NEW TROUT PONDS AT PEMBERTON.

A close-up of one of the ponds, showing construction and method of aerating water.



NEW TROUT PONDS AT PEMBERTON.

This picture shows what an ideal setting the new ponds have.

rates will apply from July 28 -

OFFICERS' HEADQUARTERS	ADULT MALES	
	Basic Rate	Increase
Metropolitan Area	£ 606	£ 22
South-West Land Division	606	26
Other Districts	621	24

The total salary rates now payable to the inspectorial staff are as shown -

Office	Basic Rate	Margins	Actual rates
	£	£	£
Pearling Inspector	621	290-310	911-931
Master, "Lancelin"	606	290-310	896-916
Supervising Inspector	606	290-310	896-916
Technical Officer	606	250-270-290-310	856-876-896-916
Metropolitan Inspector	606	250-270	856-876
Inspectors (including Fauna Warden and Relieving Inspector, but excluding Inspector, Shark Bay)	606	200-215-230	806-821-836
Inspector, Shark Bay	621	200-215-230	821-836-851
Assistant Inspectors	606	65-80-100-120-135-150	671-686-706-736-741-756
Cadet Inspectors at 15 yrs. 40% of b.w.			242
Cadet Inspectors at 16 yrs. 50% of b.w.			303
Cadet Inspectors at 17 yrs. 65% of b.w.			394
Cadet Inspectors at 18 yrs. 77½% of b.w.			470
Cadet Inspectors at 19 yrs. 92½% of b.w.			561
Cadet Inspectors at 20 yrs. b.w. + £15			621

THE CLEARING-HOUSE

The following paragraphs culled from overseas and eastern States periodicals are published for information.

Real Anglers' Diary

The number of fish caught by an amateur angler - with plenty of time on his hands - is a question often asked in fishing circles; and, as few records are fully maintained, is rarely answered.

However, Norman Martin, of Cottesloe, Western Australia, who before his retirement some ten years ago was keeper of records for the W.A. Department of Agriculture, has perhaps one of the best-kept fishing diaries in the Commonwealth.

Now a sprightly 70, Mr. Martin has fished the coastal waters around Cottesloe since 1912. His best year was 1944, when the herring were plentiful; he caught 6,343 in 102 trips with a record 164 in a single day. Between June, 1942, and this year, with a 12 months break between 1950-51, he caught 21,990 herring, skipjack, whiting and garfish - 14,765 by hand-line from a dinghy off South Cottesloe and, some 7,225 by rod from the local jetty. His statistics are a guide on how the fish are biting. From the jetty in 1945 he caught 1,064 fish in 42 days; 1946 he had his worst season in 40 years fishing. He bagged only 66 fish in 77 days. Martin is by no means an all-day fisherman - he goes out only for a few hours each day when the weather is fine.

Two questions that his diary prompts him to ask are: "Why is it that in the old summer days, the big garfish bit hard from November to January, whereas now they are almost winter fish", and "where are the barracouta which 25 years ago used to fight for the tailor baits at the Cottesloe and Busselton jetties"?

(Outdoors and Fishing, Sydney, June 1952.)

Extract of Tannin in the Preservation of Fish Nets

The use of the cold dip preparation for the preservation of fish netting has, as yet, not quite gained the confidence of fishermen; therefore in this article the endeavour is to offer some useful practical data for the efficient tanning of fish nets to those still using extract of tannin.

It is as well, firstly, to eliminate certain bogeys that persist with the use of Tannin Extract, viz., netting cannot/burnt either by the use of steam, a hot tannin bath, or a strong tannin bath. A hot tannin bath gives a much better result than a cold bath. In a hot bath, considerably more of the extract is taken into solution and is certainly more penetrating - the prime object in all treatments.

Netting which has been in use a long time and often tanned, becomes brittle through the fabric having become too well sealed with a crystalline deposit of extract of tannin; this netting is termed "burnt".

Tannin Bath

The design of a convenient tannin bath would be six inch walls of a special concrete mixture that will stand heat, breadth ten feet, length 18 feet and depth three feet six inches. On the one side an apron or draining table, ten feet long by seven feet broad, with a set of about one in five to fall into the bath. A drain cock to clean the bath and a lead of steam and fresh water to the bath is necessary. The addition of a boom rig greatly facilitates the charging and discharging of the bath.

In preparing the bath, the extract of tannin is dissolved in a vat with a steam jet. As the mixture becomes concentrated it is brailed out into the bath and a fresh solution started. Three and a half to four bags of Extract of Tannin are used to make up a bath to dimensions given above.

The tannin having all been turned into a saturated solution, water is added to the bath to the depth of about 2 feet nine inches to three feet and the steam jet put into the bath to heat it to a point just under boiling point.

The netting is now charged into the bath taking care to see that it is well-immersed in the

solution. Agitation with poles from 30 minutes to one hour is a good practice. This facilitates uniform penetration.

The bath is allowed two days to cool down and the netting is then boomed on to the apron to drain, and then spread out in a cool place to dry slowly.

The solution in the bath is again heated up and the process repeated.

If, after the second dip, the netting does not appear satisfactorily rich in colour, it would be as well to add one half to one bag more of extract of tannin in the form of a saturated solution. Do not attempt to dissolve extract in the bath.

Well Tanned

The netting can now be considered well tanned.

A soft lay of netting absorbs the tannin solution better than a medium hard lay, and a hard lay takes more persuasion. Three baths to a hard lay is recommended. Better results are obtained by tanning netting well before use rather than counting on frequent tanning while in use.

Tannin does toughen the cotton fabric, has, and still does serve the fisherman well, but the pilchard fisherman using tannin is well advised to tan well before using a net, and to use a hot medium-strength bath once in two to three weeks. This rids the net of a deal of impregnated fish slime.

Alternative washes are: (1) Two per cent solution of copper sulphate; (2) Lime water; (3) Hot strong brine.

(South African Shipping News and Fishing Industry Review, June 1952.)

Mackerel Air Scouting Pays Purse Seiners

Air scouting for mackerel schools out of Port Hueneme and Santa Barbara has been proving successful and resulted in better fishing in the area from Port Hueneme to Pt. Conception. A number of purse seine owners banded together and contracted for airplane spotting services.

The planes locate schools of mackerel; then by two-way radio tell the contract seiners where to set, when the fish are not visible from the vessel crow's nests. Planes work on the basis of a percentage of the catch.

(Pacific Fisherman, Los Angeles, June 1952.)

Fishery Production, Processing and Distribution
Economics

What can fishermen afford to fish for?

What margin of profit must processors have?

What should be the wholesale-retail mark-up of profit?

What can consumers afford to pay?

Market trends are constantly affected by these four governing factors.

Sea foods are by no means alone in the fact that they can and do price themselves out of a market. A lower priced commodity will thrust out a high priced food product.

When a branch of the fishing industry fishes out a species it seeks to exploit, the result is no more disastrous than when such available sea foods are priced out of a market through other economic factors, be it a matter of depletion of a species, a matter of price, or foreign competition, the economic consequences are of the same intensity to fishermen, to processors, and the suppliers of their equipment, materials and services. As an example we might cite the serious consequences which happened in California last year as the result of Japanese tuna competition.

A fishing boat can only earn for its crew, carrying insurance, depreciation, etc. by being at sea and engaged in profitable fishery. All else means economic chaos to fishermen, processors, distributors, suppliers and to citizens as a whole dependent upon successful exploitation and operation of basic industries, upon which all payrolls, and dividends, depend.

Sea Food Distribution.

Storage facilities must be available at all key points of distribution. It has been said that cold storage space is fairly adequate on all but the retail level. As this increases, it is probable that the consumption of frozen fishery products will go up.

Merchandising of frozen fishery products has improved in recent years. Some think that more use might be made of counter cards, window posters, banners and other point-of-sale material such as cookery recipe booklets.

More general interest magazine and local advertising is appearing, particularly with reference to chain store newspaper advertising.

We might encourage more sea food consumption in cafeterias in our schools, universities, plant mess halls, and public institutions.

Overbuying by the retailer to beat the market should be discouraged, for he has but retail, not public cold storage facilities.

It has been said that fish should be kept in the wooden shipping boxes which provide good insulation, at 35 degrees. Some report, at 30.5 degrees F.

The shipper should pack sufficient ice at the bottom of the boxes, rather than on top, and the fish should preferably be separated from the ice by parchment paper.

The fish in the retail store should be graded for quality each morning.

Different species do vary in keeping degrees. Does the retailer know?

Perhaps flat fish hold up the best of all, and firm fish better than soft ones; large fish better than small ones.

Fish should be washed only once, before use rather than at time of packing in the store refrigerator. Washing should be done in chilled water or weak brine.

With fish bought in the round, take out clotted blood with a knife.

Fish should be placed in the refrigerator with a layer of ice underneath; also when on display.

Use parchment paper where dripping occurs from one layer of fish to another.

Freezing Does Not Change Quality Grade of Fish.

The large majority of fish that are landed as strictly fresh go into the fresh market, while the fish of lesser quality go into the freezer. This is the logical position because the time required to market the inferior product in the fresh state is considerably in excess of the remaining storage life of the fish.

The dealer may fail to fully realize that the quality of the fish does not improve in the least upon freezing, and that the fish which are of questionable quality upon entering the freezer will be of even poorer quality when they are removed from storage and thawed.

What Fish Spoilage Does to Flavour

An easily unobserved stage in the deterioration of quality of fish is the loss of flavour. Fish in this phase of spoilage have all the outward appearances of fresh fish, including the absence of off odors and off flavours, but the normal and sales-appeal sea-fresh odor and flavour is entirely absent.

Retail-Chain Store Fish Handling

Refrigeration developments have changed consumer preference from a heavily cured product to an article resembling fresh fish.

The temperature of 30 degrees F. must be maintained throughout the process of distribution from landing at port to consumer.

In one survey it was revealed that retail stores with storage and display cases with constant refrigeration ranging between 32 and 35 degrees F., had the lowest spoilage in cod fillets.

Retailers with best equipment and who make use of the latest fish handling practices, have the advantage over those who do not so handle their fish.

Fish on Display

The average store may have 60% of their fish on display as reasonably fresh. The remaining percentage, while entirely edible, may drop into the classification between fresh and the point where spoilage is definitely present.

It should be possible to avoid this condition of semi-freshness in fish before it is sold, since relatively few steps in the marketing process require improvement to ensure retention of quality.

(Western Fisheries, Vancouver, B.C., May 1952.)

Bermuda Undertakes Fisheries Survey

A survey to determine whether offshore deep-sea fishing can be developed into a profitable industry for Bermuda is being conducted by the Danish trawlers "Kosak" and "Skaggerak 4", with combined crews of ten. The trawlers are operating at the invitation of the Bermuda Government, who are providing £5,000 for the project.

Both trawlers are equipped with scientific fishing gear, and the crews have worked with considerable success in the North Atlantic. In their experiments in Bermuda they are using the latest techniques and employing 12 different types of nets. The trawlers carry echo-sounding machines, which send sound waves to the sea bed to locate shoals of fish.

Special equipment to deal with fish caught has been brought from Denmark and installed on Boaz Island, in buildings leased from the Admiralty. With this equipment, the fish can be smoked or placed in deep freeze, and the waste material can be processed as fertiliser or as poultry and pig meal.

Dependent as it is on the tourist trade, Bermuda has need for secondary industries, and it is hoped that as a result of the survey, it will eventually be possible to turn the backward fishing industry into a profitable undertaking.

(New Commonwealth, London, June 9, 1952)

Electrocution of Whales

More Humane and Economic Killing

Despite long experience in hunting, little exact knowledge has been accumulated on whales and whaling. Such paucity of precise data and experimental conclusions has rendered it most difficult to develop and apply a safe method of electric whaling. Yet increased efficiency in catching remains of the utmost importance.

From the humane aspect, the firing of several explosive harpoons into a dumb animal, which may fight in agony for up to two hours, is highly undesirable, to say the least. From the commercial point of view, the use of whale oil and other products is so widespread that it is important to take full advantage of every opportunity to lower the costs of catching and to improve the quality of products.

The Svend Foyn heavy harpoon was introduced in 1865 and has been little altered up to the present day. Electric harpooning was first recorded in London in 1868, when a patent for electrical equipment was granted, but no practical results of any experiments are known. There followed two Norwegian experiments, but the first promise of some success came in 1929, when Dr. Webber, a German engineer, succeeded in electrocuting four fin whales off the Norwegian coast.

Further experiments, including the reported electrocution of 250 whales in 1932-33 by the Sir James Clark Ross expedition, were carried out in co-operation with Dr. Webber until 1945, when he destroyed all his papers on committing suicide. Research and new design have been continuously carried on for the last five years by the General Electric Co., Ltd., London, in close co-operation with United Whalers, Ltd., London, and in conjunction with Elektrohval, Oslo.

Renewed impetus was given to this research upon the return from the Antarctic of Dr. Lillie in 1947, when he described explosive harpooning to members of the Universities Federation for Animal Welfare, who strongly advocated a thorough investigation of more humane methods. These investigations indicated the electrical method of killing as the most promising solution.

This was supported by the directors of United Whalers, who undertook the extremely heavy costs of commissioning an experimental catcher to collect data during the 1948-49 Antarctic season. The fact that this cost some hundreds of pounds per week emphasises both the generous response of the company and the importance which they attach to the matter.

The whalecatcher "Terje 2" was hurriedly equipped for the Antarctic. Complete heavy, waterproof control equipment was built, with a 250-volt, single-phase alternator; electric manila forerunners (the lines to which the harpoons are attached) were made up; and the Kongsberg Gun Company, of Norway, sent an experienced technician to assist.

Three major difficulties were revealed. First, the gear received such an enormous buffeting when mounted in the bow, ploughing through high seas, and icing-up in snow and gales; the equipment demanded too much attention. Secondly, the harpoon was deflected in flight by the trailing of the electric manila forerunner and by the heavy tubular sheathing on the leg of the standard harpoon by which the weapon was insulated from possible short-circuiting with the sea. Thirdly, many post-war gunners had adopted nylon forerunners, which suited Antarctic conditions better than manila, particularly as the latter absorbs a much greater percentage of seawater than does nylon.

In agreement with United Whalers, the G.E.C. redesigned the master control panel, to be housed in a miniature marine enclosure and mounted on the bridge for convenient control by the helmsman or other appointed operator. In Norway, Elektrohval and the Kongsberg Gun Company made a clean break with the adapted forms of Svend Foyn harpoon and produced an entirely fresh design. Unencumbered with the heavy insulating tube, this is now well known as the "detachable-leg" type harpoon; the flow of current into the sea is prevented by withdrawing the shaft of the harpoon when the head and forerunner have become fast in the whale.

Immediate Paralysis of Whale

Simultaneously, the Pirelli-General Cable Works, in close co-operation with British Ropes, Ltd., had to solve the problem of designing a flexible electrical conductor to be carried by the three-cordal rope and to

meet the inherent characteristics of the nylon, which can expand and contract by 40 to 45 per cent., according to the pull on the forerunner.

In considering the effects upon the whale itself, it was learnt that the flow of current with any satisfactory shot produced immediate paralysis, the whale surfacing with no struggle. The convulsion of the tail flukes (which can measure up to 24 ft. from tip to tip) acted as a brake upon the movement of the huge body and turning over on its side, the whale was dead within three minutes from the firing of the shot.

The directors of United Whalers next decided to commission a second catcher for the 1949-50 Antarctic season in order to ascertain some idea of critical buoyancy, load figures, stresses, short-circuit conditions, time of flight of the harpoon and the effects of Antarctic sea conditions. One of the initial problems to be determined was the critical buoyancy of the whale's body, so Westley Richards and Co., Ltd., Birmingham, produced a spigot gun to fire a very lightweight harpoon. Again, the Pirelli-General Cable Works had to construct an ultra-lightweight conductor of very high tensile strength together with the necessary mechanical apparatus to feed out this conductor at the higher operational velocity of the spigot gun.

Sir Vyvyan Board, a director of United Whalers, decided to join the expedition at Cape Town and travelled 15,000 miles in the whalecatcher round the Antarctic continent to the Ross Sea area, accompanied throughout by Mr. Robert Marsden, of the G.E.C. In addition, Mr. Dagfinn Brøther, of the Elektrohval Company, with Mr. Venaas, of the Kongsberg Gun Company, carried out successful electric killing with the standard Kongsberg gun. Westley Richards and Company were represented in these trials by Mr. Roy Hill, who, having helped to build the experimental spigot gun, serviced this in the severe climatic conditions.

Once in the Antarctic, the effects of low temperatures and the icing-up were soon manifest. Elementary manipulations of the gear took longer to perform than in warmer climates owing to the heavy clothing and bitter weather. Obvious, too, became the practical difficulties of recording observations when the crew were working watches in such conditions. An

instance was provided, moreover, of the snapping of the light harpoon, made of high-tensile steel, by the convulsive movement of the whale's dorsal muscles; thus the conductor was parted by the enormous strength of these muscles and the whale regained consciousness, ultimately swimming away and taking part of the harpoon with it.

In the end the expedition returned from the Antarctic with much vital information of the behaviour of various species of whale, the electric current required, time duration and so on, and with a catch of 51 whales by the Konsberg gun.

Attention was then directed to the outstanding problem of the stresses and strains imposed upon the equipment. Greater tensile strength was needed than was possessed by the light research harpoon and this necessitated a light yet stronger forerunner. Wrights Ropes, Ltd., Birmingham, undertook many experiments, with manila as an alternative to nylon, in conjunction with Pirelli-General Cable Works, who were faced by the problems of higher velocity, reduced weight and less coverage of yarn for the electrical conductor within the rope. Finally a lighter manila forerunner was successfully tried out with a newly-designed Westley Richards gun.

Instead of waiting for the forthcoming Antarctic season, the directors of United Whalers arranged for a trial expedition to the little island of Sao Thome, on the equator, off the African coast. A whale of the sei species, weighing 50 tons, was quickly killed and, after various tests in which the mammal sank to approximately 300 ft., it was safely retrieved and hauled in on a new type of forerunner, which the Pirelli-General Cable Works had produced on a new principle with a tensile strength of little more than half that normally used. Based on this initial success, further experiments are contemplated with an improved spigot gun, still utilising a lighter harpoon than normal.

It may now be said that the whale can be killed without any undue pain and with less waste of products. The average time for the shooting, killing and making-fast of a whale is considerably reduced with the electrical method, while fewer electric harpoons are used.

(The Fishing News, London, May 24, 1952.)