1934.

NEW ZEALAND.

MARINE DEPARTMENT.

ANNUAL REPORT FOR THE YEAR 1933-34.

Presented to both Houses of the General Assembly by Command of His Excellency.

YOUR EXCELLENCY,— Marine Department, Wellington, 23rd August, 1934.

I do myself the honour to transmit, for Your Excellency's information, the report of the Marine Department for the financial year ended the 31st March last.

I have, &c.,
JOHN G. COBBE,
Minister of Marine.

His Excellency the Governor-General of the Dominion of New Zealand.

REPORT.

THE SECRETARY, MARINE DEPARTMENT, to the Hon. the MINISTER OF MARINE.

SIR,— Marine Department, Wellington, 31st July, 1934.

I have the honour to submit the Annual Report on the operations of the Marine Department for the financial year ended 31st March, 1934 :—

FINANCIAL.

The following statement summarizes the revenue and expenditure of the Department (excluding Westport and Greymouth Harbours) for the past four years in comparison with the figures for 1922–23 :—

Branch.	1922–23.	1930–31.	1931–32.	1932–33.	1933–34.
		Revenue.			
Shipping Branch—	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Light dues	39,688 16 8	84,062 0 5	78,334 6 0	87,297 17 7	89,075 6 0
Engagement and discharge fees	3,179 11 0	2,235 3 6	2,002 13 0	1,561 10 11	1,712 19 6
Survey fees	3,095 9 0	4,184 18 11	3,809 5 0	3,551 3 5	3,542 5 9
Examination fees, &c.	395 12 6	367 1 0	252 13 6	264 17 6	229 12 6
Miscellaneous	1,289 0 4	1,736 15 1	1,543 7 3	1,717 14 1	1,370 19 10
Harbours—					
Pilotage, port charges, &c.	764 14 6	1,431 17 4	1,293 4 1	1,860 7 5	1,806 3 0
Foreshore revenue	1,126 14 1	4,559 17 3	2,611 18 9	2,498 11 3	2,192 8 1
Inspection of Machinery—					
Inspection fees, &c.	17,126 19 6	22,535 16 4	22,801 19 8	18,981 3 10	19,529 12 2
Examination fees, &c.	667 0 0	384 17 6	384 7 0	401 0 0	313 2 6
Fisheries—					
Sale of oysters	7,702 9 6	6,431 13 8	5,430 8 5	5,101 9 4	5,359 16 9
Fishing-boat license fees, &c.	324 9 6	638 15 10	691 0 3	560 1 6	613 7 6
Rental of toheroa-beds	10 0 0	300 0 0	309 0 0	317 18 6	320 1 9
Government steamers—					
Freight, passage-money, &c.	1,785 0 7	1,213 3 9	756 10 10	1,527 12 4	719 4 0
Ross Sea revenue	..	2 10 0	600 0 0	..	1,000 7 6
Miscellaneous revenue	2,800 11 4	14 8 10	26 1 7	27 17 1	14 8 10
Totals	79,956 8 6	130,098 19 5	120,846 15 4	125,669 4 9	127,799 15 8
		Expenditure.			
Head Office	9,612 2 8	9,708 14 1	8,931 6 9	7,124 6 0	7,788 11 9
Harbours	4,826 13 2	3,225 6 7	2,409 16 0	1,919 12 1	1,792 3 3
Lighthouses	27,834 14 8	23,691 3 4	21,244 8 4	20,145 7 2	20,779 18 1
Mercantile marine	15,150 17 11	27,373 3 1	21,216 13 0	19,383 12 5	18,868 11 0
Inspection of Machinery	27,015 0 0	24,652 11 7	22,800 13 1	14,636 5 6	14,279 19 6
Fisheries	9,580 7 1	7,804 12 11	7,207 0 7	8,784 6 10	8,948 11 2
Government steamers	21,697 19 6	21,257 3 11	17,557 3 1	16,561 18 1	17,526 15 10
Miscellaneous services	2,655 3 8	130 10 8	1 14 8	0 18 11	25 19 6
Grants and subsidies	1,510 0 0	175 0 0	125 0 0	629 3 4	550 0 0
Depreciation	8,156 0 10	10,067 9 0	13,343 13 2	13,598 8 3	13,303 8 10
	128,038 19 6	128,085 15 2	114,837 8 8	102,783 18 7	103,863 18 11
Interest on capital	15,716 7 3	18,378 5 0	20,325 19 2	20,609 4 5	20,634 1 0
Totals	143,755 6 9	146,464 0 2	135,163 7 10	123,393 3 0	124,497 19 11

These figures disclose that the year's operations produced a surplus of £3,301 15s. 9d. after making full provision for depreciation and interest on capital. This is the best result that has been obtained since the commercial balance-sheet system was instituted thirteen years ago, during which period the financial position has worked out as follows :—

Year.	Before paying Interest on Capital.		After paying Interest on Capital.	
		£ s. d.		£ s. d.
1921–22	Deficit	74,146 4 2	Deficit	95,153 14 11
1922–23	,,	48,082 11 0	,,	63,798 18 3
1923–24	,,	9,759 8 1	,,	27,231 4 9
1924–25	,,	2,144 4 11	,,	19,882 0 6
1925–26	Surplus	517 2 2	,,	17,294 8 10
1926–27	,,	5,881 5 2	,,	12,124 0 10
1927–28	,,	5,941 6 0	,,	12,178 12 0
1928–29	,,	17,531 8 1	Surplus	1,474 15 2
1929–30	,,	8,494 8 11	Deficit	8,940 6 3
1930–31	,,	1,891 10 5	,,	16,365 0 9
1931–32	,,	5,877 19 4	,,	14,316 12 6
1932–33	,,	22,885 6 2	Surplus	2,276 1 9
1933–34	,,	23,935 16 9	,,	3,301 15 9

The Department has continued to pursue a policy of rigid economy throughout the year under review and expenditure of only an essential nature has been incurred.

The revenue is continuing to show a steady increase, having risen from £120,846 15s. 4d. in 1931–32 to £127,799 15s. 8d. in 1933–34.

Westport Harbour.

The following statement shows the revenue and expenditure in respect of Westport Harbour for the past thirteen years :—

Year.	Expenditure.	Revenue.	Year.	Expenditure.	Revenue.
	£ s. d.	£ s. d.		£ s. d.	£ s. d.
1921–22 ..	63,950 1 10	25,836 19 3	1928–29 ..	68,871 13 0	64,214 5 6
1922–23 ..	50,738 17 5	38,700 8 1	1929–30 ..	64,877 10 5	66,274 17 3
1923–24 ..	46,619 1 11	42,285 7 4	1930–31 ..	53,436 16 9	53,013 2 11
1924–25 ..	44,666 14 0	50,378 11 0	1931–32 ..	46,803 2 4	34,602 12 9
1925–26 ..	51,909 4 11	57,539 12 11	1932–33 ..	40,974 8 9	30,516 6 1
1926–27 ..	52,769 12 6	62,976 13 10	1933–34 ..	39,783 7 4	30,886 13 9
1927–28 ..	65,828 1 7	65,909 8 1			

The loss for the year under review amounted to £8,896 13s. 7d. after charging interest on loans, depreciation, and sinking fund. The position, although by no means satisfactory, is a little better than it was last year.

The decline in revenue consequent upon the severe depression in the coal industry has left the harbour with an income barely sufficient to meet minimum working-expenses plus interest on loans, the deficit this year representing approximately the total of depreciation and sinking fund.

The bunkering trade has shown a slight improvement, but does not bear comparison with what it was four years ago. The number of vessels which called at Westport for bunker coal during the past nine years is as follows :—

Year.	Number of Vessels.	Quantity of Bunker Coal taken.
		Tons.
1925–26	20	..
1926–27	44	..
1927–28	51	54,993
1928–29	54	54,083
1929–30	57	61,546
1930–31	24	25,969
1931–32	10	7,637
1932–33	7	6,872
1933–34	14	12,703

The port dues with respect to ships calling for bunker coal have been reduced to a minimum, with the object of encouraging this trade as much as possible.

The following statement shows the net tonnage of shipping entered the port, the tonnage of coal shipped, and the financial result for each year since the Department has had control of the harbour :—

Year.	Net Tonnage of Shipping entered.	Tonnage of Coal shipped.	Financial Result.	£	s.	d.
1921–22	273,706	480,873	Deficit	38,113	2	7
1922–23	332,401	573,487	,,	12,038	9	4
1923–24	275,762	442,070	,,	4,333	14	7
1924–25	334,827	556,669	Surplus	5,711	17	0
1925–26	386,669	552,949	,,	5,630	8	0
1926–27	459,670	637,165	,,	10,207	1	4
1927–28	466,021	623,256	,,	81	6	6
1928–29	458,712	604,778	Deficit	4,657	7	6
1929–30	479,623	625,835	Surplus	1,397	6	10
1930–31	352,228	513,503	Deficit	423	13	10
1931–32	234,936	336,873	,,	12,200	9	7
1932–33	223,936	282,163	,,	10,458	2	8
1933–34	240,132	280,080	,,	8,896	13	7

For the seven years from 1924–25 to 1930–31 (inclusive) there was an average annual surplus of £2,563 16s. 11d., but during the past three years with a heavy decline in coal export the finances of the harbour have shown a substantial deficit.

In order to minimize the loss the Department has been compelled to reduce expenditure in every possible direction. The extension of the breakwaters had to be discontinued and the bucket dredge "Maui" laid up. In an endeavour to maintain a satisfactory depth of water on the bar the suction dredge "Eileen Ward" has been kept in commission.

The depths in the river are being closely watched, and the dredge "Maui" will be recommissioned when the circumstances demand it. The depth of water at the entrance to the port has occasioned some concern recently, and the whole question is at present under investigation with a view to ascertaining the best method of coping with the ever-recurring problem of the shoaling of the bar. Lack of trade, and consequently of funds, has been the obstacle to the prosecution of any major works during the past three years.

Greymouth Harbour.

A subsidy amounting to £7,875 was paid to the Greymouth Harbour Board during the year in pursuance of the provisions of section 5 of the Greymouth Harbour Board Amendment Act, 1920. This is the first occasion on which the Marine Department has been called upon to make the payment. In the past the subsidy has been paid out of permanent appropriations under special Acts.

Harbour Works.

Westport Harbour.—No further construction work has been carried out on this harbour for the year. There has been a steady shoaling on the bar, and for the first three months the average depth was maintained, but in July a decline set in, which has been more or less continuous, owing to moderate seas, light to moderate freshes, and the light to strong easterly set which prevailed. The average working depth at high-water on the bar was 19 ft. 7 in., a decrease of 1 ft. 11 in. since last year, and 3 ft. since 1932. The average working depth in the river was 24 ft. 10 in., an increase of 5 in. on last year, but at the berthage area the depths have decreased slightly.

The suction dredge "Eileen Ward" has removed 340,875 cubic yards of material from the bar, 30,455 cubic yards from the lower river, and 10,050 cubic yards from the floating basin and berthage area. The dredge was overhauled at Westport on the 4th May, 1933, and did not resume dredging until the 7th August. She proceeded to Wellington for annual survey on the 2nd January last. Throughout the year the work was hampered by bad weather and insufficient water on the bar. The work on dredges and other plant has kept the workshops staff fully employed. The signal station was painted during the year, and the beacon and harbour lights are in good order. The willow plantations have also received attention.

The shoaling of the bar has occasioned some concern, and the Marine Engineer is now engaged on the preparation of a report with recommendations as to future policy for the harbour. Survey work is being carried out and additional tidal observations made, and a study is in hand of the progressive changes following past efforts to improve the depth by means of training-walls and moles. Since the close of the year covered by this report, a marked improvement in bar conditions has taken place due to favourable natural conditions, and for the past three months shipping has been able to work the bar without inconvenience.

Karamea Harbour.—This harbour has not been worked since 1931, and conditions in the river show no signs of improving.

Little Wanganui Harbour.—In August and September the bar again shoaled. At this stage the a.s. "Fairburn" was delayed in port for four weeks. A combination of freshes and seas then improved conditions, and the entrance has since remained satisfactory.

Repairs have been effected to the mooring-pile and pilot boat, and snags have been removed from the river. A proposal has been prepared for improvement to the facilities for handling merchandise at the wharf.

Waikokopu.—This port has continued to be operated under the direct control of the Wairoa Harbour Board for the Public Works Department.

The wharf has been in regular use, and during the year seventy-six coastal boats and one warship worked the harbour. Minor repairs have been made to the wharf and buildings as required. Three blocks totalling 100 tons have been cast to repair storm damage to the breakwater. Depth soundings adjacent to the wharf have shown that no siltation has taken place.

Waitangi Wharf, Chatham Islands.—The contract for the erection of this wharf has been satisfactorily completed. The wharf is a timber structure 202 ft. long and 26 ft. wide, of brush box decking carried on stringers, caps, braces, and wales of ironbark supported on iron-bark pile piers. The approach is 385 ft. long, and is built of similar timbers. At the shore end a shed 97 ft. long by 30 ft. wide has been erected.

Pitt Island Jetty.—The contractors for the Waitangi Wharf have undertaken to erect a jetty at Pitt Island, and all materials are on the site.

Tryphena Wharf.—The approach to the wharf on the north side of the harbour consists of the construction of a stone-faced wall 80 ft. long by 12 ft. wide on top with an average height of 9 ft., and work is well in hand. On the southern side the approach consists of stone breastwork 50 ft. long, average width 30 ft., and height 9 ft. This work is well in hand.

Okupu Wharf Approach.—This work which comprises 80 ft. of stone breastwork 12 ft. wide on top has been completed.

Elmslie Bay Wharf.—Extensive repairs and replacement were carried out to the piling, bracing, stringers, and decking. Plans have been prepared for a new wharf on a more suitable site.

General.—A number of applications have been received from local bodies and private individuals for the approval of works involving marine interests. Among the various applications were the following:—

Foreshore Licenses: Paremata, Hutt County; Pukerua Bay, Hutt County; Weymouth, Manukau Harbour; Horeke, Hokianga Harbour; Cambridge, Waikato River.

Wharves and Jetties: Waihou River, Te Aroha; Pilot Bay, Tauranga Harbour; Port Charles, Coromandel; Napier; Point Howard (extension), Wellington Harbour; Pouto Point, Kaipara Harbour; Big Wanganui River; Karamurama Island, Hauraki Gulf; Okura Point, Whangaroa Harbour.

Boat-sheds and skids: Kohukohu, Hokianga Harbour; Balena Bay, Wellington; Seatoun, Wellington; Hamilton, Waikato River; Mercer, Waikato River; Evans Bay, Wellington (2).

Bridges: Combined flood-gate and bridge over Styx River, Harbour Road, Brooklands; Wairoa River, Hawke's Bay; Railway Bridge, Patea; Taruheru River Pipe Lines Suspension Bridge, Gisborne; Waitangi River, Bay of Islands.

Retaining-walls: Whananaki Inlet, Whangarei County.

Lighthouses.

Very little work has been done during the year, and maintenance and improvements have been carried out where necessary.

Kahurangi Lightkeeper's Cottage.—A cottage for the lightkeeper at Kahurangi was assembled at the Public Works Workshops, Wellington, and despatched to Kahurangi and erected on the site.

Baring Head.—In January last a tender was accepted for the erection of two cottages in timber and a reinforced concrete tower. Good progress has been made, and on the 31st March the tower was completed with the exception of balcony handrailings and iron stairways. Both cottages are well advanced. Two 500-gallon underground concrete tanks have been constructed for the storage of water.

Centre Island Lighthouse.—A quantity of ruby glass for replacement of the ruby screens at the Centre Island Lighthouse was purchased, and is held in store pending the visit of an expert to place same in position.

Harbour Board Legislation.

During the year the following legislation affecting harbours in the Dominion was passed:—

Harbours Amendment Act.—This Act generally gives legislative effect to certain requests made by the Harbours Association on matters affecting the administration and control of harbours.

Auckland Harbour Board Empowering Act.—This Act provides for the determination and payment by certain lessees of the Board of contributions to the cost of formation and dedication of certain streets and rights-of-way on land in the vicinity of the old railway-station.

Bluff Harbour Board and Bluff Borough Council Empowering Act.—This Act validates an agreement between the local authorities mentioned in regard to the control of the water supplied to shipping at Bluff.

Bluff Harbour Board Empowering Act.—This Act authorizes the Board to make an annual contribution not exceeding £200 to the Bluff–Stewart Island steamer service.

Napier Harbour Board and Napier Borough Enabling Act.—This Act authorizes the Board to lease to the Borough Council certain of its endowment lands and extends the boundaries of the borough to include such lands.

Napier Harbour Board Empowering Act.—This Act authorizes the Board to sell a small area of its endowment land for church purposes.

Napier Harbour Board Loan Act.—This Act authorizes the Board to borrow a sum not exceeding £335,700 for the purpose of constructing harbour works at Napier, subject to a poll of the ratepayers of the harbour district.

New Plymouth Borough Council and New Plymouth Harbour Board Empowering Act.—This Act, *inter alia*, empowers the Board to lease to the Council certain endowment lands near the foreshore

for recreational purposes, and gives certain necessary powers to the Council in the matter of control and administration of the area.

Whakatane Harbour Board Vesting Act.—This Act vests certain mud-flat areas in the Whakatane Harbour Board.

Lighthouse Tender.

The work of tendering the coastal lighthouses and overhauling the buoys and beacons in harbours under the control of the Department has been efficiently carried out by the s.s. "Matai."

Adjustment and Inspection of Ships' Compasses.

The regulations for the adjustment of compasses have been carefully administered, and compasses continue to be maintained in a good state of efficiency. The results of the investigation of adjustments show that the work of Compass Inspectors and Adjusters has been carefully performed. In a few cases it has been necessary to exercise extra supervision on account of the changing magnetic force in the vessels.

Admiralty Charts.

The stock of Admiralty charts maintained by the Department as agent for J. D. Potter and Co., London, has been further increased during the year by the addition of several numbers which have, at different times, been asked for. The charts now in stock cover a considerable portion of the globe and practically include all ports where vessels are likely to go after discharging in the Dominion.

After receipt of the charts from J. D. Potter and Co., Ltd., the numerous corrections necessary to keep them up to date are made here periodically, and to ensure that information received between dates of correction is available to purchasers, a list of Notices to Mariners affecting them is kept at each office for inspection.

New editions of Chart No. 3484, Bluff Harbour, and No. 2540, Bluff Harbour and New River entrance, No. 2411, Otago Harbour, and No. 1423, Port Nicholson, showing large corrections made from information supplied by the Harbour Boards have been issued by the Hydrographer.

Coastal Survey.

The existing charts of the New Zealand coast are mostly based on surveys carried out as long ago as 1850, and are neither sufficiently accurate nor complete to meet the needs of modern high-speed shipping running closely to time-table. The Government has been in communication with the Admiralty in London on this matter, and it is expected that an Imperial surveying-ship will commence a resurvey of the coastline towards the end of 1936.

Examination of Masters and Mates.

During the year examinations were held in Auckland and Wellington, and were conducted in a satisfactory manner, and in accordance with the Imperial Board of Trade requirements.

Under the present regulations, which were introduced in 1931, the examination for each grade of foreign-going and home-trade certificate is divided into two main parts, a written part dealing with navigation (the more theoretical part of the syllabus) and an oral and practical part dealing primarily with seamanship. A candidate who passes in either the written or the oral part receives a partial pass, which holds good for six months, and is only re-examined in the part in which he failed. There is also an examination in signalling which candidates are allowed to take separately from the rest of the examination.

During the year the Richmond Nautical (Technical) School, Auckland, was approved as a "Shore School for Nautical Training," after inspection by officers of the Education Board and the Marine Department. Half of the time spent at the school will be allowed to count as sea service, with a maximum remission of six months in the case of boys attending the junior course before going to sea, and two months in the case of candidates who attend the senior course after having completed the larger part of the services required for a second mate's certificate.

Seventy-four examinations were held, of which seven were for signals only, one for Yacht Master in New Zealand waters, one for Colonial Pilot, and ten for Sub-Lieutenant, R.N.V.R. For certificates of competency the percentage of total passes was 66·0 (an increase on last year), 21·2 per cent. for partial passes, 6·4 per cent. for partial failures, and 6·4 per cent. for total failures. Four candidates passed for a square-rigged sailing-ship endorsement, and one for fore-and-aft sailing-ship endorsement.

Examination in Form and Colour Vision.

These examinations continue to be held at Auckland, Wellington, Lyttelton, and Dunedin. During the year seventy-two candidates were examined, three of whom failed in the lantern test and one in the letter test. There were two special examinations during the year.

Helm Orders.

The new helm orders—*i.e.*, starboard and port in their direct sense—have now been in use since 1st January, 1933, and, so far, no accident resulting from confusion between the old and the new orders has been reported.

Marine Casualties.

During the year the casualties on or near our coasts varied considerably in their nature, and were fortunately attended with no loss of life. The majority of them were of comparatively slight importance, and were due to fire, collision, grounding in small harbours, heavy seas, &c. Preliminary inquiries were, when necessary, held by Superintendents of Mercantile Marine.

Formal investigations were held to inquire into the loss of the steam trawler "Serfib," which foundered near Tokomaru, and into the stranding of the coastal motor vessel "Holmglen" on Banks Peninsula near Akaroa.

The circumstances attendant on other major casualties were such that further inquiry was unnecessary.

A list of the casualties is published at the latter end of the report.

The New Zealand Nautical Almanac and Tide-tables.

This publication for 1934 (32nd edition) was published, as usual, on 1st November. In co-operation with the different Harbour Boards, every effort is made to keep the port information up to date, so that masters may have the latest available. It is published early so as to be available to masters likely to be away from the Dominion at the beginning of the year.

New plans for Napier, Timaru, Nelson, and Mapua from recent surveys made by the respective Harbour Boards were published this year. Collingwood information was left out, as no reply has been received from the authority in charge of the port as to whether or not any changes affecting navigation of the port had taken place. An additional plan of Port Chalmers berthage supplied by the Otago Harbour Board was also published.

The 1931 International Code of Signals.

This new code was brought into international use on 1st January, 1934.

It is now published in two volumes—Volume I for visual and sound signals, and Volume II for radio signalling.

Notices to Mariners.

Information relative to changes in navigational aids and to the discovery of obstructions, wreckage, or other dangers to navigation, and general information necessary for the use of mariners was published in the form of Notices to Mariners, of which 57 have been issued during the year.

Arrangements were made for the exhibition and inspection of notices received from the Admiralty, Australia, Tasmania, and Suva, at the office of the Superintendent of Mercantile Marine at all ports visited by overseas vessels, and for the inspection of notices received from America, India, and Japan, at the Nautical Adviser's office.

Radio Beacons.

After considerable delay from causes entirely beyond control, it has been found possible this year to consider again the question of erecting radio beacons round our coasts. It has been decided to erect a beacon at the new lighthouse on Baring Head, outside Wellington, if after investigation the site proves suitable, and a temporary beacon for experimental purposes at Tiri Tiri, Matangi, Hauraki Gulf. Further proposed beacons will be erected as soon as the controlling circumstances permit.

Radio Call Signs and/or Signal Letters.

In accordance with the decision of the International Code of Signals Committee of the Washington Radiotelegraph Conference, 1927, endorsed by the International Radiotelegraph Conference of Madrid, 1932, ships' radio call signs were, on and after 1st January, 1934, used both for wireless and visual signalling, and the visual signal letters which had previously been used were cancelled. Ships which had visual signal letters and were not fitted with radio were allotted new letters from the radio call signs.

The signal letters and/or radio call signs of all ships registered in New Zealand now begin with ZM and, as before, consist of four letters.

Re "Certificates of Efficiency as Lifeboatmen."

Arrangements have been made for the examination of seamen, and the issue of certificates of efficiency as lifeboatmen in accordance with the provisions of the "International Conference for the Safety of Life at Sea, 1929," which, although not yet in force in the Dominion, applies to many of the vessels trading here.

The examinations are held at Auckland, Wellington, Lyttelton, and Dunedin, and the certificates issued by the Superintendent of Mercantile Marine.

The shipping companies are required to provide the necessary lifeboat and gear, and are responsible for getting the men together at the time appointed for the examination.

Since the examination was introduced about 580 certificates have been issued.

Survey of Ships.

The following table shows the number of certificates issued to ships during the past five years:—

——	1933–34.	1932–33.	1931–32.	1930–31.	1929–30.
Sea-going steam-ships and motor-ships ..	147	155	153	186	202
Sea-going sailing-ships	4	5	5	12	13
Restricted-limits vessels	389	401	401	442	499
Totals	540	561	559	640	714

The amount of tonnage laid up in New Zealand waters is reflected in the reduction in the number of surveys carried out and certificates issued during the year. Thirteen vessels were surveyed for the first time during the year ending 31st March, 1934, of which one was a home-trade vessel and twelve were restricted-limits vessels. The home-trade ship was the s.s. "Awarua," a steam-tug built for the Bluff Harbour Board in 1932 to replace the motor-tug "Southland." The "Awarua" arrived in New Zealand in November, 1932, and was first surveyed by the Department in May, 1933. She is a well-equipped modern steam-tug propelled by two sets of triple-expansion engines capable of developing 1,200 indicated horse-power. Steam is supplied by two water-tube boilers working at a pressure of 180 lb. per square inch. The vessel opened out well during the survey and appears to be satisfactory in every respect. The only sea-going vessel built in New Zealand during the year was the auxiliary yacht "Morewa." She was built of wood at the yard of Mr. C. Wild, Auckland, for a northern owner. The vessel is not subject to survey, but, being over 25 tons gross, the plans were examined and approved by the Department. Her tonnage is 51 tons gross and 5 tons register.

Two hundred and ten vessels were surveyed for efficiency and seaworthiness under section 226 of the Shipping and Seamen Act. There were also 18 tonnage and other surveys making a total of 228 surveys carried out in addition to the usual annual surveys, compared with a total number of 190 additional surveys in the previous year. Three vessels, the s.s. "Kurow," s.s. "Waitomo," and s.s. "Tofua," were sold to Eastern buyers and were put in a satisfactory condition for voyages to China and Japan. Two vessels, the s.s. "Welcombe" and "Dalmore," loaded the first full cargoes of bulk grain lifted in New Zealand. The erection of the necessary shifting boards and the stowage of the cargoes were examined and passed by the Department's Surveyors before the vessels were cleared at the loading-ports.

A major casualty occurred on the 30th May, 1933, when the American vessel, "Golden Harvest," grounded on Barrett Reef, Wellington Harbour. The vessel remained fast for twenty-four hours and was refloated with the assistance of tugs and under her own power. The vessel returned to Wellington where, on discharge of a portion of the cargo, she was dry-docked on the 8th June for examination and repairs. Fairly extensive damage was sustained to the hull plating and the ship's structure in the fore-peak, No. 1 hold, and Nos. 1 and 2 double-bottom tanks. After extended negotiations, a contract for reconditioning the hull was let to a Wellington firm of ship repairers. The work was carried out to the satisfaction of the Department's Surveyors, and the vessel was refloated after a stay of six weeks in dry dock. Other seaworthiness surveys of overseas vessels included the "Tasmania" (leak in No. 1 hold), "Parracombe" (in collision), "Dalcroy" (hull damaged through stranding on a reef on voyage to New Zealand), "Kent" (defective propeller), "Port Fremantle" (broken crank-shaft), "Orari" (fire in exhaust pipes), and "City of Canberra" (fire amongst coal).

The art of welding has made rapid progress in recent years, and the use of electric welding in ship building and repair yards has developed at a rate comparable with its expansion in other industries. Circular instructions were issued to the surveying staff during the year with regard to the use of arc welding for ship repairs.

No alteration has been made in the load-line of any of the eight vessels to which international load-line certificates have been issued this year by the classification societies.

Registration of Shipping.

On the 31st December, 1933, there were on the Register of Vessels in the Dominion 56 sailing-vessels of 4,809 tons register, 211 steamers of 97,847 tons register, and 249 motor-vessels of 8,939 tons register, as compared with 58 sailing-vessels of 5,380 tons register, 225 steamers of 103,185 tons register, and 236 motor-vessels of 8,800 tons register at the end of the previous year.

The number of seamen employed on board was 3,431, as compared with 3,560 for the year 1932.

Government Shipping Offices.

In the Government Shipping Offices the administration of the Shipping and Seamen Act has been efficiently carried out. Appended is a statement showing the number of seamen engaged and discharged at the various ports during the year, and the fees received for such transactions. The total number engaged and discharged was 9,613 and 9,519 respectively, as compared with 8,830 and 8,694 respectively during the previous year. The transactions at the four main ports were as follows, the figures in parentheses being those of the previous year.

Port.	Engagements.	Discharges.	Fees.					
			£	s.	d.	£	s.	d.
Auckland	2,626 (2,701)	5,338 (2,813)	484	0	0	(513	19	0)
Wellington	4,534 (4,014)	4,499 (3,675)	804	0	0	(685	5	0)
Lyttelton	623 (439)	641 (433)	106	6	0	(73	4	0)
Dunedin	395 (352)	397 (406)	70	14	0	(74	4	0)

Engagement of Seamen.

This service has been maintained. A record of seamen applying for work is kept for the purpose of filling vacancies.

Sick and Injured Seamen.

The total amount paid by shipowners to sick and injured seamen, under the provisions of the Shipping and Seamen Act, 1908, and its amendments, was £9,764 19s. 8d., as against £9,908 15s. 3d. for the previous year, a decrease of £143 15s. 7d.

Examination of Marine Engineers.

In the course of the year 192 candidates were examined for marine engineers' certificates of competency at various centres throughout the Dominion.

Of these, 79 were examined for third-class, second-class, and first-class ordinary and motor certificates of Imperial validity; of the 57 third-class candidates who presented themselves for examination 33 were successful and 24 unsuccessful; of the 8 second-class ordinary, motor, and endorsement candidates examined, 5 were successful and 3 unsuccessful; and of the 14 candidates examined for first-class ordinary and motor, 7 passed and 7 failed in the examinations.

In the case of second-class candidates, the above particulars are comprised of 4 candidates for ordinary certificates, 2 of whom were successful, 3 candidates for motor certificates, all of whom were successful, and 1 candidate for steam endorsement who was unsuccessful.

In the case of first-class candidates, the foregoing return comprised 9 candidates for ordinary certificates, 5 of whom were successful and 5 candidates for motor certificates of whom 2 were successful.

Of the 7 candidates who were successful for first-class ordinary and motor certificates, 4 passed at the first attempt, 1 at the second attempt, and 2 at the third attempt.

Of the 5 candidates who were successful for the second-class ordinary and motor certificates, 4 passed at the first attempt and 1 at the second attempt.

In the case of the 33 candidates who were successful for third-class marine certificates, 23 passed at the first attempt, 4 at the second attempt, 4 at the third attempt, 1 at the fourth attempt, and 1 at the fifth attempt.

The remaining 113 candidates were examined for certificates of competency which are valid in New Zealand only. Of these 68 (47 of whom were successful) were examined for service in sea-going vessels propelled by some motive-power other than steam; 37 (32 of whom were successful) for service in vessels propelled by some motive-power other than steam plying within restricted limits; 8 (6 of whom were successful) for service in steam-driven vessels plying within restricted limits.

The examinations for first-class, second-class, ordinary, and motor certificates, and those for third-class certificates are held at the four main centres only.

Examinations for certificates of competency which are valid in New Zealand only are held at the fifteen centres throughout the Dominion.

Inspection of Boilers and Machinery.

Boilers and Pressure Vessels.

The following is a statement of the number of inspections made during the year, the corresponding figures for the previous year being shown in parentheses:—

	Number.	
Boilers and pressure vessels inspected for the first time ..	293	(167)
Air-receivers inspected for the first time	52	(75)
Total inspections of all boilers and air-receivers	7,922	(7,658)

The peak year for inspections of boilers and pressure vessels was 1931, when 8,144 inspections were made. The numbers dropped during 1932 and 1933 to 7,914 and 7,658 respectively. The inspections made during the year ended 31st March, 1934, show an increase over the two previous years and are only 222 below the peak of 1931. The number of power boilers manufactured in the Dominion during the year was 45, with a total horse-power of 1,297, and 22 boilers with a total horse-power of 524 were imported.

A minor boiler explosion occurred during the year from the mud-drum of a water-tube boiler. The drum consisted of a cast-iron cylindrical shell and ends. It was 4 ft. 11 in. long by $9\frac{3}{4}$ in. internal diameter, and the thicknesses of shell and ends were $\frac{7}{8}$ in. and $1\frac{1}{4}$ in. respectively. A large portion of the bottom of the drum blew out under the steam pressure of 120 lb. per square inch, fortunately without injury to any person and without doing much material damage. Investigation into the cause of the explosion showed that the thickness of the portion which blew out had been reduced by external corrosion from $\frac{7}{8}$ in. to $\frac{3}{8}$ in., and that the material had been so weakened that it could not sustain the working pressure of the boiler. The drum had been bedded in concrete at the bottom and front sides with a covering course of bricks upon the outside of the concrete. The concrete had been in position since 1926 when the boiler, a second-hand one, was installed in its present situation. Dampness at the concrete where it came in contact with the mud-drum caused severe external wastage of the metal, with failure as the ultimate result. The Department requires that brickwork or concrete in contact with boiler plates shall be periodically removed for the examination of the plates. The importance of this

requirement is not appreciated by many boiler-owners, but its necessity is illustrated by this explosion, where the material hidden by the concrete wasted from $\frac{7}{8}$ in. to $\frac{3}{8}$ in. in the short period of seven years.

An explosion occurred in May, 1933, from the barrel of a loco-type boiler of a traction engine used in Canterbury for agricultural purposes. The barrel was $26\frac{1}{2}$ in. in diameter and 57 in. long, and the longitudinal seam was lap-jointed and double-riveted. The barrel was completely stripped of lagging in November, 1932, so that the joint could be thoroughly examined under an hydraulic test. Although the test was satisfactory and a careful inspection did not reveal any defect, yet six months later the barrel ripped without warning along the longitudinal seam, fortunately without causing injury to any person. Examination of the plate revealed that the explosion was due to a lap-seam crack which on the hidden side of the plate extended practically the full length of the barrel. During the explosion the crack opened up on the outside of the plate for a distance of 36 in. Rivets were cut out of the joint, and the workmanship was found to be satisfactory. Extensive laboratory tests of the defective plate failed to reveal any clear cause of the lap-seam crack. Owing to the numerous failures of lap seams in the shells of boilers in New Zealand during the past few years, the land-boiler rules were amended in 1931 to provide that no riveted longitudinal seam of a shell subject to internal pressure shall be of lap construction where the diameter of the shell exceeds 36 in. or the working pressure exceeds 100 lb. per square inch. This rule, of course, applies to new construction only. It is not possible to alter existing boilers to comply with the requirements of the rule. Very particular attention is given by Inspectors to all lap-jointed longitudinal seams.

Machinery.

The number of machinery inspections for the year amounted to 26,025, an increase of 1,466 over the previous year. The new lifts installed number 24, and 15 cranes were inspected for the first time.

Seven fatal accidents and thirty-three non-fatal accidents were reported during the year, as against nine and fifty respectively reported during the previous year. The circumstances of every accident were fully investigated by the Department's officers and where possible additional safeguards were fitted to reduce the risk of a recurrence of similar accidents. Brief summaries taken from the reports of the fatal accidents are as follows:—

(1) An owner of sawmilling machinery was ripping timber with a breast-bench circular saw when a piece of heavy timber was thrown back over the saw and struck him on the head with fatal results. The machinery had been reported idle and was not certificated. The accident was due to insufficient guarding at the back of the saw. This type of accident was formerly very common, and the Department has for some years past required that every breast-bench saw shall be equipped with a curved fin guard or riving knife which shall completely guard the back of the saw. Sketches of approved types of these guards have been freely distributed among owners of sawmilling machinery, and since the adoption of the curved fin guard accidents at breast-bench saws have been infrequent. It is unfortunate that the victim of this accident started working his mill without advising the Department and receiving the benefit of the Department's experience with regard to breast-bench saws.

(2) A boy nine years of age was visiting his father, who was night-shift engine-driver at a wood-working factory, when his clothes became entangled with the end of a revolving shaft. He received injuries from which he died almost instantly. The machinery was under trial and the potential danger of a shaft of this description had not been realized by the management of the factory. The end of the shaft which projected 10 in. beyond a bearing has since been cut off and the shafting efficiently fenced.

(3) A workman engaged in painting a wall of a dairy factory was caught by the end of a revolving shaft situated some 10 ft. from the floor and received fatal injuries. This is the class of accident which can be prevented by educational methods rather than by mechanical safeguarding. The victim was not concerned with the machinery, and should not have been instructed to work near a shaft while it was in motion.

(4) A drag-line used for obtaining gravel from the Rangitikei River had been hauled tight for the transport of three men across the river in the drag-line bucket. The line failed and precipitated the men into the river below. One man was pinned beneath the bucket and was injured and drowned. Investigations into the cause of the accident showed that the suspension rope had withdrawn from a socket attaching it to an anchorage on the far side of the river. The socket was not of satisfactory dimensions, nor had the best practice been adopted in socketing the rope. The socketing of wire ropes is covered by a British Standards Specification, and copies of the specification have been promulgated for the information of the Inspecting Staff and those concerned with the attachment of wire rope.

(5) An operator of a continuous-running power press in a leather-working factory inadvertently crushed a portion of his index finger between the die and press. The accident was not thought to be a serious one, but unfortunately tetanus developed and the victim died. The fitting of a safe and efficient guard for the protection of the operators' fingers to this class of machine is a difficult matter, and is now receiving the close attention of the Department. Many power presses are fitted with a pedal, the movement of which controls the operation of the press, but the careless or accidental tripping of the pedal is the cause of many accidents, and it is clear from the Department's experience that pedal control is by no means the solution of the problem.

(6) The manager of a sheep-station visited a small hydro-electric plant on the station for the purpose, it is assumed, of oiling the shafting. His clothing became entangled with the end of a shaft and he received injuries from which he died. The shaft was 18 in. from the floor, and a guard which had at one time been fitted was not in position at the time of the accident. The Department was not aware of the existence of the plant, and previous to the accident it had not been visited by an Inspector of Machinery. The machinery is now efficiently guarded.

(7) A patternmaker of many years' experience with wood-working machines was killed when struck by a portion of a wooden pattern which was thrown from a lathe during the process of being turned. Investigations into the cause of the accident proved that the fastenings of the pattern, which was made in two parts, were insufficient to withstand the centrifugal force, tending to separate the two parts when the pattern was revolved at the high revolutions necessary for turning. The pattern was also insecurely attached to the face plate of the lathe.

Of the 33 non-fatal accidents reported, 9 were connected with circular saws, 5 with power presses, 3 with woollen-manufacturing machinery, 2 with transmission-shafting, 2 with electric lifts and the remaining 12 with various types of machines. In 15 accidents fingers only were injured, and in 8 cases hands were injured. In 17 cases, mostly with circular saws and power presses, lack of care or concentration on the work in hand was a contributing cause to the accidents. A serious non-fatal accident occurred at Waihi Gold-mine in July last. A cage with 12 men was being lowered down a shaft when the clutch on the winding-engine shaft slipped out of position and let the cage away. The cage dropped with great velocity, but eventually tore into the timber guides and the sides of the shaft and came to rest 500 ft. from the bottom of the shaft and 1,300 ft. from the surface. Both hand and foot brakes were fitted to the winding-drum. All 12 men in the cage were injured, but fortunately none were killed. From investigations and tests carried out after the accident it was proved that the clutch could not have been fully engaged when the brakes were released and the cage set in motion and that the brakes were efficient. Since the accident indicators have been fitted for the purpose of showing when the clutch is engaged or disengaged, and the machine has been equipped with a locking-device for holding the clutch in the engaged position.

This year marks the sixtieth anniversary of the enactment of the first Inspection of Machinery Act. It may not, therefore, be out of place to refer briefly to the history of this legislation.

The first Act was introduced into the House of Representatives in 1874 by the Hon. Edward Richardson, member for Christchurch City West and Minister for Public Works. The necessity for such legislation had been agitating the public mind for some years prior to this period. Many boiler explosions and serious accidents with machinery were occurring with disastrous results to life and property. Following an explosion of a boiler on the 24th January, 1874, at the Kurunui Battery, Thames Goldfield, by which three persons were killed, a Royal Commission was appointed on the 21st February, 1874, to inquire into the causes of the explosion, and on the condition of the boilers and machinery generally on the goldfield. Three methods of dealing with the subject of boiler inspection were examined by the Commission, and opinions of witnesses were sought as to their merits. The Commission reported that there was a remarkable unanimity of opinion in favour of the plan of Governmental inspection.

The provisions of the first Act may be briefly summarized as follows :—

All boilers were required to be inspected at least once in every year, or oftener, as occasion may require.

A boiler was defined as any boiler or vessel in which or by means of which steam is generated or used for the purpose of working any machinery. An Inspector was required to keep a complete record of each boiler inspected, containing particulars of the nature and construction of the boiler, the name of the maker, the pressure which it was calculated to sustain, the mode of working the boiler, and the state and condition of it, and its fitness for the purpose for which it was used. A fee of £1 was charged for the inspection of each boiler not exceeding 10 h.p., and £3 for each boiler over 10 h.p.

Provision was also made for the inspection and certification of certain classes of machinery, such as machinery for cutting, preparing, or dressing *Phormium tenax*, and all machinery used in printing by steam machinery, or in flour-mills, sawmills, bone-crushing mills, woollen-mills, distilleries, foundries, planing-machines, and quartz-crushing mills or batteries. Fencing and guarding were required for certain parts of machinery whether or not they were parts of the machinery mentioned above, such as for every flywheel connected with mechanical power, and every part of a steam-engine and water-wheel, and every hoist near to which children or young persons were liable to pass or be employed, and every wheel-race was also required to be fenced.

A fee of £1 was charged for the first inspection and certification of machinery not having boilers connected therewith. No further fee was payable for any subsequent inspection of the same machinery.

No child under the age of ten years was permitted to be employed in working or assisting to work at or with any machinery.

Owners of boilers and machinery were required to give notice of any boiler explosion and of every machinery accident resulting in loss of life or serious bodily injury to any person whether the machinery was subject to the provisions of the Act or not.

It is interesting to note that Justices were empowered to allow to any person who had suffered bodily injury or damage by reason of default in respect of which a penalty was imposed a certain proportion of the penalty as compensation.

The Act could only be brought into force in the various provinces by request of the Superintendents. Within a year, it was in force in all the provinces excepting that of Hawke's Bay. It came into force in Hawke's Bay in 1877.

The first Inspectors of Machinery were Mr. Joseph Nancarrow, Chief, and Messrs. William James Jobson, Henry Augustus Levestam, George Croll, and Thomas Cairns Burt. Mr. Levestam and Mr. Burt resigned within a few months after appointment, and Messrs. Henry Alexander McGregor and Alexander Crawford were appointed in their stead.

In his first report on the working of the Act (a very brief one as the Act had been in force then for only six months) the Minister stated that the Government considered that, while no attempt should be made to create a revenue from this source, the fees should be made to pay all the necessary expenses of carrying out the Act.

The first report of the Inspectors showed that a considerable number of the boilers inspected were in a defective, and some in a highly dangerous, state.

Subsequent Legislation relating to Boilers.

Since 1874 steam has come into use for other purposes than driving engines, and compressed air, often under high pressure, has also come into general use. Proper periodical inspection of steam-pressure vessels and air-receivers is necessary if explosions are to be avoided. As these pressure vessels came into general use, the legal definition of boiler was extended to include them. In 1894 steam-digesters were brought under inspection, and by 1908 all other steam-pressure vessels were also similarly treated. Since 1927 air-receivers working at pressures exceeding 30 lb. per square inch have been subject to periodical inspection.

In the search for efficiency, boiler pressures have crept higher and higher. Up to 1890 a pressure higher than 100 lb. per square inch was rare. Nowadays pressures of 180 lb. to 200 lb. are common. Abroad quite a number of boilers are working at pressures between 500 lb. and 1,000 lb. per square inch, and even a few boilers have been constructed for a pressure of 3,000 lb. per square inch.

The design, workmanship, and inspection have been progressively improving to meet the more exacting conditions under which high-pressure boilers are worked.

Boiler explosions often attributed in the early days to inevitable accident would, in the light of our knowledge to-day, be put down to gross negligence. A boiler explosion due to avoidable causes is very rare to-day. For the ten years prior to 1905, there was only one boiler explosion in New Zealand for the 38,976 boilers inspected. In 1911 it was reported that there had been only two explosions in the last twenty-one years, and that over 70,000 boilers had then been inspected. Since 1911, 173,324 boiler inspections have been made, and there has been one explosion since this time resulting in one death, and two explosions which did not cause any personal injury.

In 1888 complaints were being made as to the incompetency of many of the drivers then in charge of traction engines, which were rapidly superseding the horse-drawn portable engine.

In 1894 provision was made in the Act for the examination of engine-drivers of locomotive and traction engines, and drivers of winding-engines, and for the issue of appropriate certificates to applicants passing the examinations. In 1900 a similar provision was made for engine-drivers of stationary engines other than winding-engines, and for the issue of an Extra First-class Engineers' Certificate to applicants who were trained engineers and had a superior knowledge of the design and operation of steam machinery. Certain marine engineers' certificates are also accepted as equivalent to stationary engine-drivers' certificates. The Department's experience is that this requirement that persons responsible for the safe operation of boilers and engines should hold certificates has had very beneficial results. Holders of certificates generally realize the responsibility which rests on them for the correct operation of boilers, and they are deserving of some of the credit for the good results attained in respect to the safety of boilers. Approximately 17,000 certificates of competency granted under the Inspection of Machinery Act have been issued to date.

Subsequent Machinery Legislation.

The remarkable development of machinery driven by mechanical power during the last sixty years is well known. It is not surprising, therefore, that as new kinds of machinery were made for an increasing variety of manufacturing processes, the schedule in the original Act defining the class of machinery subject to inspection should have been extended. New sources of power, such as gas, oil, and electricity, greatly assisted in this development. It was in 1896 that machinery driven by electricity was first made subject to inspection. Four years later, machinery driven by gas, gaseous products, and compressed air was also defined as machinery subject to the Act and brought under inspection. In 1908 machinery driven by hand or animal power was excluded from the provisions of the Act. At the present time machinery driven by power of 1 h.p. and under and farm machinery not exceeding 6 h.p. are also exempt from inspection. In respect to the farm machinery, however, an owner who permits the moving parts of any such machinery to be used without being guarded is liable to prosecution.

In 1908 all vehicles propelled by steam and all motors whose weight unladen exceeded three tons were brought under the Act. In 1928 an amendment was made to the Act limiting its application to steam wagons and other special types of steam-driven vehicles.

In 1927 the standard of safety for lifts and cranes was raised. These special classes of machinery are now required to conform to safety standards as regards design and construction, as well as to be properly fenced and guarded.

In 1874 a child of ten years of age could be employed in working machinery. In 1882 the age at which a young person could work machinery was raised to twelve years, and in 1902 to fourteen years.

Machines are being continually perfected to perform speedily most complicated operations, and special safety devices, often of an automatic nature and of intricate design, are essential to reduce the risk of serious accidents. The technique of safeguarding has kept pace with this development and safety engineering is now recognized as an important factor in the prevention of accidents.

Most countries have now standards of safety for the protection of machinery workers.

A few examples of many may be quoted to illustrate the progress that has been made in safety requirements. The case of lifts will be mentioned first, as certain types of this class of machinery may be safely operated by the most inexperienced person. In the early days lifts were operated by hydraulic power, the lift-cage was often supported by a fibre rope, no safety grips were fitted to hold the cage in the event of the rope breaking, the cage often crept away from the floor landing if left unattended for long, and the cage-floor could only be levelled with the landing-floor with difficulty. Cross bars were generally the only means provided to prevent falls down the lift-well, and they were probably seldom used.

To-day the great majority of lifts are operated by electric motors. By pressing a button after closing the lift-well gate, and only when the gate has been properly closed and locked, a passenger is transported at a predetermined speed to the desired floor landing, with the lift completely beyond the control of any one outside of it, and lands at his destination with the cage-floor level with the landing-floor. He is lifted or lowered by two or more steel wire ropes attached to the cage, and should the remote possibility occur of all the ropes breaking simultaneously, the cage is automatically prevented from falling. In addition, overspeed and other supplementary safety devices are fitted.

Power-driven presses are a class of machinery which are often dangerous and a fruitful cause of accident. They cannot always be made absolutely safe, but, as an instance of what can be done, an official of the Home Government a few years ago reported that a certain owner was so confident that his small presses had been rendered practically fool-proof that he actually employed two blind girls on them. After a few months' training one of them was able to earn about 25s. a week.

Wood-working machinery is another class of machinery for which a very high standard of guarding is essential.

Another indication of progress is the practice of some designers and manufacturers of incorporating the safety-devices in a machine during its construction. It is most difficult and sometimes impossible, especially in the case of machines requiring automatic safety-devices, to add a satisfactory safety-device to a machine after it has been made. Unfortunately, it is the case in some instances that many such machines are offered at two prices, one with and one without safety-devices. Since 1928 the Act has given an Inspector power to require machinery to be properly guarded before it is sold.

Accidents.—For the year 1933–34 the numbers of machinery accidents reported were seven fatal and thirty-three non-fatal. Only accidents involving loss of life or serious bodily injury to any person are required to be reported. The number of machines inspected in the period is not definitely known, but would not be less than 65,000.

The circumstances contributing to each accident are carefully investigated and any measures which are considered to be reasonable and necessary for the prevention of a recurrence of a similar accident are adopted.

Notwithstanding, however, the progress that has been made in mechanical safeguarding, accidents continue to occur. The majority of present-day accidents are due to failure of the human factor—for instance, to such failings as inattention, lack of skill or experience, unfit physical condition, ignorance of safety practices, or disobedience of safety instructions. Far too many accidents occur through workers approaching moving machinery normally out of reach. If more interest were taken by employers and workers in the prevention of accidents due to human fallibility, an improvement in the accident rate could be made. In this connection the following resolution adopted in 1928 by the International Labour Conference held at Geneva, and fully supported by British employers and workers, is of interest: "The Conference is of the opinion that the time has come to attempt to reach a higher standard of safety by the development of new methods, and believes that the greatest advance can be made on the lines of the movement which has received the name of the 'Safety First' movement, and which applies in its application to industry—(1) The recognition of accident prevention as an essential part of the organization of the works; (2) common interest and endeavour on the part of employers and workers in the individual works in seeking to promote a higher standard of safety." Steps to encourage the formation of safety organizations in Great Britain have already been taken by the Home Office. Space will not permit further information being given here.

Administration.—To the Parliament of 1874 is due the credit of taking the first steps in accident-prevention work in New Zealand.

From 1874 to 1880 the Inspection of Machinery Act was administered by the Minister of Public Works; from 1880 to 1892 it was under the control of the combined Departments of Marine and Customs; from 1893 to 1898 it was again transferred to the Public Works Department; from 1899 to 1901 it was again controlled by the combined Departments of Customs and Marine; from 1902 to 1914, the Inspection of Machinery Department had a separate identity; and since 1914 it has been under the control of the Minister of Marine. Inspectors of Machinery have always held the dual positions of Inspectors of Machinery and Surveyors of Ships.

In the final analysis of a necessarily brief review of the history and progress of the inspection of machinery legislation and the engineering measures taken for the prevention of machinery accidents, one may ask whether it has all been worth while and beneficial in its results to employers and workers. It is now an established fact that "safety" pays. It has been authoritatively stated that the total cost to an employer of an accident to a workman is four times the direct cost—that is, four times the cost of medical and compensation costs. There is also the monetary loss to the victim of an accident to be taken into account even when he receives some compensation, and also the physical and mental torture suffered by him and his dependants. An industry which has an unduly high accident rate must pay higher insurance premiums; it cannot maintain uninterrupted production and quality of work; it does not attract a good class of workman, and cannot, therefore, produce efficiently and cheaply. There is evidence in the voluntary support given by them to national safety first associations that enlightened industrialists support this view.

Acting on the lessons learned from these accidents and by the dissemination of knowledge by the Inspecting Staff of the technical appliances necessary for safety, the Department hopes to retain the confidence and co-operation of machinery owners and workers, and anticipates that accidents will continue to decrease in number and severity as they have done in the last sixty years.

Examinations of Land Engineers, Engine-drivers, and Electric-tram Drivers.

These examinations were held at the various offices of the Inspectors of Machinery throughout the Dominion at the regular intervals provided for in the regulations. In addition, a few special examinations were granted, but the holding of special examinations is not encouraged, as it is considered that the regular examinations are of sufficient frequency, and, except in very exceptional circumstances, candidates are expected to arrange that they may attend the scheduled examinations.

The full list of places where the examinations were held is shown in an appended return, as also is the number of candidates examined at each place. The classes of certificates for which examinations were held were—Extra first-class stationary engineer, first-class engine-driver, second-class engine-driver, steam winding-engine driver, electric winding-engine driver, locomotive-engine driver, traction-engine driver, locomotive- and traction-engine driver, electric-tram driver, and electric-tram driver (one-man car).

The total number of candidates examined was 311. Of this number 216 were successful and 95 failed in their examinations. 252 certificates were issued, which includes 216 to successful candidates in their examinations, the remainder being replacements and issues under the provisions of sections 53, 59, and 62 of the Inspection of Machinery Act, 1928.

Prosecutions.

During the year proceedings for offences under the various statutes administered by the Department were instituted in 32 cases. Prosecutions under each Act were as follows: Fisheries Act, 24; Harbours Act, 1; Shipping and Seamen Act, 4; Inspection of Machinery Act, 3.

Fisheries.

The report of the Chief Inspector of Fisheries, which is appended, deals exhaustively with the operations of this Division during the year.

The sale of rock-oysters for the 1933 season showed an increase on the sales of the previous season, the number of sacks marketed being 4,717, and the proceeds of sales £5,336 19s. 3d., as compared with 4,414 and £5,046 17s. 8d. The quality of the oysters was, on the whole, very satisfactory.

Whaling.

The position with respect to the International Whaling Convention is that it cannot enter into force until the ninetieth day following the receipt by the Secretary-General of the League of Nations of ratifications or accessions on behalf of eight members of the League or non-member States, including Norway and Great Britain. While some sixteen countries have deposited the necessary instruments of ratification or notices of accession, Great Britain has not yet done so, although advice has been received by Government that it is hoped to do it in the near future.

The Convention has been signed on behalf of New Zealand, and the necessary steps in the matter of ratification and of introduction of the necessary legislation will be taken in due course.

With respect to the local whaling-stations, that at Whangamumu took 3 whales only, and these were caught during the taking of a moving-picture film. These whales produced 3 tons of oil. The whaling-station in Tory Channel took 41 whales, giving a yield of 205 tons of oil. The total catch from the two stations in the previous season was 18 whales only, yielding 92 tons of oil. The decreased operations were, as stated in my last annual report, due to inability to dispose of the previous season's production. It is understood that sales had during the past year shown better results, and it is expected that the operations during the current season will be on a larger scale.

I have, &c.,

L. B. Campbell, Secretary.

REPORT ON FISHERIES.

SIR,—

I have the honour to submit my report on fisheries for the year ended 31st March, 1934.

A summarized statement as to the principal methods of fishing, the number of fishing-vessels and men employed, and the quantity of fish landed for the year at various ports is given in Tables I and II; and in Table IIA the quantities of different kinds landed are indicated for certain of the ports from which data have been obtainable. As will be seen by examination of these tables, the data on which they are based are not so comprehensive nor so categorical as one would desire. There are also variations in the degree of their approximation to accuracy according to the local facilities that exist for the collection of figures for the returns. Where the industry is a steady and well-established one with definitely known agencies for distribution the question of obtaining records of the annual quantities of fish handled is not very difficult. There are, however, certain places where the fishing industry though by no means negligible is so irregular and diffuse that it is impossible to get any reliable record of its operations.

Although by various methods, such as the collection of data from individual fishermen's log-books and from returns of fish of different kinds landed or handled at various fish depots, we have acquired for certain of the ports more detailed records of the results of fishing operations than hitherto, we still lack the means of obtaining data of real statistical significance on which to base statements that may be considered as satisfactorily elucidating the main features and trends of the industry. The principal defect is the absence of information about fishing power and the time factor in relation to the quantities of fish landed; for is is obvious that the quantity of fish caught will depend on the abundance of the stock in the area fished, the efficiency of the method (fishing power), and the duration of the time spent in fishing operations.

From the collation of returns obtained from local inspectors of fisheries for the purpose of this report the approximate quantities and values of the chief categories of fishery products for the year have been estimated as follows:—

	Quantity.	Value. £
Wet fish	313,319 cwt.	283,107
Whitebait	2,118 cwt.	10,993
Dredge oysters	42,176 sacks	21,088
Rock-oysters	4,717 sacks	5,254
Mussels	4,888 sacks	1,309
Crayfish	8,922 cwt.	5,494
Toheroa (canned products)	1,433 cases	2,832
Whale products—		
Oil	208 tons	3,095
Fertilizer	Nil.	..
Quinnat Salmon (netted fish only)	13,527 lb.	507
Total value		£333,679

In addition to the above it is worthy of note that the returns from Auckland include 13 cwt. of shrimps at £48 and 13 sacks of scallops valued at £10, besides 31 cwt. of sardines valued at £4, indicating an increased tendency to utilize for market purposes certain minor products of the sea which have formerly been ignored or only harvested by amateur fishermen.

Reviewing the broad features of the greater commercial fisheries, one finds in comparison with the previous year that an appreciable increase is shown for every section with the single exception of whitebait, of which the quantity taken has greatly declined.

The Auckland returns are the most comprehensive and the most uniform in comparison with those of previous years. The total quantity and value of fish landed here show an increase—91,512 cwt. and £65,498 compared with 82,758 and £59,617 for the year 1932–33. Snapper and tarakihi landings have increased appreciably, but the flounder fisheries have produced a much smaller yield. The following shows the quantities of flounders (including dabs) landed at Auckland and Thames in the last four years:—

——	1930–31.	1931–32.	1932–33.	1933–34.
	Cwt.	Cwt.	Cwt.	Cwt.
Auckland	2,549	4,201	10,452	6,607
Thames	6,889	7,228	6,516	4,869

The figures would have more significance if the returns were capable of being analysed so as to show the average catches per day's fishing of representative boats.

The increased yield of snapper is to some extent connected with the greater range of the Danish-seining vessels and the exploitation of new grounds, aided by the generally favourable weather of the last year. The flounder fisheries have been continuously pursued on very much the same grounds and, while the intensity of fishing was increased from 1931–32 to 1932–33—when the fishing was very good—it does not appear that there was any diminution in intensity of fishing from 1932–33 to 1933–34.

The fact is that the fish on the grounds were fewer and catches were less. A significant and perhaps ominous feature of the fishing is that the best catches were made in the month of August, which is the height of the spawning-season for dabs and flounders.

Three steam trawlers operated from Auckland, but the "Serfib" was lost on the 8th June, 1933. No trawling took place in the month of December, and the intensity of fishing throughout the year was equivalent to the continuous operation of one trawler—*i.e.*, 12 trawler-months compared with 15½ trawler-months in 1932–33 and 27 in 1931–32. The operations were divided fairly equally between the outer part of the Hauraki Gulf and the East Coast Grounds (Bay of Plenty to East Cape).

Observations on the spawning of snapper were made by Captain Daniel, who took tow-nettings from the area between the Noisies and Kawau on the 4th December and on the 21st January. The region of greatest spawning activity as indicated by the density of the occurrence of the floating eggs was an area of about twenty to thirty square miles immediately to the eastward of Tiritiri with surface-water temperatures from 18° C. to 18·9° C. (64·5° to 66° F.) on the 4th December, and 19·0° C. to 20° C. (66·2° to 68·0° F.) on the 21st January. Anchovy (*Engraulis australis*) and horse-mackerel (*Trachurus novae-zelandiae*) eggs were taken in the tow-net, together with the snapper eggs. Ripe flounders and dabs of both sexes were obtained on the "Dab Patch" (midway between Ponui Island and Deadman Point) for the first time on the 8th August. This year the spawning period of these two species nearly coincided, the dabs being slightly the earlier. By the end of August the majority of both species had finished spawning.

A very limited amount of fishing for sardines took place, about 31 cwt. taken by fishing with a bright light being landed at Auckland in October and about 50 cwt. caught by drift-net in daylight were landed at Thames.

Lack of demand for fish with consequently depressed prices brought about a reduction in the strength of the fishing fleet at Thames, especially of Danish-seiners, but the quantities landed have not fallen off so much as might have been expected. The total landings for the last three years were

1931–32	..	..	21,291 cwt. valued at £21,116.
1932–33	..	..	18,078 cwt. valued at £14,029.
1933–34	..	..	17,412 cwt. valued at £13,595.

The poor demand for fish at Thames caused a reduction in the number of line-fishing boats operating at Mercury Bay, where, however, eighteen boats worked at crayfishing to supply the demand brought about by increased requirements for canning and for export.

The Hawke's Bay fisheries are reported to have been very good on the whole so far as trawling operations were concerned, flatfish, particularly soles, being in abundance from December to March while some large catches of tarakihi were landed in June and July. Prices have been poor, however, the quantities landed frequently exceeding the local demand which has been supplied to an increased extent by fish caught by long-shore men and sold by hawking. Post-earthquake difficulties arising from the loss of proper harbour accommodation continue to be a source of trouble and expense to the trawler fleet.

Of the principal trawler fish landed at Wellington, tarakihi, which comes first in abundance, shows an increase over last year's landings, as also do snapper, moki, and barracouta. Hake catches by this method of fishing have been very much less, and the total quantity of all kinds of deep-sea trawled fish has been slightly less than last year.

The fish-carrier "South Sea," whose first landing in February, 1933, was recorded in the annual report for last year, has continued to land at Wellington once or twice each month throughout the year, with the exception of April, 1933, and January, 1934. Blue cod to the amount of 10,085 cwt. and 487 cwt. of groper caught by Chatham Island fishermen and frozen on the "South Sea" were shipped during the year, and 6,679 cwt. of blue cod were frozen on the island for subsequent shipment to Wellington. The bulk of this fish was exported to Australia. Considerably smaller quantities of blue cod were consigned to Wellington from the French Pass than in previous years, the demand having been weakened owing to the competition of the above-mentioned supplies from the Chatham Islands. Moreover, the French Pass fishing-grounds are considerably less productive than they were a few years ago. Unfortunately no precise records are available. A further report of depleted fishing-grounds, obviously well-founded but without any definite quantitative evidence, is to hand with reference to the Nelson fishing industry. Here it is the flatfish grounds of Tasman Bay and Admiralty Bay, which formerly yielded abundant catches, that are now described as "played out." These fisheries in recent years have been continuously worked by Danish-seiners, whose operations have increased in intensity as the prices and catches diminished. According to our annual returns the numbers of whole-time Danish seiners at Nelson during the last five years have been as follows: 1930, 2; 1931, 2 (?); 1932, 7; 1933, 12; 1934, 13.

It would appear that only a relatively small proportion of the total area of Tasman Bay is suitable for Danish-seining operations. The middle of the bay is said to be too rough to work, and therefore these operations tend to be concentrated on the inshore grounds which are smooth and of course more sheltered in bad weather when the wind is off the land. It is possible that the grounds unsuitable for seining may also be naturally deficient in fish. A rational fishery exploitation can only be guided by an adjustment of fishing intensity (or fishing restriction) to the available stock of fish in the area; which adjustment can only be made on the basis of knowledge derived from a statistical study of fishing operations and their yield, preferably supported by biological facts about the fishes. The former alone would go a long way towards elucidating the conditions, and, indeed, would of itself bring to light important biological facts as to the occurrence of the fishes without very much in the way of additional special observations.

The fisheries of Canterbury and Otago ports have shown an improvement on the previous year's operations, though prices have remained low except when rough weather brought about a temporary shortage of supplies. In spring and summer the markets were frequently oversupplied, and serious losses to the fishermen would have occurred but for the sales to exporters. The fishermen established in the more remote places on the Otago coast have, generally speaking, had good fishing, but their business is seriously hampered by transport limitations and by difficulties arising from lack of good harbour facilities. One fatality occurred, when a launch was wrecked on the bar at Taieri Mouth in July.

A general review of the conditions reveals how the financial stringency of the times has had its effect on the fishing methods employed. The personnel of the industry contains a large proportion of recruits who followed other occupations prior to the slump. These are for the most part dinghy or shore fishermen who fish very intermittently and whose catches, being hawked locally, are not usually included in our returns. A diminution in the employment of fishing-vessels of the highest class as regards capital value as well as fishing-power and working-expenses is shown in the further decrease in the operations of deep-sea trawlers, apparently brought about by the fall in prices. In 1927 six steam-trawlers of the North Sea type were in practically continuous commission. This year, though three vessels of this type were based on Auckland, it was only for a very short period that as many as two were in operation at the same time; and only one steam-trawler worked from Wellington. Other steamers engaged in trawling from such ports as Napier, Lyttelton, and Port Chalmers are small converted vessels originally built for other work and not to be classed as deep-sea trawlers according to the standards of the Northern Hemisphere. Considering that the large trawlers kept several hands in employment and consumed coal produced by New Zealand labour, and, moreover, kept the markets supplied with fairly uniform amounts of mixed fish, it is a matter for regret that their activity has shown a decline. On the other hand their fishing-power had certainly been such that with a limited area of ground available for exploitation there was some danger of depletion from overfishing. Visits of both steam-trawlers and Danish-seiners to inshore grounds fished by local line fishermen have given rise to complaints and protests from various districts. The difficulty is that practically all the best fishing-grounds are comparatively close to the land and must be exploited by the more intensive methods if supplies of fish to the larger ports are to be maintained. There is, moreover, the additional problem of keeping a proper surveillance over "prohibited" areas for which our fisheries protection organization is already inadequate and indeed in most districts non-existent.

While steam-trawling has declined, Danish-seining has increased and developed. In the early days small motor-launches of about 35 ft. in length were generally employed for this fishing. In the last year or two several bigger and more seaworthy vessels have been specially built, with a wider field of operation and the ability to work in weather which was formerly regarded as impossible. Moreover the installation of Diesel engines in place of the benzine or petrol consumers of a few years ago has effected marked economy in propulsion and has also extended their range. Some trawling and line-fishing vessels have also added to their efficiency and economy by the same change.

Generally speaking, the Danish-seiners are decidedly the most efficient and productive of all fishing-vessels in the Dominion. In the Auckland vicinity considerable restrictions have been imposed on their operations by closing certain areas to this method of fishing, and there is at least ground for believing that it may be advisable to limit their operations in inshore waters off other parts of the open coast. Owing to the limited market there has been a considerable amount of voluntary restriction of fishing intensity in the last two years. At the same time, however, the low price of fish or increased scarcity has induced more of the most enterprising fishermen to take up this method of fishing. Unfortunately, a comprehensive appreciation of the situation has been prevented by the lack of statistical information to which reference has already been made. Snapper and flounder on the Auckland fishing-grounds and flounders and other flatfish on the Nelson and Canterbury fishing-grounds are the kinds most sought after and most affected by this method of fishing.

Hapuku or groper fishing in Cook Strait and off the Canterbury and Otago coasts is another special fishery to which more intensive methods are being increasingly applied. This kind of fish is becoming more and more difficult to catch. Formerly the market requirements could be supplied by hand-line fishing, but nowadays the majority of groper are taken by long lines. Each line carries several hooks, usually on wire snoods, a sinker being attached to the further end of the line and a buoy to the nearer end. Several of these lines may be fished by a single boat, and in fishing they are allowed to drift with the tide. Experience has shown that groper grounds which are fished in this way do not maintain their original productiveness for very long. An opinion very generally held by fishermen is that owing to the frequent loss of lines by this method of fishing—they sometimes drift on to foul ground and cannot be recovered—the groper are caused to leave the locality, being scared away either by the presence of dead fish on the lost lines or by the predatory fish such as sharks and blind-eels, which are thus attracted to the spot. This is a purely hypothetical explanation. In my opinion the more probable explanation is that the local depletion is largely a matter of the abstraction of larger numbers of the fish population by the intensified efficiency of the fishing operations. Even hand-line fishing, if carried on continuously, can have a marked effect in reducing the stock of fish, as is indicated, for instance, by the present condition of most of the blue-cod grounds in the Cook Strait region. It must, however, be recognized that an abundance of a certain species of fish may be due to especially successful natural reproduction or an abnormally high degree of survival of progeny, and conversely its impoverishment may be due to abnormal mortality of progeny. The occurrence of good spawning years and bad spawning years is well known, and the elucidation of the factors effecting such variation in the ultimate results of the natural reproduction of fishes have been

clearly demonstrated by fishery investigators in other parts of the world. They remain matters of obscurity with regard to New Zealand fishes, though statistical records of the fisheries, even without biological investigations, would have thrown a great deal of light on these questions. The same observation may be made with regard to our oyster, toheroa, and crayfish resources. In respect of oysters, it has not been difficult with our existing staff and with the willing assistance of those engaged in the industry at the Bluff to keep a satisfactory statistical record of the results of the dredging operations in Foveaux Strait, which prevents us from entertaining either any anxiety on the score of the rational conservation of the stocks or, what is equally undesirable, any unfounded optimism as to the possibilities of enormously augmented exploitation. There are—or have been—other oyster-beds, of less extent but nevertheless of definite economic value, in other parts of the coast, of which very little is known in the Department, which have been exploited in an uncontrolled manner and to an unknown degree. The question of their better control and possible development is worthy of serious consideration.

Exports.—The statistics provided by the Customs Department and shown in Table V give the main features of the export trade during the year. A very appreciable improvement is seen in every important category. The total value of New Zealand fish and shellfish exported amounts to £98,417 compared with £51,321 for the preceding year. The general trend over the last five years is indicated in the statement which follows:—

	1929–30.	1930–31.	1931–32.	1932–33.	1933–34.
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
Frozen fish	22,760	17,678	14,098	19,584	34,738
Fish smoked, dried, pickled, or salted ..	414	1,128	638	521	1,243
Potted or preserved in tins—	lb.	lb.	lb.	lb.	lb.
Oysters	20,316	15,079	69,497	51,620	128,028
Other kinds	109,172	87,063	112,138	103,186	384,282

As to the causes of this increase, the operations of exporters have doubtless been stimulated and assisted by the lowering of prices brought about by the impaired purchasing-power of New Zealand consumers. While the fishermen's loss has thus been the exporters' gain, it must be recognized that, but for their presence and the effect of their requirements in saving the market from the losses arising from gluts, the returns to fishermen would in many cases have been insufficient to pay for working-expenses. A further important reason for the improvement in the export trade in fish is that some merchants are realizing that the key to better business is better quality. Improved methods of freezing have been adopted and more attention given to the careful cleaning and handling of fish for export than was the case under the easier trading conditions of former years. There is, however, still much room for improvements in this direction, improvements which are hindered by lack of suitable modern plants for fish refrigeration. It cannot be doubted that the trade in the future will come more and more into the hands of those who are by virtue of their equipment and organization in a position to bring the best-quality fish to the consumer, whether in New Zealand or overseas; and quality for export depends more on careful handling, rapid freezing, and proper transport than on anything else.

Among the items shown in Table V it will be seen that the greatest increase is shown for the vaguely defined category of "Other kinds, frozen." Under this heading will be included the exports to England of frozen crayfish tails, a comparatively new branch of the industry which will be the subject of further remarks later in this report.

Rock-oysters.

Oyster-picking for the 1933 season began on the 22nd May and closed on the 6th September. The number of sacks taken from the different areas was as follows: Bay of Islands, 1,762; Kaipara, 853; Hauraki Gulf, 1,802 (Takatu to Gull Point, 192; South Shore, Tamaki Strait, 56; Kawau, 144; Rakino, 168; Rangitoto, 385; Motutapu, 117; Brown's Island, 24; Motuihi, 28; Waiheke, 555; Ponui, 133; Coromandel, 300: total, 4,717 sacks; value, £5,254.

The beds in Whangarei Harbour, Manukau Harbour, on Great Barrier Island, and on Pakihi Island were not picked this season.

The quality of the oysters marketed, though not reaching the very high standard of the previous season, was very satisfactory on the whole, and the sales exceeded those of 1932 by 303 sacks. Increased use of washing-machines was made, two being in operation at the Kaipara and one at the Bay of Islands.

Oyster-cultivation.

From the necessity of keeping down expenditure this year the cultivation work was reduced to a minimum, and with the exception of the transference of oyster-bearing stone from Kawau and Mahurangi, the replacement of some of the capstones shifted in the course of this work and the deposit of clean stone at Timber Bay, Kaipara, the operations shown in the statement given below were

carried out by the Inspectors in the course of their ordinary duties. The following shows the nature and amount of the work done in the different areas and cost of the same :—

Area, Work done, and Cost :—

I. Bay of Islands : 5,000 borers destroyed. Cost, nil.

III. Kaipara : 2,537 square yards of clean rock moved to the oyster zone. Cost, £48 13s.

IV. Takatu to Gull Point : 78,500 borers destroyed ; 242 pupu destroyed ; 80 yards of rock cleared of dead shell ; 226 sacks of clumpy oysters and 408 capstones transferred to Coromandel. Cost included in sum shown below for Area VI.

VI. Coromandel : 154,240 borers destroyed ; 1,730 pupu destroyed ; 344 square yards of drift-beds formed from the 226 sacks of clumpy oysters transferred from Area IV ; 1,068 capstones transferred from Areas IV and VII. Cost £27 12s.

VII. Kawau : 36,100 borers destroyed ; 124 pupu destroyed ; 660 capstones transferred to Coromandel and 275 yards of walls rebuilt and recapped. Cost, £7 10s.

XIII. Waiheke : 385,100 borers destroyed ; 1,302 pupu destroyed ; 11 yards of rock cleared of dead shell. Cost, nil.

XIV. Ponui : 191,400 borers destroyed ; 123 pupu destroyed. Cost, nil.

All areas : 850,340 borers destroyed ; 3,521 pupu destroyed ; 91 yards of rock cleared of dead shell ; 226 sacks of clumpy oysters transferred to form 344 yards of drift beds ; 1,068 capstones transferred to fresh beds ; 2,537 square yards of clean rock moved down to the oyster zone ; 275 yards of walls rebuilt and recapped. Total cost, £83 15s.

The cultivation work was carried out under the general direction of the Marine Biologist, Mr. M. W. Young. The principal undertaking was the transfer of stones or small boulders bearing numerous but small-sized oysters from the consistently reproductive stocks on Bon Accord, Kawau, and Mahurangi Harbour to the scantily stocked beaches in the Coromandel Peninsula. From subsequent inspections made by the Marine Biologist the transplantations appear to have succeeded. The new colonies show no appreciable losses ; but it is too early yet to see any reproductive effects.

The cultivation experiments begun in 1927 and since continued in a more systematic form by Mr. Young have now reached a stage at which definite conclusions may be drawn. A detailed report by the Marine Biologist will be available at an early date, and only a brief outline of the experiments need be given here. In the annual report for the year 1927–28 reference was made to certain methods which had been successfully adopted in Australia, where stakes are fixed on which oyster spat settles and develops to the half-grown oyster stage. These small oysters are than transfered to "trays" made of galvanized wire netting stretched on a rectangular frame supported by uprights, and placed so as to be submerged by the rise of the tide. The level at which they are placed is chosen by experience of results in growth and fattening that have been observed on natural beds or from previous trials. In Australian waters, especially in Georges River and Hawkesbury River, New South Wales, the oysters transferred to these trays reach a marketable size and a good edible condition in a comparatively short time, and this method of cultivation is the basis of a substantial industry. An account of this industry by Mr. M. W. Young was published as Appendix II in the Fisheries Report for the year ended 31st March, 1929.

Our experiments began in 1927 with a series of preliminary trials in which cheaply constructed trays were used to test the suitability of localities and to ascertain the nature of the various complications that were likely to arise in practice. These preliminary experiments were made in Kaipara Harbour, Mahurangi Harbour, Bon Accord, Kawau, and the Bay of Islands.

Stunted oysters, taken from mangroves or from overcrowded beds in the high-water zone, where reproduction is copious but growth and fattening unsatisfactory, were used for the trays. The results obtained showed that an appreciable increase of growth could be obtained, and in many cases the oysters reached a stage where they were satisfactory for eating, but they did not fatten so early in the season as the natural oysters on the rocks of the foreshore. Thus comparatively few were available for sale during the open season, and many were lost through the collapsing of the trays. In some cases the silting that was induced by the presence of the trays in the tideway caused considerable loss. It was evident that a more constant supervision than was possible in some of the remote and only occasionally visited places chosen for our experiments, in order to correct displacement of the oysters and repair and renew the eroded or teredo-bored material of the trays, would be necessary for success in this method of cultivation. It would also be necessary to market the oysters when they were at their best condition irrespective of season. It was found that the low-level oysters reached marketable size and condition most quickly, but nowhere were results obtained so quickly as in Australia where water temperatures are higher. The use of heavily galvanized wire and teredo-proof frames and supports was indicated. More difficulty than was expected was experienced in finding sites for the trays where there was sufficient depth of submergence at high water to produce the best growth and at the same time sufficient clearance and flow of water below the tray to prevent silting. The most promising results were obtained in the Kaipara and at Manaia.

A second series of experiments commenced in the Kaipara and in Manaia in 1931 has now been reported on by Mr. Young, who gives a careful analysis of costs and results. The conclusion arrived at is that this method of oyster cultivation is definitely unprofitable for New Zealand conditions though satisfactory in New South Wales where natural conditions and the constant presence of the cultivator make for better growth and fewer losses and where, moreover, the market price of the product is considerably higher.

The propagation of oysters on stakes is another feature of Australian cultivation which has been tried out with various materials, and the verdict of the Marine Biologist is that, until such time as we

can find some cheap timber that will retain its bark in salt water for at least three and a half years and at the same time resist the attacks of teredo, the method must be regarded as impracticable in New Zealand.

A series of experiments in which rock-oysters contained in wire cages were kept below the low-tide level has demonstrated that they will survive and maintain their condition in this zone. The experiment is being continued to ascertain what effects an abnormal environment will have on the shell-form of this species. The study of the fixation and growth of oysters at different levels and under different environmental conditions by means of observations on concrete slabs placed at selected points in different areas has been continued. Observation of the effects of clearing a portion of the rocky foreshore of "grape-weed" at two localities in the Bay of Islands has shown that this operation may be carried out with useful results for increasing the natural oyster-beds.

Dredge Oysters.

During the open season—from February to September inclusive—the Foveaux Strait oyster-beds were worked by the Bluff fleet of seven steamers. The landings for the season totalled 42,176 sacks of a wholesale value (estimated at 10s. per sack at Bluff) of £21,088. The number of landings averaged 93 per month with a minimum of 76 landings in April and a maximum of 105 landings in June. The catch per day remained fairly uniform with an average of 136·8 boxes, the lowest average per landing for the month being 127·4 boxes in April and the highest 145·2 in March (2·42 boxes = 1 sack = 3 bushels). The catch per landing (or per day's dredging) was evidently influenced by the market demand which was obviously lowered by the depressed purchasing-power of consumers.

The quantities of oysters landed yearly at the Bluff for the last five years have been as follows: 1929, 39,331 sacks; 1930, 42,744 sacks; 1931, 36,538 sacks; 1932 37,484 sacks; 1933, 42,176 sacks.

As will be seen from reference to Table V, an increased quantity of oysters was canned at Bluff during the 1933 season. There was also a marked increase in the quantity exported in the fresh state from this port—105,941 dozen, valued at £966, as compared with 22,560 dozen, valued at £200, for the previous year.

Toheroa.

After having suspended operations in 1932 owing to the depression, and more particularly to the slump in "luxury trades," the two North Auckland factories resumed canning in the winter of 1933, and a total of 453 cwt. of canned toheroa and soup was packed during the season. Six licenses for taking fresh toheroa for sale were issued in the North Kaipara district, but there is no record of the quantities obtained by these licensees. There is an increasing tendency for the general public to make use of the toheroa resources of the various beaches for their own consumption, and, generally speaking, an increasing tendency for the available stocks to diminish on the more accessible of the beds. The necessity of a more thorough system of patrol of toheroa beaches by fisheries officers for the more rigorous enforcement of the regulations and of a more comprehensive survey of the stocks is indicated.

Crayfish.

Although varying in the density of their occurrence according to locality and as a result of seasonal migrations, marine crayfish (or crawfish) may be found in fair abundance off the New Zealand coast wherever the bottom is rocky. In the past the principal and almost the only fisheries have been in connection with the supply of crayfish for retail in the larger towns. The demand has thus been limited, and there has rarely been any difficulty in meeting it except owing to rough weather.

Only in the vicinity of the bigger towns has anything like intensive fishing been carried on, and, although in these cases some depletion of fishing-grounds has evidently taken place, there has never been any doubt but that the potential supplies were considerably in excess of the demands made on them by the fishing. There has therefore been no apparent necessity for restrictive regulations regarding the catching of crayfish. The fishery has afforded a useful side-line to line fishermen and a means of earning a livelihood to those who have insufficient capital to lay out on the boats and gear required at the present day for the pursuit of the whole-time fisherman's calling.

Considerable developments in the crayfishing industry have to be recorded for the year now under review. These were to meet a comparatively new market for frozen crayfish tails in London. After starting in a more or less tentative way in 1932 the export trade grew very considerably in 1933. A precise knowledge of what the importer at home required was obtained through the medium of the High Commissioner's Office in London and circulated in the Dominion by the Department of Industries and Commerce. Increasing consignments were regularly shipped, and to supply the demand there was some increase in the number of boats and men pursuing this fishery and a prolongation of the fishing-season for most of the ports. Comparing this year's returns with those of the two preceding years it will be seen that the number of boats engaged was as follows:—

	Whole Time.	Part Time.
1931–32	11	115
1932–33	10	173
1933–34	3	196

These figures, however, do not truly represent the actual increase in the intensity of fishing. The boats returned as employed for the whole time are certainly not all whole-time crayfishing boats in the

sense that they work continuously at this fishery throughout the year, and there is of course a considerable variation in the amount of fishing done by those returned under the "part-time" category. The returns of the quantities landed have more significance, but these figures also require to be read bearing in mind the fact that it has been impossible to get anything like complete records. Except for the fishing port of Moeraki, there are no statistics of crayfish-landings for the whole Otago District, although from our general information it is known that a considerable amount of crayfishing was carried on at Puketeraki, Taieri Mouth, and Port Chalmers, and considerable quantities of crayfish were frozen for export at Port Chalmers and Dunedin. Crayfish were also canned at this centre.

The Comptroller of Customs has provided the following information regarding the quantity of frozen crayfish exported from New Zealand during the year ended 31st March, 1934:—

Exporting Port.	Quantity.	Value.
	Cwt.	£
Auckland	409	1,490
Lyttelton	297	1,367
Dunedin	2,022	6,431
Total	2,728	£9,288

The increased intensity of fishing arising from the demand for export may best be shown by taking four of the principal crayfish ports and comparing them for the two last years:—

Port.	1932-33.		1933-34.	
	Quantity.	Value.	Quantity.	Value.
	Cwt.	£	Cwt.	£
Auckland	1,051	1,033	1,587	1,420
Mercury Bay	148	147	2,348	1,072
Akaroa	50	25	1,197	834
Moeraki	50	20	2,600	1,260
Totals	1,299	1,255	7,712	4,586

The total quantity for those four ports has increased nearly 500 per cent. and the total value by nearly 300 per cent. The relative increase for Auckland is not so great, because this has always been an important retailing centre. Canning, as well as freezing for export, has stimulated the demand at Mercury Bay, where a considerable quantity was taken for the Zealandia Packing Co.'s factory at Whangaroa, and at Akaroa where Messrs. Irvine and Stevenson have resumed canning operations: the same company also obtained supplies from Moeraki for their Dunedin factory. It is interesting to note that an increased demand for the retail trade has also been indicated—probably owing to the availability of more steady supplies.

With the increased intensity of fishing, the question of whether it was not desirable to place some restrictions on the fishing in order to conserve the stocks became one of some urgency. There was ample evidence of a decline from the abundance of earlier years in cases where the crayfish grounds had been continuously fished. Two ways of "rationalizing" the fishery were suggested—(1) A size-limit (prohibiting the taking of crayfish below a certain length); (2) the protection of spawn by prohibiting the taking of female crayfish bearing spawn. Inquiries showed that the imposition of a size-limit would fall with different weight on the fishermen of different places. At one place, where crayfishing was the principal means of livelihood for the fishermen, a very high proportion of small crayfish occurred in the catches, and the suggested limit of 9 in. would have been a sore handicap to the none too prosperous fishermen. At other places the catches consisted almost entirely of large crayfish, and a size-limit would have made no difference. With regard to the spawn-bearing females, owing to seasonal migrations these occur in proportions which vary widely according to the season and the locality of the ground. In many cases the fishermen themselves voluntarily return to the water most if not all of the crayfish in this condition. Other fishermen cannot afford to do so.

A very comprehensive knowledge of the fishery and the habits of crayfish off different parts of the coast is necessary to enable one to apply restrictions that will be correct from the standpoint of conservation and not unnecessarily hampering to the fishermen, most of whom are at the present time only making a bare living out of their work. It seems likely, however, that in the near future it will be advisable to make regulations prescribing a size-limit and also providing for the protection of spawn-bearing females, or, alternatively, to have a close season, which, however, would require to cover a different period for different areas. Arrangements for a regular system of statistical returns of crayfish-landings are also very desirable.

The augmented prosecution of the crayfisheries received a check during the winter of 1933 owing to a set-back to the export trade arising from the oversupply of the English markets (which also receive considerable quantities from South Africa). The bulk of the crayfish landed in England were re-exported to France, where the demand for this commodity was considerable. A quota on imports of crayfish imposed by the French Government early in 1934 has brought a still greater check to the export of both frozen and canned crayfish. Although efforts have been made to increase the demand in England, it would appear that the present-day restraint of international trade will definitely limit the development of our new crayfish export industry for some time to come. From the point of view of conservation that is perhaps not altogether a misfortune. A recommendation for restrictive measures that will affect the earnings of fishermen is a serious responsibility at any time, and especially so in these times; but it is undesirable through either ignorance or inertia to assent to a wasteful exploitation of natural resources that should be preserved for posterity. Therefore we require the fullest possible understanding of the problem before any decision can be made with confidence.

Whitebait.

A synoptic view of the location of the principal whitebait fisheries and their production for the 1933 season is given in the tabulated statement which follows:—

Whitebait Fishery.

Inspector's Centre.	Rivers fished.	Method of Fishing.	Fishing began	Best Month.	Number of Fishermen. (Approximate.)		Total Quantity caught. (Approximate.)
					Whole Time.	Part Time.	
			1933.				Cwt.
Auckland ..	Lower Waikato ..	Hand-nets ..	1st July ..	September ..	60	50	386
Auckland ..	Kaituna and Tarawera (Bay of Plenty)	Hand-nets ..	Early in August	August and September	..	100	101
Napier ..	Tuki Tuki, Ngarururoro, Wairoa	Set-nets ..	July ..	October ..	30	50	38
New Plymouth	Mimi, Urenui, Mokau, Waitara, Waiwakaiho, &c.	Hand and set nets	August ..	September ..	(?)	100	85
Wanganui ..	Wanganui, Wangaehu, Waitotara	Hand-nets ..	1st July ..	October ..	(?)	(?)	9
Foxton ..	Manawatu ..	Set-nets ..	June ..	October ..	5	20	18
Blenheim ..	Wairau, Opawa, Tua Marina	Hand-nets ..	Late August	October ..	..	20	54
Karamea ..	Karamea, Little Wanganui	Hand-nets ..	September	November ..	..	50	82
Westport ..	Buller, Orowaiti ..	Hand-nets ..	July ..	October ..	4	40	127
Greymouth ..	Grey	Hand-nets ..	August ..	End of October and beginning of November	40	200	209
Hokitika ..	Hokitika, Teremakau, Arahura, Mahinapua Creek, Totara, Waihaha	Set and hand nets	August ..	October ..	..	105	309
Matainui ..	Maori, Jacobs, Waitangi, Wanganui	Set and hand nets	Late July	September–October	25	..	105
Christchurch ..	Ashley, Waimakariri, Styx, Avon	Set and hand nets	August ..	October ..	..	..	183
Dunedin ..	Taieri, Clutha, Shag, Waikonaiti	Hand-nets ..	September	October ..	(?)	(?)	369
Invercargill ..	Mataura, Oreti, Aparima, Makarewa	Set and hand nets	September	October ..	..	100	43
Total ..	..	..	..	..	..	..	2,118

The total catch appears to have fallen to less than half that of the previous season.

The Waikato fishery was again much below the average of previous years. The runs, though small, were fairly continuous, with no floods occurring to check them. The returns from the Kaituna and Tarawera Rivers in the Bay of Plenty represent a substantial but hitherto officially unrecognized contribution to the market supplies of this fish. The Hawke's Bay catches were rather below average and the deficiency has been ascribed to the prevalence of raupo fires on the banks of the Tukituki and Ngarururoro Rivers during the spawning-season. In the Manawatu the worst season for many years was experienced, and no cause for the diminution is apparent or has been suggested. On the other hand the whitebait fishery at the Onoke (Lower Wairarapa) Lake outlet was the best for several years, and bigger catches were obtained from the Canterbury rivers, especially the Ashley and Waimakariri, than for last year. The numerous whitebaiters on the Buller, Grey, Hokitika, and other Westland rivers experienced a very disappointing season, but some of their non-success was ascribed to the prevalence of flooded rivers. A Hokitika whitebaiter who had made observations during the previous spawning-season has stated that the principal spawning took place in the month of February, and that abnormal floods occurring while the eggs were on the river margin resulted in the spawn being covered with silt, which caused considerable mortality. Other known spawning-grounds were less "seeded" than in the previous year for no apparent reason other than shortage of parent fish. It was demonstrated that the principal spawning-area on the banks of Mahinapua Creek, a tributary flowing into the Hokitika

mouth, was subject to the damaging effects of grazing cattle, and that the only patches of suitable spawning-ground left were under gorse-bushes where the herbage could not be trodden or closely grazed by the cattle. The gorse in fact was saving the situation so far as whitebait propagation was concerned.

It is to be deplored that the occurrence of satisfactory spawning conditions is still purely a matter of chance in the case of this species, which investigations have shown is particularly affected by conditions arising from settlement and agricultural developments, but which, as explained in previous reports, is nevertheless amenable to comparatively simple conservational measures. There is good ground for concluding that money spent on the protection and development of the whitebait fisheries would result in increased production. By imposing a system of license fees for commercial whitebait fisheries, it could be obtained from those who would benefit from its expenditure, and the surveillance and administration of these fisheries—at present a difficult task and in many cases ineffective—would be considerably facilitated.

Quinnat Salmon.

Following a poor fishing-season, considerably marred by floods but also unattended by any big runs of fish, the trapping operations in the Hakataramea in winter were not expected to produce a big yield of salmon for stripping, and it was perhaps fortunate that no ova were required for distribution to other rivers. The Waitaki River was still 4 ft. above its normal level at the end of the angling-season (in the middle of May). The Hakataramea River, on the other hand, was 2 in. below its lowest summer level for the past three years. Thus instead of there being a good flow of water from the mouth of the Hakataramea its waters were backed up and forced into an old flood-channel from which they merely percolated through shingle-beds to the main river. It was not until the Waitaki had fallen considerably, so that the tributary river could resume its old mouth, that the first quinnat salmon entered the Hakataramea on the 25th April.

The building of the rack was begun on the 28th April, and the first salmon was taken and stripped on the 30th of that month. The numbers of fish and ova taken in each month were as follow :—

	Males.	Females.	Ova.
April	10	4	14,000
May	93	99	389,000
June	3	7	14,000
Whole period	106	110	417,000

Of the fry hatched out, 7,000 were kept for rearing in the ponds, to be marked before liberation as yearlings, and the rest (about 400,000) were liberated in the Hakataramea River.

Among the quinnat salmon taken in the trap in the Hakataramea in May were three marked fish, all females and each weighing 12 lb. after stripping. These fish had been hatched in 1930, and 6,042 were marked as yearlings by clipping off the adipose and left ventral fins before being liberated in the Hakataramea in the autumn and winter of 1931. They had thus grown from an initial length of about 8 in. to 30 in., or from a weight of one or two ounces to over 12 lb.—which was their weight after the eggs had been taken from them—during their two years of sea-life. An examination of the scales showed that the number of winters indicated by the zones of growth on the scale corresponded with the known age of the fish. This experiment thus provided a useful confirmation of the reliability of the scale-reading method for the determination of the age of our quinnat salmon.

The deficiency of the run of salmon into the Waitaki system in the winter of 1933 was demonstrated by an examination of the Ahuriri and some of the smaller tributaries where, it was reported, not a quarter the number of fish were seen on the spawning-beds that were there in the previous year, nor did they ascend so high. An inspection of the Waitaki River immediately below the Hakataramea confluence in July, when the river was very low, showed that a considerable amount of spawning had taken place in that portion of the main river, but several "redds" had been left more or less "high and dry" by the receding of the river from its earlier volume and breadth, and most of the eggs seen in them were dead. This evidence, provided by a very partial inspection, strongly suggests that a very considerable amount of loss may take place by such variation in the volume of the river after the spawn has been deposited. More extensive and detailed examination of redds and a study of the variation in river conditions might very well be the subject of definite investigation.

The quinnat angling-season of 1934, like that of the previous year, has been a disappointing one. Last year the prevalence of floods accounted for the small catches of the rod fishermen, but the same cause cannot be ascribed this year, although the middle of April, when good quinnat fishing is usually obtainable, was a period of very heavy floods in the big Canterbury rivers. At the beginning of the season many anglers were inclined to attribute their lack of success to the low state of the rivers and the exceptional clearness of the water. Fish were reported to be travelling and not lingering as long as usual in the lower reaches, and this was to some extent corroborated by the reports of more fish being caught in the upper parts of some of the rivers. However, so far as conditions in the fishing-season were concerned, reports from the principal salmon rivers—Waimakariri, Rakaia, Rangitata, and Waitaki—all indicated that the runs were below the average abundance of previous years. The fishing on the Rangitata was described as the worst experienced since the salmon became established. Mr. James

Lewis, of Arundel, has suggested that the reduction in the number of salmon running this year was caused by damage to the spawning-beds brought about by the exceptionally heavy floods of three years ealier. There seems to be a strong probability that this is correct, for the Opihi, a river whose watershed does not extend to the high mountain ranges and which is therefore not affected by the norwesters which flood the big rivers, shows an increasing run of quinnat salmon. Mr. F. W. Pellett, Inspector of Fisheries, Temuka, reports 142 fish caught in the Rangitata for the season for thirty-one rods, the largest being 32 lb. and the average weight 18 lb. He points out that there were more fishing-days but fewer fish caught than last year, when approximately 360 were taken. Salmon began to run into the Opihi River on the 6th February and finished at the end of April, during which time 180 fish were taken by anglers, the largest weighing 37 lb. In the Waitaki odd salmon were seen entering the river early in December, and they ran fairly steadily throughout February and March, but never in large numbers. The recorded catches of seven rods fishing the lower Waitaki amounted to 24 male and 16 female salmon, averaging 16·4 lb. in weight. The largest was a 37 lb. male and the smallest a 3 lb. male. All were caught between the 4th March and the 9th April. A large proportion of small fish has occurred in the runs in all the rivers this year, and this would appear to hold out prospects that next year's run, which will contain the later-maturing majority of the same generation or year-group, will be more numerous. There is some ground for thinking that the ripening of the sex organs was rather later this season than usual and that this had some effect on the movements of the fish.

The usual summary of returns made by rod fishermen holding selling licenses and by the four net fishermen licensed to operate in the Waimakariri is given below, this year the Opihi River being included for the first time.

Quinnat Salmon, 1934.

——	Males.	Females.	Sex not given.	Totals.
Returns from Rods.				
Waimakariri River, 22/2/34 to 15/3/34 (two rods)—				
Number of fish caught	10	6	..	16
Total weight of fish	163 lb.	114 lb.	..	277 lb.
Average weight	16·3 lb.	19·0 lb.	..	17·3 lb.
Rakaia River, 14/2/34 to 7/4/34 (three rods)—				
Number of fish caught	83	59	15	157
Total weight of fish	1,131 lb.	992 lb.	275 lb.	2,398 lb.
Average weight	13·6 lb.	16·9 lb.	18·3 lb.	15·3 lb.
Rangitata River, 13/2/34 to 5/4/34 (six rods)—				
Number of fish caught	41	31	2	74
Total weight of fish	628 lb.	558 lb.	21 lb.	1207 lb.
Average weight	15·3 lb.	18·0 lb.	10·5 lb.	16·3 lb.
Opihi River, 16/2/34 to 10/4/34 (one rod)—				
Number of fish caught	3	2	1	6
Total weight of fish	54 lb.	43 lb.	25 lb.	122 lb.
Average weight	18·0 lb.	21·5 lb.	25·0 lb.	20·3 lb.
Waitaki River, 13/3/34 to 3/4/34 (one rod)—				
Number of fish caught	3	4	..	7
Total weight of fish	41 lb.	90 lb.	..	131 lb.
Average weight	13·7 lb.	22·5 lb.	..	18·7 lb.
Combined rivers, 13/2/34 to 10/4/34 (thirteen rods)—				
Number of fish caught	140	102	18	260
Total weight of fish	2,017 lb.	1,797 lb.	321 lb.	4,135 lb.
Average weight	14·4 lb	17·6 lb.	17·8 lb.	15·9 lb.
Return from Net Fishing.				
Waimakariri River, 16/1/34 to 16/4/34 (four nets)—				
Number of fish caught	456	415	247	1,118
Total weight of fish	4,875 lb.	5,761 lb.	2,934 lb.	13,570 lb.
Average weight	10·7 lb.	13·9 lb.	11·9 lb.	12·1 lb.

The similar table given in the 1933 report shows a total of 298 fish, weighing 5,208 lb. for twenty rods, as compared with a total of 260 fish, weighing 4,135 lb. for the 1934 season for thirteen rods. In 1933 the catch per rod averaged 14·9 fish, or 260·4 lb.; in 1934, 20 fish, or 318 lb. This gives the impression of better fishing than in the previous year, but it should be noted that these are the catches of the most hard-working and probably the most skilful of the anglers. The statistics of the catches from the four nets operating in the Waimakariri River also show a somewhat better result than last year, when the total number of fish taken was 928, with a total weight of 12,318 lb. It seems likely that the better results in 1934 were due to more favourable river conditions. The numbers of fish caught by the nets in each month were as follows: January, 22; February, 377; March, 697; April, 22.

The first fish was caught on the 16th January and the last on the 16th April.

Atlantic Salmon.

High floods in the Waiau watershed during the whole of April and May, which kept the Upokororo River overflowing its banks and submerged the jetty on Lake Te Anau for a considerable time, enabled the early runs of salmon to get up the Upokororo before any trap could be operated. It was not until the 31st May that a pound net could be fixed in the river.

The first fish were taken on the 2nd June, but for the rest of the month only nine females and four males were captured, from which 13,000 ova were taken. The trap was taken out at the end of June, and the temporary staff consisting of two men ceased work.

During July a number of salmon came into the Upokororo and Eglinton Rivers. These were taken in the Southland Acclimatization Society's traps together with trout and yielded a total of 220,000 eggs. Several of the fish in the Eglinton run were considerably over the average size of the Upokororo fish in recent years, ranging from 8 lb. to 12 lb. in weight. It seems probable from the description given by the hatchery staff that these were sea-run fish. The ova were hatched out in the Te Anau Hatchery by the Southland Acclimatization Society, and from them 165,000 fry were liberated in the Upokororo River and 55,000 in the Eglinton River.

With regard to the fishing-season, it has been impossible to collect anything like comprehensive information. The fishing at Lake Te Anau has been described as disappointing, the majority of the fish taken being of small size. There has been an increasing tendency on the part of salmon anglers to confine their attention to the Waiau River between Te Anau and Manapouri. Some fair catches have been made, and this river fishing certainly yields sport of a higher class than can be obtained by trolling from a boat in the lake. For the 1933–34 season fishing from a boat was prohibited in that part of the lake between Blue Gum Point and the mouth of the first creek to the north of the Upokororo mouth as well as within a quarter-mile radius of the Eglinton mouth. Fishing with a spoon was prohibited in the Eglinton; the Upokororo River and the lake within a quarter-mile of its mouth were closed to fishing for the whole season. The daily catch for an angler on the Eglinton River was limited to three fish; elsewhere the limit remained at six as in the previous season. These measures have for their object the building-up of a stock of fish commensurate with the apparent carrying capacity of the Eglinton River and the restoration of a good head of fish in the Upokororo River which had evidently been depleted during the past decade by too intensive fishing and by removal of ova for stocking other waters.

Fresh-water Eels.

An interesting development to be recorded this year is the establishment at Greytown of a cannery for the packing of fresh-water eels which commenced active commercial operations in the 1934 season.

Eels are the dominant species in practically all the fresh waters of the Dominion,* the only other native fishes being of small size, and with the exception of the whitebait species (*Galaxias attenuatus*) of no economic importance. There are two species of fresh-water eel in New Zealand, the short-finned or northern eel (*Anguilla australis*) and the long-finned or southern eel (*Anguilla aucklandii*). The fresh-water eels of North Auckland practically all belong to the former species and those of the extreme south to the latter species, the two kinds overlapping in their distribution so that in the waters of the more central portion of New Zealand, such as Wellington Province or Canterbury, one finds a mixture of both.

The general abundance of eels in the rivers and lakes of this country and the remarkable size to which some of them grow are matters of common knowledge. Equally well known is the fact that eels have always constituted a very important source of food-supply to the Maoris, the prosecution of the eel fisheries being a very highly organized and skilfully conducted industry in the old times and still of considerable importance at the present day to the Natives in certain districts. Very rarely, however, are eels to be seen among the stock of a fishmonger's shop in this country, although they have a distinctly higher nutritive value than most of our food-fishes. In the *N.Z. Journal of Science and Technology*, Vol. X, No. 2 (July, 1928), p. 124, there is an article on "The Fat-soluble Vitamins A and D and the Nation's Food Supply," which is an extract from the report of the Medical Research Council for the year 1926–27. The following passage is quoted from this article: "The body-oil in eels (almost 30 per cent. of their whole substance) contains not only vitamin D but almost as much vitamin A as good cod-liver oil—a striking confirmation of the mediæval notion that eels have a high dietetic value." Actually they were more highly priced than salmon in England in the Middle Ages, although in the last century, with a general abundance of good and cheap fish from the sea, the eel trade in Britain has tended to become limited to London and to some of the larger industrial centres. In 1931 the quantity of eels imported into England amounted to 32,054 cwt., valued at £117,520, Denmark, Holland, Ireland, and Norway being the principal sources of supply.

In some of the European countries eels occupy a much more important position among the marketable food fishes. For instance, in 1929 in Denmark 82,234 cwt. of fresh-water eels were caught; in Germany nearly half that quantity, and in Sweden about a third of that quantity. These figures are taken from the Statistical Bulletin published by the International Council for Sea-fishery Investigations. It is probable that they relate only to the quantities of eels landed or marketed at fishing-ports, and do not include the eels taken from inland waters. Eel statistics are given in this Bulletin for Sweden, Norway, Denmark, Latvia, Poland, Germany, and Holland. The countries for which no eel statistics are given are Finland, Iceland, Belgium, France, Great Britain, Ireland, and Portugal; but there are eels in all these countries, and eel fisheries in most of them. It should be noted that conger-eels are a

* The outstanding exception to this generalization is Lake Taupo and its tributaries, to which the access of young eels is prevented by the Huka Falls on the Waikato River.

distinct and purely marine species, and are separately shown in these statistics. In Germany not only is the eel fishery pursued on a considerable scale in the tidal waters of the great rivers and in the inland rivers and lakes, but there is also a considerable import trade. A paragraph in the *Canadian Fisherman* for June, 1927, contains the announcement that a firm in Hamburg wished to get in touch with Canadian exporters who could supply large quantities of frozen eels in boxes weighing about 100 lb. The same journal for November, 1933, gives the quantity of eels taken commercially in 1932 by the fishermen of Quebec, Ontario, and the three maritime provinces as totalling 21,476 cwt., and states that they are marketable in the fresh and frozen forms, exports to Germany aggregating 8,349 cwt., and to the United States 3,768 cwt. for the year 1932. Live eels are also exported from Canada to Germany and Holland, but there is a greater volume of trade in frozen eels.

The possibilities of developing a permanent trade in New Zealand eels depend on availability and suitability of supplies, on the cost of proper treatment and transport, and on the prices obtainable. With regard to availability of supplies, it would appear that nature has favoured us with bountiful stocks in many localities, but there are certain places and certain seasons when the maximum quantities may be caught with the minimum of effort, though in any case the provision of catching-devices—nets or traps—must be on a scale commensurate with the quantities to be handled. Line-fishing for eels is not so likely to be a profitable commercial pursuit. The most favourable time for catching quantities of eels is in autumn, when the adult fish are migrating from the fresh waters to proceed to their ocean spawning-grounds. This is when the great eel fisheries of the Maoris have been carried on for many generations. Highly interesting accounts of the details of the *modus operandi* and the remarkable sociological aspects of these fisheries in the life of the Maori may be found in papers by Elsdon Best, Hamilton, and others.*

A brief account of eel-fishing operations observed towards the end of March, 1931, may throw some light on certain practical points. The fishing was conducted by local Maoris at the lower end of Lake Onoke (lower Wairarapa Lake). The site of the traps was a short distance above the point at which there is an outflow to the sea when the lake is open. They were hauled just before daybreak. On this occasion the catches were relatively small on account of the brightness of the moon during the night, but rather more than three large sackfuls were obtained.

In this late summer and autumn fishery in the lower Wairarapa there are four distinct classes of eels which run at their own proper time, with a certain amount of overlapping. The first run appears at about the end of February and consists of the smallest class. A belated specimen of this class was obtained and was 17½ in. long. The Maori name for these eels is *hau*. They are dark above and white or silvery on the underside. They are very firm and hard in condition, and are the most highly esteemed for eating. Examination of the specimen taken showed that the *hau* is the male of *Anguilla australis*. The sex organ at this stage is quite conspicuous and easily recognized. The species was identified by the typical rounded patch of teeth in the middle of the roof of the mouth and by the short dorsal fin.

The next run, which begins in March, consists of eels termed *paranui*. An average specimen measured 32 in. This is the female of *Anguilla australis*, as was identified by teeth and fin proportions. It is not so dark as the male on the back and has copper or bronze tints on its sides. The underside is whitish but more mottled than in the *hau*. The ovaries are very conspicuous but the eggs are minute, though they could be clearly distinguished with the aid of a lens. These organs have always been regarded by the local fishers, both Maori and pakeha, as consisting of fat. These fish are very much more slimy and are softer in the flesh than the *hau* eels. I was told that the name *paranui* means "plenty of slime."

About the end of March there arrives a run of a different kind of eel, which is called *riko* by the Natives. An average specimen measured 22½ in. in length. These are the males of *Anguilla aucklandii*. The species was identified by the elongated patch of teeth on the roof of the mouth and by the longer dorsal fin. The sex organs were similar to those seen in the *hau* eels, and, as in the case of the males of *Anguilla australis*, these fish are firmer, more silvery in coloration, and less slimy than the females.

The last class of eels to run are the *kokoputuna* which appear later in April or at the beginning of May. One early-running specimen of this class was taken at the time of my visit. It proved, as expected, to be a female *Anguilla aucklandii*, the species being identified by teeth and length of dorsal fin. The ovaries are very much in evidence and at about the same stage of development as in the *paranui* examined.

The Maori names may be only local and probably, as is frequently the case, are different in other districts. The point of interest is the occurrence of the definite migration of each sex of the two species and the opportunity it affords to take four different classes of eel, each with its distinctive character from the gastronomic point of view.

The eels taken on this occasion consisted mainly of *riko*, but there was also a considerable number of *paranui*. Only three belated *hau* eels were taken, and, as above mentioned, one early-running *kokoputuna*.

The above-mentioned facts are given to afford some basis or background for a discussion of the possibilities of developing fresh-water eel fisheries in New Zealand. From time to time various tentative efforts have been made by private individuals, and at least one company has been formed for the purpose of utilizing the eel for commerce, but these essays have not been carried beyond the preliminary trials. There must, therefore, have been difficulties and impediments to success which would need to be overcome before an established trade could be developed. As is usual in business enterprises, some of these undertakings have been carried out with as much secrecy as possible. In

*See, for instance, Elsdon Best: "Food Products of Tuhoeland." "Trans. N.Z. Inst.," Vol. 35 (1903), and A. Hamilton: "Fishing and Sea-foods of the Ancient Maori," Bull. No. 2, Dominion Museum, Wellington, N.Z. (1908).

other cases both this Department and the Department of Industries and Commerce have been consulted by persons contemplating the prosecution of a trade in eels. A great deal of work has been done and a considerable amount of relevant information has been collected by the Department of Industries and Commerce through the agency of the High Commissioner for the Dominion in London. An attempt may now be made to set forth some of the considerations bearing on the question of the possibility of bringing the eel definitely and permanently into the ranks of our commercial fishes. Among the first of the pros and cons it may be said that its merits as a food should place it high among the useful fishes, as it is in other countries which have been mentioned: as also it is in the estimation of Maoris and a not insignificant proportion of the white population of these Islands, though to too many people a strange prejudice, apparently on account of its bodily form, prevents a recognition or even a trial of its edible qualities. If the flesh of the eel could be grown on the skeleton of a flounder it would doubtless be among the most highly valued of our fishes. Eels are rich in fat, but so is the herring, the pilchard, and the mullet, and it is the oil of the eel, with its unusually high vitamin content, that forms one of its most important constituents from the aspect of nutrition. In spite of all this, however, one must conclude that it is as a commodity for export rather than for domestic consumption that the most promising market is offered. This involves some process of preservation, for although live eels shipped across the North Sea constitute practically the whole of the eel imports into England, and Canadian eels have been shipped alive to London and to Hamburg on steamers carrying special tanks, the long voyage over tropical oceans would appear to make this impracticable for shipments from New Zealand.

Freezing and canning are the two alternative methods of treatment. The canning of New Zealand eels has been carried out before this, both for private consumption and as a preliminary to contemplated commercial projects, and the product has proved quite acceptable, bearing comparison according to some judges with such high-priced fish as salmon. It may be mentioned in passing that the oily fishes, such as salmon, herrings, pilchards, and sardines, for example, are more satisfactory for preserving in tins than are the non-oily fish like blue cod. The existence of the Greytown Canning Co., with a plant specially intended for the treatment of eels, indicates that in one quarter at least the period of tentative small-scale trials is over and the industry definitely launched. It is to be hoped that this will lead to an increased domestic consumption of a fish of New Zealand origin in place of some part of the considerable quantity of tinned fish that is imported from abroad. The introduction of a new foodstuff is notoriously difficult and uncertain, and in the case of eels the conservatism of the average consumer is attended also by the sort of prejudice to which reference has already been made. It is possible that with the passage of the former period of prosperity and plentiful food-supplies we may be living under conditions in which this prejudice will be forgotten—as has happened in many other instances.

With regard to refrigeration we already have the knowledge that frozen eels are acceptable in Germany and also in England although in the latter case only preliminary trial consignments from New Zealand have been handled. Improvement in the quality of these trial consignments is certainly possible and probably necessary—in fact certainly necessary if lucrative prices are to be obtained. Frozen eels command lower prices than are paid for live eels which at present hold the markets at any rate in London. It will be useful here to give some of the requirements and desiderata from the consumers or retailers end of the chain and consider how far they can be met. There is naturally some variation in the requirements according to difference in individual points of view or local conditions. First of all, with regard to the most popular and therefore the most profitable sizes of eels—the bulk of the eels marketed in London are used in the stewed-eel trade, and for this purpose fish of small sizes are in request. From information obtained through the High Commissioner it is evident that eels weighing between ½ lb. and 1 lb. each would be in greatest demand for the London market, and there would be a limited demand for eels between 1 lb. and 2 lb. In Germany, where eels are very largely retailed in the smoked state, the chief demand is for eels of 1 lb. to 1½ lb., but those up to 2 lb. are quite acceptable.

There is an objection to the larger-sized eels on account of the toughness of the skin, which is apparently a greater drawback in frozen eels than in fresh ones. It is most essential that eels, or any other fish, should be frozen *quickly*, which involves exposing them to a very low temperature in not too great bulk. For the London market it has been recommended that the fish should be frozen singly, not when packed in bulk, and that brine-freezing should be employed. This is certainly a better method for fish than air-freezing, but at present there is no brine-freezing plant in New Zealand, and quite satisfactory results have been obtained by freezing in air in an ordinary refrigerator chamber at about 5° F. It seems likely that freezing at about 10° F. followed by storage and transportation at 15° F. would give good results if the fish were frozen singly or in shallow pans so that each fish was rapidly frozen throughout. Canadian eels for the Hamburg market are frozen whole, but London experts recommend beheading, cleaning of entrails and kidney tissue, wiping the outside clear of slime, and then wrapping each fish in waxed paper. This wrapping enables the fish to be easily taken singly from the package, prevents drying, and moreover helps to check the development of rancidity which tends to take place in most oily or fatty articles of food if they are stored for a long time in contact with air even when the temperature is kept low. In describing the different runs of each sex in the lower Wairarapa reference was made to the silvery coloration of the undersides of the males of both species which is assumed immediately prior to their emigration. While at the immature stages, feeding and growing in fresh water, both sexes are more monotonously coloured though variation according to environment is shown. Yellow eels is the trade name for such fish in England. Silver eels are the most highly esteemed in the market; therefore this, as well as suitability of size, places a premium on the catching of the male eels on their spawning migration to the sea. In passing, it may be mentioned that it is a general rule for male fish to become mature at a younger age and smaller size than females. It is more than probable that all large fresh-water eels are females. Since

it is evident that for the present at any rate no eels over 2 lb. are acceptable for an export trade, and only those of 1 lb. and under are likely to be in good demand for the London market, it is clear that of the seaward migrants, which are the most easily to be caught, only the males are required. Juvenile females could, of course, be taken in baited traps, but it seems doubtful whether they could be consistently caught in sufficient quantities for industrial purposes. It seems likely, however, that for canning the larger sizes would be acceptable and ultimately perhaps preferable to the smaller fish. Moreover the skins of large eels have a definite value as the raw material for making fine leather, for which at present there appears to be a growing demand.

With regard to prices, a record of the wholesale prices of eels in Billingsgate Market, London, for seven weeks in the autumn of 1930 shows that from 8s. to 30s. was paid per "draft" of 21 lb. of live eels. Frozen eels would fetch less—probably not more than 6d. per lb.—though the price would probably rise when the market became accustomed to the trade provided that the cleaning, packing, freezing, and transport were all that could be desired. One poor consignment would have a damaging effect on future demand. Prices in Hamburg realized for frozen Canadian eels in 1930 were from 12 to 15 cents per lb., and consignments were sent in 100 lb. and 55 lb. boxes. For New Zealand consignments transhipment from London for Hamburg would involve additional transport expenses.

The question is whether catching, cleaning, freezing (or canning), and transport to a European market can be carried out on a scale and at costs that would ensure profitable business. The best location for the depot or factory is the first point of practical importance. The lower Wairarapa (Onoke) Lake which is the one outlet to the sea—usually closed by Nature at the time of the eel-run, to the great convenience of the eel-catchers—for a very large system of rivers and streams and the extensive Lake Wairarapa, is one of the best, if not the best, of all eel-fishing sites in the Dominion, but it is known that there are other waters in both islands where large quantities of eels may be caught, although no precise data as to actual quantities are available.

The fact that active operations may have to be confined to three or at most four months out of the twelve, and for the rest of the year more labour, more time, and more travelling would be involved in order to get substantial catches, makes it unlikely that a factory on the spot would be the most satisfactory arrangement. It is in fact probable that an eel industry would have the best chance of success if it were run as a seasonal change in connection with the operations of an established fish merchant's depot already provided with refrigeration facilities and with a staff expert in handling fish and with proper facilities for the cleaning and packing operations. For canning, an existent whitebait, crayfish, or oyster cannery, if available, might introduce eel-canning as a possible side-line. It is evident that there is nothing of the nature of what is described in sporting parlance as a "snip" or "easy game" in this eel fishery, or a fortune to be made out of it, but so far as can be judged from the information available there does seem a possibility of providing a living for a few employees and a reasonable return for capital invested in a new minor industry that may add another item to our short list of exports of primary produce. The import duties recently imposed by Britain on foreign fish should be of some assistance.

A possible complication to be considered, especially in the North Island, is the difficulty that might arise from interference with special Maori eel-fisheries such as exist in certain places and have been used by the Natives for many generations, though not generally of the same essential importance to-day as they were in the old times. The obvious way to get over such a difficulty would be to employ only local Maoris for the catching of the eels for, though comprehensive information on this matter is not available, it seems likely that systematic fishery operations in a suitable locality would provide sufficient eels both for local consumption and for the trade. One of the national problems of to-day is to create industries that will provide Maoris with a means of earning wages, and it would appear that no occupation could be more suitable for the special aptitude of the Native people.

Fresh-water Fishery Research.

The work carried on, from Canterbury College as headquarters, under the general direction of the Fresh Water Research Committee of the New Zealand Acclimatization Societies Association during the past year has been a continuation of the scheme projected when the Committee first met in November, 1929. The objects and methods of this research have been explained in previous reports and in Fisheries Bulletins already published, but it seems desirable, in addition to a review of the past year's work, to discuss briefly the general question of fresh-water fishery research in New Zealand.

Although, in common with most of our research institutions, the Committee has suffered from the cramping effects of a financial stringency that was not anticipated when the scheme was undertaken, there has been a continuous and gratifying increase in the work done. The Biologist, Mr. Parrott, has continued his investigations upon the growth and age of fish, especially trout, in various waters by the method of examination of scale samples, the majority of which have been collected by the voluntary assistance of anglers organized by local research committees set up by some of the acclimatization societies.

Up to September, 1933, the total number of scale samples received and examined was 5,700 from anglers and 4,650 from trapping and netting operations. For the 1933–34 fishing-season 1,130 further samples were received.

Two reports by Mr. Parrott were published during the year—"The Variability and Growth of the Scales of Brown Trout in New Zealand," in the "Transactions of the New Zealand Institute," Vol. 63, part 4 (January, 1934), and "Some Observations on the Brown Trout Population of the Kakanui River (North Otago)," in the *New Zealand Fishing and Shooting Gazette*, Vol. VII, No. 5 (March, 1934). The former paper is of fundamental interest in that it demonstrates the basis for the method of

determining age from the scale markings of trout in New Zealand. The latter provides an application of the method in an analysis of the trout population of a particular river. Other reports have been prepared and will soon be ready for publication adding to the data from certain waters and extending the geographical field previously covered. Some work has been done on the quinnat salmon run of 1932 and on a sample of rainbow trout from Lake Taupo. The data from brown trout have been analysed with reference to the occurrence of characteristic growth-types and special attention paid to local and seasonal variations in the condition of trout in a report that is nearing completion. Professor Percival, the Honorary Director of Research, is continuing his work on environmental factors and has reported upon preliminary surveys of rivers and lakes in various districts. Mr. D. F. Hobbs, the Honorary Secretary for Research, has made his services available for field work during the last two winters, and by his observations of conditions in various spawning streams in Canterbury and Westland has thrown considerable light on a phase in the life-history of trout and salmon which has hitherto received very little attention. A report on losses in the embryo and larval (or alevin) stages and the causes to which such losses are due is in preparation.

One of the most difficult matters with which the Committee had to deal during the past year was the question of the publication of reports, its own funds being insufficient to provide for printing the results of the research work. The two reports by J. S. Phillips on the work he carried out while holding the Wellington Acclimatization Society's Fresh-water Research Fellowship at Victoria University College were published by the Marine Department as Fisheries Bulletins Nos. 2 and 3. Reports written by A. W. Parrott and Professor E. Percival on investigations carried out for the Fresh-water Research Committee were published by the Marine Department as Fisheries Bulletins Nos. 4 and 5 respectively. It is most regrettable that owing to the reduced vote of this Department, it has subsequently become impossible to provide any assurance as to its ability to undertake the publication of research papers. It is desirable that such reports should be issued with the least possible delay and that they should be available in a uniform series.

When the research scheme was first commenced it was hoped to engage the services of two paid biologists, one to make observations and collect data in the North Island, with headquarters at Wellington, and the other stationed at Christchurch to deal primarily with South Island conditions. It was intended that one should concentrate on the study of the trout, with special reference to age and growth, and the other on the food organisms and other environmental factors. With the immediate development of an unpromising financial outlook, arising primarily from the fact that Government at that time did not see its way to contribute to the funds, the appointment of only one biologist was made. Considerations of practical advantages decided the selection of Christchurch for headquarters, with laboratory accommodation at Canterbury College. In June, 1931, Miss V. K. Lawrie was engaged to assist in preparing scale material for examination and in clerical tasks, with the result that the output of laboratory work was considerably increased. Professor Percival has throughout devoted the greater part of his spare time to the service of the Committee as Honorary Director of Research and in special investigations and consultations, and for the last two years, as above mentioned, active participation in field and laboratory work has been undertaken by Mr. D. F. Hobbs.

Starting with a credit balance of £522 in April, 1930, the yearly income of the Committee has averaged £688 for the last four years, and its average yearly expenditure has been £715, some of which has become material assets, but most of it has been disbursed for working-expenses. Detailed statements of receipts and expenditure are given in the balance-sheets published by the New Zealand Acclimatization Societies Association. The expenditure for the year ended 31st March, 1934, was £722 14s. 3d. This covers the salaries of biologist and assistant, travelling-expenses (the second largest item to salaries), delegates expenses in attending committee meetings, equipment, stationery, and other working-expenses, a grant of £5 to Dr. Milligan for pathological investigation on trout embryos, and a grant of £5 to Mr. W. J. Phillipps for research on trout-food in Wellington District. It will be realized that for a Dominion-wide investigation the Committee's means are extremely exiguous. Progress would have been much slower, if not, indeed, almost impossible, but for the voluntary work of unpaid helpers on the main Committee, on Acclimatization Society Councils and their local research sub-committees, and among interested anglers. Appreciative acknowledgment of so much voluntary and gratuitous assistance is due; but at the same time the fact cannot be ignored that voluntary and amateur collaboration has its definite limitations and drawbacks. For most effective operation fishery research requires the whole-time attention of the professional worker both in its direction and in its prosecution.

The question arises as to whether the research scheme in its present form with its amateurish machinery and hand-to-mouth financial provision is adequately meeting requirements commensurate with the Dominion's important interests in regard to its fresh-water fisheries. The Committee, and especially its working staff, have done well with the means at their disposal, and have thrown considerable light on conditions that were altogether obscure before their work was commenced; in other words, the funds provided for the work have been well spent. These funds have all, with negligible exceptions, been provided by acclimatization societies, some from their fishing-license revenue and some also from opossum revenue; and all such revenues have recently undergone a diminution. The societies are democratic local bodies controlled by holders of fishing and shooting licenses. Their policies are subject to changes and even reversals. Continuity of work and provision for future developments which are essential for the proper prosecution of research are thus subject to an uncertainty which detracts from efficient working and endangers the attainment of its objective. The objective also tends to be limited and distorted by the perfectly natural proprietary interest that is taken by many members of acclimatization societies in the work. Some demand early results in the form of bigger catches of fish as the *quid pro quo* for the financial contribution made by their society.

On the other hand, there are societies that have contributed on a generous scale that is relatively much in excess of their local interest in the work being done. However, the result of better understanding and more effective biological control of fresh-water life may be expected ultimately to be of most benefit to those districts where the fishing is at present of little value, the fishing-license holders few in number, and therefore, in most but not in all cases, the present contributions to the funds for the work at a minimum. The work indeed is a national not a parochial interest. All unpolluted natural waters will carry a stock of useful and sporting fish of some sort, but until we know more about such waters we cannot make proper use of their potentialities. One of the future objectives of this scheme is the establishment of a station where possible subjects for acclimatization, both fishes and food organisms for fish, may be experimentally kept under scientific control before being liberated into suitable environments. One important object will be achieved when we have a scientific—*i.e.*, an accurate and comprehensive—understanding of all the conditions affecting trout-life in New Zealand waters; but it need not and should not end there. As the science and art of agriculture, depending on a basis of biological research, have enabled us to multiply the productiveness of the land, so can the science and art of aquiculture be applied to augmenting the productiveness of the fresh water when the biological factors are elucidated. Only thus can this allegedly deteriorating "Angler's Paradise" be preserved and developed into a still more attractive field for the future recreation of increasing numbers of New Zealand and visiting fishermen. The need is therefore immediate for undertaking the collection and study of the necessary data, and it is a task for forward planning and systematic execution. That, in brief, is the case for fresh-water fishery research being established on a sound footing. The New Zealand Acclimatization Societies Association was influenced by this fact, besides recognizing that Government Departments (Marine, Internal Affairs, and Tourist) were also interested in the well-being and development of the fresh-water fisheries, when among other resolutions passed at its Conference in 1932 on the subject of research and the setting-up of the Central Committee was one to the effect "That Government be asked for a grant towards the work." Unless in the meantime some benefactor in the person of a piscatorial Cawthron arises to endow an institution for fresh-water fishery research, there is nothing more certain than that sooner or later an appreciation of the importance of the issues depending upon such research will induce the New Zealand Government to make the necessary provision. In most civilized countries, in addition to work done by private and academic institutions, fishery research is now a normal function of some State Department. Possibly the development will take place in New Zealand as part of an up-to-date organization of the whole system of fishery administration the necessity of which is indicated by other considerations. These are not relevant to the present discussion, but it should be recognized that scientific investigation is necessary as a guide to administration, and that the efficiency of both depends upon effective co-ordination between a competent central directive unit and the provincial units that are in touch with local operations and local conditions.

I have, &c.,
A. E. Hefford,
Chief Inspector of Fisheries.

MARINE FISH HATCHERY AND BIOLOGICAL STATION, PORTOBELLO.

Sir,—

I have the honour to present the report of the Portobello Marine Fisheries Investigation Station for the year ending March, 1934.

The Board has sustained a great loss in the death of our late President, George Malcolm Thomson. In 1895 Mr. Thomson read a paper before the Institute with regard to the possibility of introducing a variety of European fishes into our seas. The desirability of establishing a marine hatchery was discussed in 1896, and the site then proposed was at Purakanui. In 1897 the matter was brought before the Otago Institute and the Otago Acclimatization Society in a more definite form, and each of these bodies voted £250 towards the establishment, conditional on the Government granting a similar sum or undertaking to carry on the station for ten years, and, as a result, the Government voted £750 to be given when Mr. Ayson as Government expert had returned from Canada and America. In 1895 the Government set aside 6½ acres at Purakanui as a reserve for a fish hatchery, and an additional sum of £250 was placed on the estimates. Late in 1899 Mr. Thomson outlined the work which should be undertaken and the style of buildings needed. It was now decided that the site at Purakanui was unsuitable, and the present location was decided on. In 1900 the nature of the buildings was decided.

In 1901 Mr. Thomson drew the attention of the Minister of Marine to the fact that the people here concerned in the Station had no status, and asked that Government should set up a Board of Control. In 1902 the Minister agreed to set up a Board consisting of one member of the Otago Institute, one of the Otago Acclimatization Society, the Collector of Customs, the Chief Surveyor, and the District Engineer of the Public Works Department. The Minister also stated that the total cost of the buildings was not to exceed £1,000 (the previous estimates were much higher), and personal working-expenses were not to exceed £250 annually. The Board was gazetted on the 9th June, 1902, the members being Messrs. G. M. Thomson, Robert Chisholm, D. Barron, C. Chamberlain, and Charles Fleming. The first meeting was held on the 24th June, Mr. Thomson being appointed Chairman.

By the beginning of 1904 the buildings were sufficiently ready for a formal opening by the President of the Australian Association for the Advancement of Science. Mr. Thomson's scheme, so long in planning, at last came to fruition after overcoming many difficulties. During the long period that has

since elapsed we all know the great amount of active personal interest G. M. Thomson took in it throughout each year since it was opened. Without his enthusiasm and energy it would not have been established; without his active participation in the working of the Station the series of investigations of our marine fauna and of hydrographic matters would never have been accomplished. It was through him that the lobster, turbot, and edible crab were brought to New Zealand. He was in direct communication with the directors of marine fish stations and aquaria in Britain and America, making no steps without fullest investigations of the probabilities of success. We owe the establishment of the Portobello Station to Mr. Thomson's pertinacity: it took nine years' persistent effort before the Station was officially opened.

With the financial position as it is the Board can only afford the services of one man, and he has had to work by himself except for the voluntary assistance of the honorary secretary when that was available. Despite these conditions the hatchery has been maintained in good order, and the aquarium has attracted large numbers of visitors, it being kept well stocked with a variety of fish and other sea life. During the year the Board has appealed to the Minister without avail for further financial assistance. We are still of opinion that much valuable work, both from a scientific and practical utility standpoint, could be carried on at the Station if the grant were increased.

European Lobsters.

During the year two lobsters were lost, one female being killed by its companions when casting its shell, and the other (a male), died apparently from old age. Another male spends most of its time lying on its back, but feeds freely. This specimen shows no sign of injury, but may have an internal growth. The remaining seventeen are in a good healthy condition and have cast their shells. One of the large ponds was cleaned out and improved, and, together with a pond at the end of the wharf, has been specially fitted to receive young lobsters. All the larvæ hatched were liberated in these ponds, and in November, during their free swimming stage, were seen in large numbers on the surface, and in February some of the small lobsters were seen crawling on the bottom, but we hardly expect to get any tangible results until the end of this year, when a number should be grown to a size which will enable them to look after themselves when liberated. It is also hoped by this method to secure a further supply to replace the original animals which are now well on in years.

Hydrographic Work.

Mr. Adams has continued the taking of temperature records of air, ponds, and harbour, and has sent in weather reports to the Meteorological Department. Apparatus for this last purpose is thirty years old, and the Board could do more accurate work if provided with an up-to-date set. Winter temperatures were not so low as usual, and July was especially mild, but in October the temperature of the ponds fell to 8° C.

General Work at the Station.

Food supplies for lobsters and fish held in the aquaria were maintained by the use of set-nets and trawls and line-fishing. The launch has been kept on the slip throughout the year awaiting the time when we can afford more staff and to pay for petrol. A saving of insurance was also effected by cutting out the marine policy. The launch has been carefully stored after repainting, and all ballast, gear, and masts removed to avoid undue strain. The two dinghies were kept painted and repaired, and the iron frames of the aquaria tanks have been cleaned of rust and painted.

In adjusting one of the large ponds for lobster fry, new stone walls were built on two sides where there were previously natural banks. The space between these walls and the banks was filled in with material secured by widening and levelling the path to the jetty, and also with several tons of mud which had accumulated on the bottom of the pond. The stone walls will prevent this accumulation of mud from recurring and so will save a lot of future work. The concrete foundation around the valves was enlarged to suit the larger-sized and finer-meshed screens now used at the outlet. Mr. Adams, using the dinghy, gathered about fifty yards of stone for building the pond-walls. New valve-screens were also installed at the outlet of the wharf pond to protect young lobsters placed therein. Fences have been repaired and made rabbit-proof, and hedges and shelter-trees cut back. A post-and-wire fence was installed from the hatchery alonside the steps to the residences, and this has proved very useful on dark nights forming a safeguard against accidents. The jetty has been strengthened and repaired and an effective shelter built at its end. The path from the jetty to the hatchery has been levelled and widened making it safer to use on dark and stormy nights. All outside ponds have been kept clear of accumulations of weed and mud and the aquarium maintained in a clean and healthy condition. New steps were made for the boat landing-stage.

Biological Notes.

Eighteen samples of whalefeed secured at various times were collected under instructions from the late Mr. G. M. Thomson, and these were forwarded to a Mr. Matthews, Somerset, England, but so far no acknowledgment has been received. We have retained a duplicate set. A further collection of otoliths and scales from large-sized flounders was sent to Mr. Young, the Marine Biologist of the Department at Wellington, and in November the livers of barracouta and red cod were secured and sent on to him for investigation of the vitamin content.

"Whalefeed" (*Munida gregaria*) occurred this year in October—a month earlier than last year—and were plentiful during November. They appeared to be larger than last year and very soon left the surface, swimming about a foot down. In January whalefeed were no longer on the surface, but fish caught in harbour were found to be feeding on them. At no period of this year were they as numerous as last year. Whalefeed kept in the ponds grew to a large size, and the females were heavily loaded with green eggs.

The clear shrimp (*Nyctiphanes australis*) occurred in large numbers from October on, and, although in the later months they were not seen, fish were found to be full of them.

In February the hagfish (*Eptatretus cirrhatus*), which has been in the hatchery for the last three years, laid fifty-three eggs on the floor of the observation tank. These eggs are pale yellow in colour and cylindrical in shape, $1\frac{1}{8}$ in. long by $\frac{7}{16}$ in. diameter. They have attachment tendrils at the end and cling to each other in a chain. They have been placed in an observation jar under running water. When separated during cleaning operations, they again join up, which is rather interesting, as we do not expect them to be fertile. They are, however, keeping fairly well, and they form an interesting exhibit.

A female skate (*Raja nasuta*), secured by line near the hatchery, produced a number of eggs, and examination of these shows that they are hatching. Opening the egg cases disclosed the young fish attached to an eggsac as large as a pigeon's egg. The fish seems to be able to live in this condition without the protection of the case and lies on the bottom of the jar continually moving its tail from side to side.

Mullet (*Agonostomus forsteri*), red cod (*Physiculus bacchus*), wrasse (*Pseudolabrus miles*), and "spotties" (*Pseudolabrus celidotus*) have been very numerous around the Station from January on, apparently attracted by the abundant food-supply; but kelpfish (greenbone), (*Coridodax pullus*), moki (*Latridopsis ciliaris*), warehou (*Seriolella brama*) and tarakihi (*Dactylosparus macropterus*) have been scarce. Barracouta (*Thyrsites atun*), ling (*Genypterus blacodes*) and kahawai (*Arripis trutta*) were also fairly numerous in the vicinity of the Station.

In 1932 an abnormal specimen of sea perch (*Helicolenus percoides*) was taken by Mr. G. Howes. It was covered with a black fungus-like growth with warty tubercules which were yellow and orange in colour. These extra colourings on this naturally well-coloured fish made it a most striking object. It is still in the aquarium and is apparently in quite good health apart from the wart-like growths. This year a further specimen has been secured, which is also covered with black fungus-like growth.

Adult *Idotea ungulata* cast their shells in February after producing a number of living young. Chitons spawned in the tanks in April. The common crab (*Cancer novae-zelandiae*) was taken in April, carrying a full batch of eggs: the male cast its shell in the same month. Pilchards (*Clupea neopilchardus*) were noted around the Station in large numbers in late March and were followed by large shoals of red cod and large mullet, giving a good supply of fish-food for the Station supply. During March last year we had to buy food for the fish.

A number of interesting specimens were secured through the honorary secretary accompanying trawlers, and these included some very fine specimens of spider crabs and other crabs, and some exceptionally fine *Doris*, one specimen measuring $10\frac{1}{2}$ in. in length. These lived well in the aquaria. The *Doris* spawned, placing a gelatinous network of an apricot shade, like fine lacework, on the sides of the tanks.

Specimens of the small octopus (*Octopus oliveri*) laid eggs in the tanks, but these were infertile. The parent fish showed great attachment to its eggs and constantly attended them.

Mr. Adams was away on a fortnight's annual leave during January, and Mr. J. Thomson kindly took charge.

A large number of books in the library prove to be the property of the late Mr. G. M. Thomson. These have been listed by the Board in company of Mr. Stuart Thomson, in order to estimate their value in the event of the Board desiring to purchase them.

During the year we have had several inquiries for specimens for University work, but we have reluctantly had to refuse these orders, as it is necessary to prepare the material in a special manner which requires time and attention to produce satisfactory results.

I have, &c.,

W. B. Benham, F.R.S.,

Chairman of the Board.

TABLE SHOWING THE NUMBER OF SEAMEN ENGAGED AND DISCHARGED IN NEW ZEALAND, AND THE FEES RECEIVED, FOR THE YEAR ENDED 31ST MARCH, 1934.

Port.	Engagements and Discharges, Foreign and Intercolonial Trade.				Engagements and Discharges, Home Trade.				Total Engagements.		Total Discharges.		Grand Totals.	
	Engagements.		Discharges.		Engagements.		Discharges.							
	Number.	Amount.	Number.	Amount.	Number.	Amount.	Number.	Amount.	Number.	Amount.	Number.	Amount.	Number.	Amount.
		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.		£ s. d.
Auckland	1,398	128 3 0	1,314	121 19 0	1,314	116 14 0	1,312	117 4 0	2,712	244 17 0	2,626	239 3 0	5,338	484 0 0
Dunedin	184	16 8 0	172	16 13 0	211	18 10 0	225	19 3 0	395	34 18 0	397	35 16 0	792	70 14 0
Gisborne	4	0 8 0	3	0 6 0	159	14 6 0	147	13 10 0	163	14 14 0	150	13 16 0	313	28 10 0
Greymouth	25	2 10 0	20	2 0 0	2	0 4 0	1	0 2 0	27	2 14 0	21	2 2 0	48	4 16 0
Hokitika	..	..	..	..	9	0 10 0	9	0 10 0	9	0 10 0	9	0 10 0	18	1 0 0
Invercargill	52	5 5 0	66	6 13 0	60	2 19 0	48	3 17 0	112	8 4 0	114	10 10 0	226	18 14 0
Kaipara	..	..	..	..	2	0 4 0	..	..	2	0 4 0	..	..	2	0 4 0
Lyttelton	198	18 12 0	215	20 7 0	425	32 18 0	426	34 9 0	623	51 10 0	641	54 16 0	1,264	106 6 0
Napier	9	0 18 0	7	0 14 0	147	13 9 0	171	16 13 0	156	14 7 0	178	17 7 0	334	31 14 0
Nelson	..	..	3	0 6 0	397	30 18 0	410	32 9 0	397	30 18 0	413	32 15 0	810	63 13 0
New Plymouth	36	3 12 0	43	4 6 0	40	2 11 0	41	2 13 0	76	6 3 0	84	6 19 0	160	13 2 0
Oamaru	4	0 8 0	4	0 8 0	2	0 4 0	2	0 4 0	6	0 12 0	6	0 12 0	12	1 4 0
Onehunga	..	..	..	..	183	15 15 0	165	14 12 0	183	15 15 0	165	14 12 0	348	30 7 0
Patea	..	..	..	..	60	3 13 0	59	3 16 0	60	3 13 0	59	3 16 0	119	7 9 0
Picton	..	..	..	..	13	1 0 0	11	0 16 0	13	1 0 0	11	0 16 0	24	1 16 0
Tauranga	..	..	..	..	5	0 10 0	8	0 16 0	5	0 10 0	8	0 16 0	13	1 6 0
Timaru	4	0 8 0	6	0 12 0	37	3 10 0	37	3 10 0	41	3 18 0	43	4 2 0	84	8 0 0
Wairau	..	..	..	..	1	0 2 0	..	..	1	0 2 0	..	..	1	0 2 0
Wanganui	2	0 4 0	1	0 2 0	47	3 17 0	48	3 4 0	49	4 1 0	49	3 6 0	98	7 7 0
Wellington	2,399	225 5 0	2,445	221 8 0	2,135	181 10 0	2,054	175 17 0	4,534	406 15 0	4,499	397 5 0	9,033	804 0 0
Westport	7	0 14 0	3	0 6 0	34	3 0 0	36	3 4 0	41	3 14 0	39	3 10 0	80	7 4 0
Whangarei	3	0 6 0	1	0 2 0	..	..	..	..	3	0 6 0	1	0 2 0	4	0 8 0
Foxton P.O.	..	..	..	..	5	0 10 0	6	0 12 0	5	0 10 0	6	0 12 0	11	1 2 0
	4,325	403 1 0	4,303	396 2 0	5,288	446 14 0	5,216	447 1 0	9,613	849 15 0	9,519	843 3 0	19,132	1,692 18 0

TABLE SHOWING COST OF MAINTENANCE (EXCLUDING INTEREST ON CAPITAL AND DEPRECIATION) OF NEW ZEALAND COASTAL LIGHTHOUSES FOR THE YEAR ENDED 31ST MARCH, 1934.

Name of Lighthouse.	Salaries and Wages.	Oil consumed.		Stores and Maintenance.	Totals.
		Gallons.	Value.		
	£ s. d.		£ s. d.	£ s. d.	£ s. d.
Akaroa Head	395 12 6	745	51 3 10	148 18 7	595 14 11
Brothers	676 10 2	744	55 15 2	324 2 1	1,056 7 5
Cape Brett	615 0 3	714	52 7 2	283 16 1	951 3 6
Cape Campbell	396 15 5	665	49 7 5	173 12 5	619 15 3
Cape Maria	605 14 0	782	56 14 7	363 16 8	1,026 5 3
Cape Palliser	432 13 1	669	50 13 2	151 12 9	633 19 0
Cape Saunders	388 0 6	748	51 4 11	125 6 0	564 11 5
Castlepoint	408 6 4	680	49 0 5	273 1 0	730 7 9
Centre Island	626 11 4	648	43 19 9	272 4 10	942 15 11
Cuvier Island	615 19 10	717	51 5 6	256 12 7	923 17 11
Dog Island	419 9 3	709	48 5 9	150 16 2	618 11 2
East Cape	394 4 10	695	50 10 2	148 0 9	593 15 9
Farewell Spit	611 15 11	865	64 7 6	431 16 3	1,107 19 8
French Pass	187 2 6	104	7 12 5	52 5 9	247 0 8
Kaipara Heads	622 11 0	808	57 4 4	190 12 8	870 8 0
Moeraki	383 13 4	691	47 6 11	96 6 10	527 7 1
Moko Hinou	648 11 2	692	49 8 0	272 6 2	970 5 4
Nugget Point	389 3 10	905	61 16 11	140 7 3	591 8 0
Pencarrow Head	541 19 7	755	55 11 7	215 9 7	813 0 9
Portland Island	683 5 11	862	62 16 4	281 18 5	1,028 0 8
Puysegur Point	645 2 1	823	52 8 7	501 6 11	1,198 17 7
Stephens Island	653 11 11	845	63 14 1	250 7 6	967 13 6
Waipapapa Point	401 6 5	739	50 5 10	112 11 10	564 4 1
Fog-signals	..	..	..	319 3 4	319 3 4
Automatic lights	812 2 0	..	..	1,500 6 8	2,312 8 8
Totals	12,555 3 2	16,605	1,183 0 4	7,036 19 1	20,775 2 7

RETURN OF ESTATES OF DECEASED SEAMEN RECEIVED AND ADMINISTERED IN PURSUANCE OF THE PROVISIONS OF THE SHIPPING AND SEAMEN ACT, 1908, DURING THE YEAR ENDED 31ST MARCH, 1934.

Name of Seaman.	Balance to Credit of the Estate on 31st March, 1933.	Amount received.	Amount paid.	Balance to Credit of the Estate on 31st March, 1934.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Ferguson, Wm.	..	4 14 5	4 14 5	..
Lancaster, J. A.	53 7 4	..	53 7 4	..
Stone, W. R.	..	37 4 8	..	37 4 8
Thompson, T.	..	11 17 6	..	11 17 6
Wildman, F. W.	..	4 3 8	4 3 8	..
Williams, J. A.	..	3 13 3	3 13 3	..
Wilson, H. C.	..	13 0 5	13 0 5	..
	53 7 4	74 13 11	78 19 1	49 2 2

RETURN SHOWING AMOUNTS RECEIVED PRIOR TO 1ST APRIL, 1933, STANDING TO CREDIT OF ESTATES OF DECEASED SEAMEN, AND FOR WHICH CLAIMS HAVE NOT BEEN PROVED.

Name of Seaman.	Balance to credit of Estate on 31st March, 1934.
	£ s. d.
Carle, W. H., late fireman, s.s. "Rata"	3 0 7
Evans, Wm., late cook, m.v. "Opawa"	8 10 4
Linton, P. A., late seaman, s.s. "Koonya"	0 1 0
McEvoy, J., late trimmer, s.s. "Koromiko"	0 1 3
McMahon, S. G., late seaman, s.s. "Apanui"	13 2 2
Stevens, F. G., late fireman, s.s. "Kaitangata"	4 5 9
Tronson, J. A. late seaman, s.s. "Rangi"	0 1 3
Wareline, F., late seaman, s.s. "Koromiko"	0 1 2
Wassel, R., late seaman, s.s. "Elsie Mary"	0 1 3
	£29 4 9

Summary of Examinations for Certificates of Competency as Masters and Mates for the Year ended 31st March, 1934.

Class of Certificate.	Auckland.				Wellington.				Lyttelton.		Dunedin.		Totals.				Total Examinations.
	Final Pass.	Partial Pass.	Failed.	Partial Failure.	Final Pass.	Partial Pass.	Failed.	Partial Failure.	Passed.	Failed.	Passed.	Failed.	Final Pass.	Partial Pass.	Failed.	Partial Failure.	
Foreign-going, masters and mates	16	6	..	3	..	..	..	..	..	..	..	..	16	6	..	3	25
Home-trade, masters and mates	10	3	..	..	3	1	..	..	..	..	..	..	13	4	..	..	17
River masters	..	..	..	..	2	..	1	..	..	..	..	..	2	..	1	..	3
Masters of sailing-vessels plying in harbours and rivers	..	..	2	..	..	..	..	..	..	..	..	..	..	..	2	..	2
Yacht-masters in New Zealand waters	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	1
Sailing-ship endorsements ..	4	..	..	..	..	..	..	..	..	..	..	..	4	..	..	..	4
Fore and aft rigged vessels endorsements	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1
Colonial pilots	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1
Voluntary examination in signalling	3	..	..	..	..	..	..	..	..	..	..	..	3	..	..	..	3
Signals only	7	..	..	..	..	..	..	..	..	..	..	..	7	..	..	..	7
Sub-lieutenant, R.N.V.R. ..	4	..	1	..	2	..	..	..	2	..	1	..	9	..	1	..	10
Totals	46	9	3	3	8	1	1	..	2	..	1	..	57	10	4	3	74

Summary of Examinations for Certificates of Competency as Marine Engineer for the Year ended 31st March, 1934.

Class of Certificate.	Auckland.			Wellington.			Christchurch.			Dunedin.			Other Centres.			Totals.		
	Passed.	Failed.	Total.	Passed.	Failed.	Total.	Passed.	Failed.	Total	Passed.	Failed.	Total.	Passed.	Failed.	Total.	Passed.	Failed.	Total.
Higher-grade Certificates.																		
Foreign-going engineer (steam)—																		
First and second class	1	..	1	6	6	12	..	..	..	..	..	..	..	..	..	7	6	13
Second-class endorsement ..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	1	1
Foreign-going engineer (motor) (first and second class)	1	..	1	4	3	7	..	..	..	..	..	..	..	..	..	5	3	8
Foreign-going engineer (third class) ..	8	12	20	14	4	18	7	4	11	4	4	8	..	..	..	33	24	57
Totals	10	12	22	24	14	38	7	4	11	4	4	8	..	..	..	45	34	79
Lower-grade Certificates.																		
Sea-going engineer, P.V.O.S. ..	28	15	43	11	2	13	3	3	6	1	..	1	4	1	5	47	21	68
Restricted-limits engineer, P.V.O.S. ..	9	..	9	1	..	1	1	..	1	2	..	2	19	5	24	32	5	37
River engineer (steam)	2	2	4	2	..	2	..	..	..	..	..	..	2	..	2	6	2	8
Total	39	17	56	14	2	16	4	3	7	3	..	3	25	6	31	85	28	113
Grand total	49	29	78	38	16	54	11	7	18	7	4	11	25	6	31	130	62	192

Summary of Casualties to Shipping reported to the Marine Department during the Financial Year ended 31st March, 1934.

Nature of Casualty.	On or near the Coasts of the Dominion.			Outside the Dominion.			Total Number of Casualties reported.		
	Number of Vessels.	Tonnage.	Number of Lives lost.	Number of Vessels.	Tonnage.	Number of Lives lost.	Number of Vessels.	Tonnage.	Number of Lives lost.
Strandings—									
Total loss	3	104	..	..	..	..	3	104	..
Slight damage	13	7,069	..	..	..	..	13	7,069	..
No damage	8	15,442	..	..	..	..	8	15,442	..
Total strandings	24	22,615	..	..	..	..	24	22,615	..
Fires—									
Total loss	..	..	..	..	..	..	..	..	..
Slight damage	2	9,712	..	1	4,689	..	3	14,401	..
No damage	..	..	..	..	..	..	..	..	..
Total fires	2	9,712	..	1	4,689	..	3	14,401	..
Collisions—									
Total loss	..	..	..	..	..	..	..	..	..
Slight damage	11	6,729	..	..	..	..	11	6,729	..
No damage	..	..	..	..	..	..	..	..	..
Total collisions	11	6,729	..	..	..	..	11	6,729	..
Miscellaneous, including damage by heavy seas to hull and cargo, breakdown of machinery, &c.	15	9,232	..	2	5,617	..	17	14,849	..
Total number of casualties reported	52	48,288	..	3	10,306	..	55	58,594	..

Return of Land Boilers and Machinery inspected during the Year ended 31st March, 1934.

Class.	Not exceeding 5 Horse-power.	Exceeding 5 but not exceeding 10 Horse-power.	Exceeding 10 Horse-power.	Total.
Boilers—				
Stationary, portable, and traction	1,042	1,184	2,356	4,582
Digesters, jacketed pans, sterilizers, vulcanizers, and other steam-receivers	..	..	..	2,649
Air-receivers	..	..	..	691
Total boilers	..	..	..	7,922
Machinery—				
Electric-motors	10,919	3,406	3,993	18,318
Internal-combustion engines	1,035	513	1,114	2,662
Water-power engines	43	59	176	278
Lifts	..	..	..	3,009
Cranes	..	..	..	334
Hoists	..	..	..	1,424
Total machinery	..	..	..	26,025
Grand total	..	..	..	33,947

Return of New Boilers inspected during the Year ended 31st March, 1934.

Class.	Made in Dominion.		Imported.		Total.	
	Number.	Horse-power.	Number.	Horse-power.	Number.	Horse-power.
Stationary, portable, and traction	45	1,297	22	524	67	1,821
Digesters, jacketed pans, sterilizers, vulcanizers, and other steam-receivers	104	..	122	..	226	..
Air-receivers	19	..	33	..	52	..
Total	168	1,297	177	524	345	1,821

Return of the Number of Certificates issued to Land Engine-drivers and Electric tram Drivers during the Year ended 31st March, 1934.

Class.	Number.	Class.	Number.
Service—		Competency—*continued.*	
First-class engine-driver	2	Locomotive and traction-engine driver ..	32
Competency—		Locomotive-engine driver	6
Extra first-class stationary engineer ..	1	Traction-engine driver	23
First-class engine-driver	14	Electric-tram driver	10
Second-class engine-driver	154	Electric-tram driver (one-man car) ..	1
Steam-winding-engine driver	7		
Electric-winding-engine driver	2	Total	252

Return of Land Engineers', Engine-drivers', and Electric-tram Drivers' Examinations held throughout New Zealand during the Year ended 31st March, 1934, showing the Number of Successful and Unsuccessful Candidates.

Place.	Extra First Class.		First Class.		Second Class.		Locomotive and Traction.		Locomotive.		Traction.		Winding.				Electric-tram Driver.		Total.		Grand Total.
													Steam.		Electric.						
	P.	F.	P.	F.	P.	F.	P.	F.	P.	F.	P.	F.	P.	F.	P.	F.	P.	F.	P.	F.	
Auckland			3	4	25	6	1	1	..	..	..	..	..	..	..	..	..	..	29	11	40
Carterton			..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	1
Christchurch			..	1	5	2	1	..	..	..	5	2	..	..	..	..	9	2	20	7	27
Dunedin			4	1	8	6	2	1	2	..	3	1	1	..	..	..	..	..	20	9	29
Gisborne			..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	3
Greymouth			3	3	8	2	3	1	2	..	..	..	2	..	..	..	..	..	18	6	24
Hamilton			..	3	13	8	2	1	1	..	..	1	1	3	..	..	..	..	17	16	33
Invercargill			..	1	19	11	5	..	1	1	5	1	2	2	..	..	..	..	32	16	48
Napier			..	..	4	..	..	..	..	..	3	..	..	..	..	..	..	..	7	..	7
Nelson			..	2	7	1	..	..	..	..	1	..	..	..	2	..	..	..	10	3	13
New Plymouth ..			1	..	15	6	..	..	..	..	2	..	..	..	..	..	..	..	18	6	24
Palmerston N. ..			..	..	9	8	..	..	..	1	..	..	..	..	..	..	..	..	9	9	18
Timaru			..	..	1	..	..	1	..	..	2	..	..	..	..	..	..	..	3	1	4
Wanganui			..	2	2	4	..	..	..	..	..	..	..	..	..	..	1	..	3	6	9
Wellington ..	1	..	..	2	21	2	..	..	..	..	..	..	..	..	..	..	..	..	22	4	26
Whangarei			..	..	4	1	..	..	..	..	..	..	..	..	..	..	..	..	4	1	5
Totals ..	1	..	11	19	144	57	14	5	6	2	22	5	6	5	2	..	10	2	216	95	311

TABLE I.—SHOWING THE NUMBER OF FISHING-VESSELS AND THE NUMBER OF FISHERMEN AND OTHER PERSONS ENGAGED IN THE FISHING INDUSTRY AT EACH PORT FOR THE YEAR ENDED 31ST MARCH, 1934.

Name of Port.	Vessels engaged in Fishing for Wet Fish.														Vessels engaged in Shell-fishery.						Number of Persons employed.					
	Steamers Trawling.		Motor Trawlers.		Steamers Danish-seining.		Motor-vessels Danish-seining.		Motor-vessels, Set-net and Line Fishing.		Sailing-boats.		Rowing-boats.		Oyster-dredging Vessels.		Mussel-dredging Vessels.		Crayfishing Vessels.		Fishermen.		Others.		Total.	
	Whole Time.	Part Time.	Whole Time.	Part Time.	Whole Time.	Part Time.	Whole Time.	Part Time.	Whole Time.	Part Time.	Whole Time.	Part Time.	Whole Time.	Part Time.	Whole Time.	Part Time.	Whole Time.	Part Time.	Whole Time.	Part Time.	Whole Time.	Part Time.	Whole Time.	Part Time.	Whole Time.	Part Time.
Russell	..	..	..	..	..	..	..	..	10	21	..	..	..	23	..	..	..	..	..	3	20	65	..	..	20	65
Kaipara	..	..	..	..	..	..	..	..	24	..	..	..	..	2	..	..	..	..	..	..	33	2	..	..	33	2
Whangarei	..	..	..	..	..	..	..	..	17	4	..	..	..	3	..	..	..	..	1	..	36	11	4	2	40	13
Auckland	1	2	..	..	..	..	31	7	82	53	1	10	45	45	..	..	1	1	..	30	320	128	80	..	400	128
Thames	..	..	..	..	..	..	4	..	24	2	..	..	2	2	..	..	2	..	..	..	87	3	18	2	105	5
Mercury Bay	..	..	..	..	..	..	..	..	6	13	..	1	..	..	..	..	..	..	..	18	13	18	2	6	15	24
Tauranga	..	..	..	..	..	..	1	2	10	10	..	..	..	..	..	..	..	..	..	..	25	..	4	..	29	..
Opotiki	..	..	..	..	..	..	..	2	..	..	..	..	..	4	..	..	..	..	..	2	2	6	..	..	2	6
Gisborne	1	..	..	..	..	..	..	..	14	..	..	..	4	9	..	..	..	..	..	27	32	22	..	..	32	22
Napier	..	10	..	1	..	..	..	..	..	21	..	..	..	40	..	..	..	..	..	10	..	140	15	8	15	148
New Plymouth	..	..	..	..	..	..	..	..	16	9	..	..	..	6	..	..	..	..	..	9	33	40	..	6	33	46
Wanganui	..	..	..	..	..	..	..	..	..	21	..	..	..	3	..	..	..	..	..	..	..	23	..	4	..	27
Wellington and district	1	..	..	..	..	..	..	..	50	40	..	..	6	56	..	..	..	..	..	42	180	227	13	40	193	267
Picton	..	1	..	..	..	..	..	..	22	20	..	..	6	4	..	..	..	..	..	..	37	46	..	..	37	46
Blenheim (Wairau)	..	..	3	4	..	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..	7	10	..	..	7	10
Nelson	..	2	..	..	2	..	10	1	6	7	..	..	..	3	..	..	..	..	..	2	32	20	5	2	37	22
Westport	1	..	..	..	..	..	..	..	..	7	..	..	..	..	..	..	..	..	..	2	2	7	..	..	2	7
Greymouth	1	..	1	..	1	..	..	..	..	11	..	..	..	10	..	..	..	..	..	..	11	33	..	..	11	33
Kaikoura	..	..	..	..	..	..	..	..	20	..	..	..	..	..	..	..	..	..	2	..	34	..	1	..	35	..
Akaroa	..	..	3	2	..	..	..	1	5	3	..	..	..	4	..	..	..	..	..	8	12	20	..	14	12	34
Lyttelton	1	2	11	3	..	..	..	3	55	5	5	5	32	72	..	..	..	..	..	16	200	80	23	..	223	80
Timaru	..	..	..	29	..	..	..	5	..	..	..	..	..	1	..	..	..	..	..	..	3	42	3	..	6	42
Oamaru	..	..	..	..	..	..	..	..	10	4	..	..	..	..	..	..	..	..	..	..	17	6	1	4	18	10
Moeraki	..	..	..	..	..	..	..	..	13	8	..	..	..	..	..	..	..	..	..	8	20	10	3	1	23	11
Dunedin and Otago district	2	..	9	17	..	..	..	..	41	33	..	..	12	14	..	..	..	..	..	19	190	50	20	3	210	53
Invercargill and district	..	..	..	..	..	..	..	..	..	40	..	..	..	10	..	..	..	..	..	..	..	130	..	..	..	130
Bluff	..	..	..	..	..	..	..	..	50	..	..	..	..	..	7	..	..	..	..	..	187	..	25	..	212	..
Stewart Island (Half-moon Bay)	..	..	..	..	..	..	..	..	35	..	..	..	..	..	..	..	..	..	..	..	96	..	10	1	106	1
Chatham Islands	..	..	..	..	..	..	..	..	17	..	..	..	..	..	..	..	..	..	..	..	44	..	15	..	59	..
Total	8	17	27	56	3	..	46	21	527	332	6	16	107	314	7	..	3	1	3	196	1,673	1,139	242	93	1,915	1,232

TABLE II.—SHOWING THE VARIOUS KINDS OF FISH CAUGHT AND APPROXIMATELY THE TOTAL QUANTITIES OF FISH* AND SHELL-FISH LANDED AT THE CHIEF FISHING-PORTS FOR THE YEAR ENDED 31ST MARCH, 1934.

Name of Port.	Principal Kinds of Fish caught.	Quantity landed.	Total Value (Fish).	Shell Fishery (excluding Toheroa).							Grand Total Value.
				Oysters.	Value.	Mussels.	Value.	Crayfish.	Value.	Total Value (Shell-fish)	
		Cwt.	£	Sacks.	£	Sacks.	£	Cwt.	£	£	£
Russell	Snapper, mullet, flounder, hapuku, crayfish, piper, kingfish, tarakihi, gurnard, maomao	840	784	..	..	..	..	160	149	149	933
Kaipara	Flounder, snapper, mullet	2,979	4,000	..	..	..	..	..	..	..	4,000
Whangarei	Snapper, flounder, hapuku, mullet, blue cod	4,931	7,506	..	..	..	..	..	..	..	7,506
Auckland (including Manakau and Coromandel)	Snapper, flounder, tarakihi, hapuku, gurnard, dogfish, dory, mullet, crayfish, blue cod, kingfish, trevally, frost-fish, barracouta, piper, herring, oysters (rock), mussels, sardines	91,512	65,498	4,717	5,254	3,500	875	1,587	1,420	7,549	73,047
Thames	Snapper, flounder, dab, mullet, gurnard, dory, herring, pioke	17,412	13,595	..	..	1,388	434	..	..	434	14,029
Mercury Bay	Snapper, tarakihi, groper, gurnard, blue cod, flounder, kingfish	1,663	1,302	..	..	..	..	2,348	1,072	1,072	2,374
Tauranga	Snapper, hapuku, tarakihi, gurnard, trevally, dogfish, mullet, blue cod	6,046	4,053	..	..	..	..	..	..	..	4,053
Opotiki	Snapper, flounder, groper, gurnard, tarakihi	129	427	..	..	..	..	..	..	..	427
Gisborne	Tarakihi, snapper, hapuku, gurnard, sole, flounder, kahawai, crayfish	3,281	4,593	..	..	..	..	..	..	..	4,593
Napier	Tarakihi, gurnard, sole, flounder, snapper, hapuku, barracouta, john-dory, moki, trevally, kingfish, kahawai, brill, mullet, warehou	11,325	9,942	..	..	..	..	96	54	54	9,996
New Plymouth	Snapper, hapuku, cod, crayfish, tarakihi, gurnard, herring, kingfish, kahawai	3,772	4,428	..	..	..	..	126	143	143	4,571
Wanganui	Snapper, hapuku, blue cod, flounder	244	298	..	..	..	..	..	..	..	298
Wellington	Tarakihi, hapuku, hake, ling, bass, crayfish, warehou, moki, flounder, sole, butterfish, kahawai, blue cod, trevally, snapper, gurnard, bream, kingfish, skate, garfish, red cod, conger, kelpfish	43,477†	54,025	..	..	..	..	712	450	450	54,475
Picton and Pelorus Sound	Flounder, butterfish, garfish, moki, blue cod, herring (bait), hapuku, crayfish	3,280	3,121	..	..	..	..	..	..	..	3,121
Blenheim (Wairau)	Sole, flounder, tarakihi, gurnard, butterfish, snapper, moki, red cod, hapuku, crayfish	3,060	2,470	..	..	..	..	..	..	..	2,470
Nelson	Snapper, flat fish, gurnard, blue cod, bream, hapuku, crayfish	3,558	3,569	..	..	..	..	80	96	96	3,665
Westport	Sole, flounder, turbot, groper, snapper, red cod	513	731	..	..	..	..	16	16	16	747
Greymouth	Sole, groper, snapper, turbot, flounder, herring, red cod, ling	4,547	3,849	..	..	..	..	..	..	..	3,849
Kaikoura	Groper, trumpeter, hake, ling, tarakihi, bass, blue cod, crayfish	4,431	5,220	..	..	..	..	..	..	..	5,220
Akaroa	Groper, flounder, sole, brill, blue cod, red cod, barracouta, moki, butterfish, kingfish, conger-eel	4,297	3,828	..	..	..	..	1,197	834	834	4,662
Lyttelton	Flat fish, groper, tarakihi, ling, elephant-fish	11,172	10,110	..	..	..	..	..	..	..	10,110
Timaru	Flounder, sole, groper, red cod, ling, kingfish, elephant-fish, barracouta, brill, gurnard	11,519	14,974	..	..	..	..	..	..	..	14,974
Oamaru	Groper, blue cod, red cod, ling, barracouta, moki, warehou, sole, crayfish	3,050	3,085	..	..	..	..	..	..	..	3,085
Moeraki	Groper, blue cod, red cod, ling, crayfish	1,830	1,880	..	..	..	..	2,600	1,260	1,260	3,140
Dunedin and Otago districts	Groper, kingfish, blue cod, flounder, sole, brill, bream, trevally, garfish, red cod, tarakihi, barracouta, moki, trumpeter, ling, mullet, red perch, kelpfish, elephant-fish, kahawai, skate	50,320	35,224	..	..	..	..	..	..	..	35,224
Invercargill and district	Blue cod, groper, flounder, green-bone, trevally, ling, king-fish, crayfish	1,227	1,795	..	..	..	..	..	..	..	1,795
Bluff	Blue cod, flounder, groper, green-bone, trevally, ling, king-fish, crayfish	7,243	11,103	42,176	21,088	..	..	..	..	21,088	32,191
Stewart Island	Blue cod, groper, trumpeter, green-bone, moki	8,982	8,580	..	..	..	..	..	..	..	8,580
Chatham Islands	Blue cod, hapuku	6,679‡	3,117	..	..	..	..	..	..	..	3,117
	Totals	313,319	283,107	46,893	26,342	4,888	1,309	8,922	5,494	33,145	316,252

* Not including whitebait. to Wellington and Lyttelton.

† Includes 2,462 cwt. blue cod, valued at £4,500, caught at the Chatham Islands and marketed in Wellington.

‡ Exclusive of 10,085 cwt. of blue cod and 487 cwt. of groper shipped direct

TABLE IIA.—SHOWING APPROXIMATELY THE QUANTITIES OF DIFFERENT KINDS OF FISH LANDED AT CERTAIN PORTS DURING THE YEAR ENDED 31ST MARCH, 1934.

—	Russell.	Kaipara.	Whangarei.	Auckland.	Thames.	Mercury Bay.	Tauranga.	Opotiki.	Napier.	Kawhia.	New Plymouth.	Wanganui.	Wellington.	Blenheim.	Nelson.	Westport.	Greymouth.	Lyttelton.	Oamaru.	Moeraki.	Invercargill.	Bluff.	Stewart Island.	Chatham Islands.
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
Barracouta	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8	..	..	110	..	..	..	..	..
Blue-cod	..	..	286	142	..	3	39	..	..	..	31	10	4,100	..	34	18	..	..	150	420	584	6,719	8,221	16,764*
Butterfish	..	..	..	..	..	..	..	..	..	..	..	..	..	120	..	..	..	..	..	..	..	..	..	..
Frost-fish	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Flounders, dabs, and soles	180	1,571	280	6,607	4,869	..	..	15	5,386	210	..	50	..	2,400	842	279	3,299	3,200	..	..	168	123	..	..
Garfish (piper) ..	20	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Groper (hapuku) ..	100	..	385	2,359	4	139	746	18	741	18	346	21	8,200	20	135	128	588	300	2,460	990	438	401	761	487†
Gurnard	..	..	..	413	865	5	..	20	1,657	..	20	7	..	180	75	13	137	..	..	..	..	..	..	..
Herring	..	..	..	..	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
John-dory	..	..	..	911	195	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Hake	..	..	..	..	..	..	..	..	..	..	..	..	2,050	..	..	..	57	..	..	..	..	..	..	..
Kahawai	..	..	..	..	..	..	..	..	..	..	..	..	..	..	20	..	..	..	..	..	..	..	..	..
Kingfish (northern) ..	20	..	..	7	9	..	27	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ling	..	..	..	..	..	..	..	..	..	..	..	..	4,100	..	..	23	54	1,000	110	70	..	..	..	..
Maunau	40	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Moki	..	..	..	..	1	..	..	..	..	..	..	..	..	70	..	..	..	..	30	..	..	..	..	..
Mullet	80	580	290	421	103	..	62	..	..	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Pioke	..	..	..	..	577	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Red cod	..	..	..	..	..	..	..	..	..	..	..	..	..	150	40	..	237	..	190	350	..	..	..	..
Sardines	..	..	..	31	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Snapper	400	678	3,245	60,540	10,429	1,307	3,938	70	404	298	3,355	156	..	50	1,163	17	58	..	..	..	..	..	..	..
Tarakihi	..	..	..	10,766	..	111	780	6	2,920	..	20	..	8,200	70	..	..	64	3,000	..	..	..	..	..	..
Turbot	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15	51	..	..	..	..	..	..	..
Trevally	..	..	..	600	1	..	54	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mixed or kind not specified	..	150	445	6,863	351	98	400	..	217	..	..	..	14,365	..	1,249	2	..	3,672	..	..	37	..	..	..
Totals ..	840	2,979	4,931	89,660	17,411	1,663	6,046	129	11,325	530	3,772	244	41,015	3,060	3,558	503	4,547	11,172	3,050	1,830	1,227	7,243	8,982	17,251

* Includes 10,085 cwt. of blue-cod shipped direct to Wellington.

† Shipped direct to Wellington and Lyttelton.

TABLE III.—SHOWING THE NUMBER OF SACKS AND VALUE OF THE OYSTERS OBTAINED IN THE DOMINION DURING THE YEAR ENDED 31ST DECEMBER, 1933.

Locality.	Quantity.	Value (Wholesale).
DREDGE OYSTERS.	Sacks.	£
Foveaux Strait	42,176	21,088
ROCK OYSTERS.		
Bay of Islands	1,762	5,254
Kaipara Harbour	853	
Hauraki Gulf*	1,802	
Coromandel	300	
Total	4,717	
Grand total	46,893	26,342

* Takatu to Gull Point, 192; South Shore Tamaki Straits, 56; Kawau, 144; Rakino, 168; Rangitoto, 385; Motutapu, 117; Brown's Island, 24; Motuihi, 28; Waiheke, 555; Ponui, 133.

TABLE IV.—SHOWING THE NUMBER AND SPECIES OF WHALES TAKEN OFF THE NEW ZEALAND COAST, WITH QUANTITY OF PRODUCTS FOR THE YEAR ENDED 31ST MARCH, 1934.

Whaling-station.	Number of Whales taken.	Species.	Yield of Oil.	Quantity of Bonedust and Fertilizer.
			Tons.	
Whangamumu (Russell)	3	Humpback	3	Nil
Marlborough Sounds (Picton)	41	„	205	Nil

NOTE.—The above record for Whangamumu refers to special operations off Cape Brett undertaken for the purpose of obtaining motion pictures of the whaling. Ordinary commercial operations were suspended for this season.

TABLE V.—SHOWING THE TOTAL QUANTITY AND VALUE OF FISH AND SHELL-FISH IMPORTED INTO AND EXPORTED FROM NEW ZEALAND DURING THE YEAR ENDED 31ST MARCH, 1934.

Fish and Shell-fish imported.

Description of Fish.	Quantity.	Value.
		£
Oysters	Nil	..
Anchovies, salted, in containers of 28 lb. or over	43 cwt.	76
Other fish—		
Frozen, smoked, pickled, dried, or salted	770 cwt.	2,381
Potted and preserved in tins	2,141,325 lb.	68,622
	..	71,079

TABLE V (*continued*).—SHOWING THE TOTAL QUANTITY AND VALUE OF FISH AND SHELL-FISH IMPORTED INTO AND EXPORTED FROM NEW ZEALAND DURING THE YEAR ENDED 31ST MARCH, 1934.

Fish and Shell-fish exported.

Description of Fish.	Exporting Ports.	Quantity.	Value.
Produce of New Zealand.			£
Oysters, fresh	Auckland	554 doz.	10
	Wellington	2,407 doz.	69
	Lyttelton	..	..
	Invercargill (Bluff)	102,980 doz.	966
	Total	105,941 doz.	1,045
Blue cod, frozen	Auckland	..	..
	Wellington	8,972 cwt.	17,222
	Lyttelton	103 cwt.	192
	Dunedin	40 cwt.	78
	Oamaru	4 cwt.	6
	Invercargill (Bluff)	8,293 cwt.	15,921
	Total	17,412 cwt.	33,419
Snapper, frozen	Auckland	4,326 cwt.	5,612
	Wellington	81 cwt.	160
	Total	4,407 cwt.	5,772
Flounder, frozen	Auckland	1,615 cwt.	3,190
	Wellington	359 cwt.	659
	Lyttelton	741 cwt.	1,271
	Dunedin	393 cwt.	861
	Oamaru	5 cwt.	11
	Invercargill (Bluff)	317 cwt.	720
	Total	3,430 cwt.	6,712
Other kinds, frozen	Auckland	3,429 cwt.	5,383
	Wellington	1,685 cwt.	2,750
	Lyttelton	1,225 cwt.	2,688
	Dunedin	2,759 cwt.	7,296
	Oamaru	50 cwt.	56
	Invercargill (Bluff)	341 cwt.	593
	Total	9,489 cwt.	18,766
Total exports of frozen fish from Dominion	,,	34,738 cwt.	64,669
Smoked, dried, pickled, or salted	,,	1,243 cwt.	2,377
Preserved in tins—			
Blue cod	,,	..	..
Crayfish	,,	280,228 lb.	16,639
Oysters	,,	128,028 lb.	4,571
*Toheroas	,,	19,266 lb.	1,619
*Whitebait	,,	84,788 lb.	7,497
Other kinds	,,	..	..
Value of total exports of New Zealand fish and shellfish	,,	..	98,417
Re-exports.			
Potted and preserved in tins	..	9,133 lb.	366

* Exporting Ports.	Toheroas.		Whitebait.	
	Quantity.	Value.	Quantity.	Value.
	lb.	£	lb.	£
Auckland	19,046	1,602	26,466	2,241
Wellington	..	..	8,251	622
Westport	..	..	..	..
Greymouth	..	..	2,852	224
Lyttelton	..	..	3,366	114
Dunedin	220	17	42,981	4,227
Invercargill (Bluff)	..	..	872	69
Totals	19,266	1,619	84,788	7,497

APPENDICES.

APPENDIX I.

ORDERS IN COUNCIL UNDER PARTS I AND II OF THE FISHERIES ACT, 1908.

PART I.

10th April,	1933.	Amending Regulations for Whitebait Fishing in Hawke's Bay Provincial District.
19th June,	,,	Amending Regulations *re* Maori Oyster Reserves, Kaipara Harbour.
21st July,	,,	Making Regulations for Whitebait Fishing in Lakes Onoke and Wairarapa and the Ruamahanga and Turanganui Rivers.
28th August,	,,	Amending Regulations for Whitebait Fishing in Mataura and Oreti Rivers.
25th September,	,,	Amending Regulations *re* Size of Mesh of Nets in Southland District.
17th October,	,,	Fixing Netting Limits in Ashley and Waimakariri Rivers.
17th ,,	,,	Amending Regulations as to Size of Hand Nets for taking Whitebait.

PART II.

10th July,	1933.	Amending Regulations for Trout Fishing in Buller Acclimatization District.
7th August,	,,	Amending Regulations for Trout Fishing in the Waimarino Acclimatization District.
7th ,,	,,	Amending Regulations for Trout Fishing in Nelson Acclimatization District.
21st ,,	,,	Amending Regulations for Trout Fishing in Wellington Acclimatization District.
4th September,	,,	Amending Regulations for Trout Fishing in Auckland Acclimatization District.
18th ,,	,,	Revoking Regulations for Trout Fishing in North Canterbury Acclimatization District and making others in lieu thereof.
18th ,,	,,	Amending Regulations for Trout Fishing in Southland Acclimatization District.
18th ,,	,,	Revoking Regulations for Atlantic Salmon Fishing in Southland Acclimatization District and making others in lieu thereof.
25th ,,	,,	Amending Regulations for Trout Fishing in Taranaki Acclimatization District.
10th January,	1934.	Increasing Minimum Penalty for polluting Rivers.
26th March,	,,	Amending Regulations for Trout Fishing in Southland Acclimatization District.

Section 7 (2) of the Harbours Act Amendment Act, 1933, repealed clause (*e*) of subsection (1) of section 78 exempting fishing-vessels from the payment of dues. Section 7 (1) provided for a maximum charge of 1d. per ton per day for berthage.

APPENDIX II.

AVERAGE TEMPERATURE OF SEA-WATER (AT THE SURFACE) FOR EACH MONTH OF THE YEAR AT FOUR DIFFERENT STATIONS.

	Auckland Harbour (off Nelson Street Wharf).			Tamaki Estuary (off Panmure).			Bay of Islands (off Russell).			Kaipara Harbour (Whakapirau Estuary).		
	1931–32.	1932–33.	1933–34.	1931–32.	1932–33.	1933–34.	1931–32.	1932–33.	1933–34.	1931–32.	1932–33.	1933–34.
	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.	°C.
May	14·7	15·4	15·6	14·1	14·9	15·1	15·4	16·1	15·7	15·1	15·7	14·5
June	12·8	12·9	12·5	11·9	12·8	..	14·1	15·0	13·9	12·4	12·6	10·7
July	12·5	11·6	11·7	11·3	10·9	11·4	13·2	13·3	13·6	11·2	11·6	10·9
August	11·8	11·6	11·6	11·4	11·3	11·4	12·2	13·4	13·4	12·2	11·3	14·5
September ..	13·0	14·2	13·9	13·2	13·4	14·0	13·1	15·2	14·7	13·6	15·0	15·1
October	15·6	17·1	15·7	15·9	16·7	12·9	14·7	17·0	16·0	13·8	17·1	15·4
November ..	19·4	18·3	17·2	20·8	19·3	21·1	17·1	17·9	16·7	19·5	19·2	16·9
December ..	19·5	19·2	20·6	19·6	19·1	20·5	18·2	18·3	20·2	21·6	21·1	23·0
January	20·9	22·2	19·4	21·2	23·1	20·3	20·7	20·8	20·7	23·6	22·3	22·8
February ..	21·5	22·0	20·3	20·8	22·8	21·9	19·8	21·3	20·9	23·7	23·0	21·2
March	20·7	20·9	19·9	20·4	20·1	..	19·6	20·2	19·2	20·2	22·0	19·2
April	19·2	18·9	18·8	19·1	18·9	17·0	18·7	19·2	19·2	18·5	20·2	17·0

APPENDIX III.

NOMENCLATURE.

LIST SHOWING POPULAR AND SCIENTIFIC NAMES OF FISH, CRUSTACEA, AND MOLLUSCA MENTIONED IN REPORT.

Popular Names.	Scientific Names.
FISHES—	
Barracouta	*Thyrsites atun* (Euphrasen).
Bass (or bass groper)	*Polyprion americanus* (Bloch. and Schn.).
Blue cod	*Parapercis colias* (Forster).
Brill	*Colistium ammotretis guntheri* (Hutton).
Butterfish (= greenbone or kelp-fish)	*Coridodax pullus* (Forster).
Dab (commonly included among flounder)	*Rhombosolea plebeia* (Richardson).
Elephant-fish	*Callorhynchus milii* (Bory).
Flounder	*Rhombosolea leporina* Guenther.
Frost fish	*Lepidopus caudatus* (Euphrasen).
Greenbone (= butterfish)	*Coridodax pullus* (Forster).
Groper (= hapuku)	*Polyprion oxygeneios* (Bloch. and Schn.).
Gurnard	*Chelidonichthys kumu* (Lesson and Garnot) and *Lepidotrigla brachyoptera* Hutton.
Hake (= southern kingfish)	*Jordanidia solandri* (Cuv. and Val.).
Hapuku (= hapuka or whapuku)	*Polyprion oxygeneios* (Bloch. and Schn.).
Herring (= South Island mullet)	*Agonostomus forsteri* (Cuv. and Val.).
"Picton herring" (= pilchard or sardine)	*Sardinia (Clupea) neopilcharda* (Steindachner).
John Dory (or dori)	*Zeus faber* Linnæus.
Kahawai	*Arripis trutta* (Forster).
Kingfish (northern)	*Seriola lalandi* (Cuv. and Val.).
Kingfish (southern)	*Jordanidia solandri* (Cuv. and Val.).
Ling	*Genypterus blacodes* (Bloch. and Schn.).
Maomao (maumau)	*Scorpis violaceus* (Hutton).
Moki	*Latridopsis ciliaris* (Forster).
Mullet (northern)	*Mugil ?cephalus* Linnæus.
Mullet (southern) (= herring)	*Agonostomus forsteri* (Cuv. and Val.).
Pioke (dog-fish)	*Squalus fernandinus* (Molina).
Piper (garfish)	*Hemirhampus intermedius* Cantor.
Red cod	*Physiculus bachus* (Bloch. and Schn.).
Rock-cod	*Lotella rhacinus* (Forster).
Sardine	*Sardinia (Clupea) neopilcharda* (Steindachner).
Skate	*Raja nasuta* Mueller and Henle.
Snapper	*Pagrosomus auratus* (Forster).
Sole	*Peltorhampus novae-zeelandiae* Guenther.
Tarakihi	*Dactylopagrus macropterus* (Forster).
Trevally	*Caranx platessa* (Cuv. and Val.).
Trumpeter	*Latris lineata* (Forster).
Turbot	*Colisteum nudipinnis* (Waite).
Warehou	*Seriolella brama* (Guenther).
Whitebait	*Galaxias attenuatus* (Jenyns).
CRUSTACEA—	
Crayfish	*Jasus lalandii* (Milne-Edwards) and *J. hugeli* (Heller).
Whale-feed	*Munida gregaria* Fabricius.
MOLLUSCA—	
Borer	*Thais scobina* Quoy and Gaimard.
Cockle (or Pipi)	*Chione (Antigona) stutchburyi* Gray.
Mussel	*Mytilus canaliculus* Martyn.
Oyster, dredge	*Ostrea sinuata* Lamarck (*O. angasi* Sowerby).
Oyster, rock	*O. glomerata* Gould.
Pipi	*Chione, Dosinia, Mesodesma subtriangulatum*, &c.
Pupu	*Thais succincta* Martyn.
Toheroa	*Mesodesma (Amphidesma) ventricosa* Gray.

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