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NEW ZEALAND.

NATIVE FORESTS AND THE STATE OF THE TIMBER-TRADE

(REPORT ON), BY T. KIRK, F.L.S.

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

Professor KIRK to the Hon. the MINISTER of LANDS.

SIR,—

Wellington, 16th November, 1885.

In compliance with your instructions I have the honour to inclose herewith a report on the general character and condition of native forests and the state of the timber trade, so far as my examination has extended.

In my final report I purpose describing the forests of the East Cape and the southern districts of the North Island.

The Hon. the Minister of Lands.

I have, &c.,

T. KIRK.

PART I.

SOUTHLAND.

THE total area of Southland is 2,279,657 acres, of which 345,197 acres, covered with timber of greater or less value, were reserved by the Crown. The proportion of this area denuded by the sawmiller is estimated by the Crown Lands Commissioner at 32,730 acres, leaving 312,467 acres of so-called virgin forest, which, however, in many cases has been indented upon by settlers. If we deduct mountain-forest and light lowland areas, where the timber is too thinly scattered to pay for the erection of mills, the area comprising convertible timber will be reduced to less than 200,000 acres; and of this, again, there are large sections which are not likely to be rendered available for many years to come—such, for instance, as the Takatimos Forest and the Eyre Mountain bush, the two together containing nearly 70,000 acres; the Takatimos, which I was unable to visit, being said to contain a large proportion of good timber, although in situations not easy of access.

The area reserved as Crown forest does not include all the timber-land in the district, portions having been alienated from time to time. Much of this has been cleared, but in a few cases the purchasers had the foresight to preserve the timber, and are now reaping the benefit of their prudent conduct. About seven sawmills are being worked exclusively in private forests.

DISTRIBUTION.

The greater portion of the forest lies in the southern part of the district: nearly one-half is found between the Waiau River and the Oreti, the remainder between the Oreti and the Mataura. The most extensive forest is the Longwood, which occupies the south-eastern corner of the district between Riverton and the Waiau, extending for fourteen or fifteen miles along the eastern bank of the river, with several outlying bushes in the Wairio District and small isolated patches in the Waiau Valley. Crossing the Wairaki River and skirting the western slopes of the Takatimos a nearly treeless district is entered, patches of forest being found at two places only, Bellmount Station and Blackmount.

Southwards the Takatimos Forest occupies the western slopes of the range, several isolated patches being situate on the lower ground. Still farther to the south Spar Bush and Waimatuku Bush will complete the enumeration of Crown forests in the western half of the district. On the eastern side Seaward Forest extends irregularly from the New River to the Mataura River. On the western side of the estuary the Otatara Bush, now cut out, nearly joins the Makarewa Bush on the north. Grove Bush, with the Titipua and sundry smaller bushes, lie to the eastward. To the north, Forest Hill and Winton Bushes cover a large area, but are excelled by the Hokonui or Dunsdale Forest, with Croydon Bush extending nearly to Gore. In the extreme northern part of the district is the Eyre Mountain Bush, chiefly consisting of mountain-beech.

The proceeding statement is sufficient to show that large tracts of country in the interior, between the Oreti and the Waiau, are destitute of timber, and that the same condition is characteristic of the north-eastern portion of the district from Dunsdale Forest to the northern boundary of Southland.

The chief timber of Southland is the red-pine or rimu, which is converted to a greater extent than in any other part of the colony at the present time. White-pine is not unfrequent, but, on the whole, is less plentiful than matai or black-pine; totara is not uncommon, but seldom occurs in any large quantity; kamai is abundant in all the bushes, but is seldom converted; miro is coming into demand for marine piles; silver-beech occurs in abundance on the western side of the district and sparingly in the Forest Hill and Winton District. Mountain-beech is found at the head-waters of the Oreti, but tooth-leaved beech, the most valuable of all, appears rare and local.

With the object of affording a more definite idea of the character of the forests of Southland it will be advisable to give detailed descriptions of three separate areas, each of which may be taken as a type of a class.

SEAWARD FOREST.

This was originally one of the largest tracts of forest-land in the district; but, from its proximity to Invercargill, and from the advantages afforded by the railway to the Bluff, it has been so extensively worked by sawmillers that not more than 18,000 acres remain untouched, and of this only a limited portion affords timber of the first quality.

Nine sawmills are now in operation in this bush; some of them being amongst the largest in the district. In all probability the total annual yield amounts to nearly one-half of the entire quantity converted in the Southland District.

The great bulk of the timber is rimu or red-pine; next in quantity comes kamai (*Weinmannia racemosa*), sometimes termed red-birch by bushmen. Kahikatea or white-pine, matai or black-pine, and totara occur in varying quantity in different sections of the forest, but are rarely plentiful. In addition, fine specimens of miro are not unfrequent in some places, but are seldom converted, although the timber is of considerable value for inside work. Broadleaf occurs but sparingly, together with horoeka or lancewood, pokaka, toatoa, and occasionally tea-tree of sufficiently large dimensions to be used for small piles.

Red-pine is the chief timber converted in the Seaward Forest, and in the Southland District generally. It varies somewhat in quality. The Seaward Forest is remarkable for the straight, clean growth of this timber, although the dimensions attained are not so large as in other places: the average being from 30ft. to 40ft. in length, and from 16in. to 30in. in diameter. Trees of less than 12in. in diameter are not allowed to be used. The timber is straight-grained, close, and silky, so that it is easily worked, but the proportion of sap is sometimes rather large. Massive trees are occasionally met with, sometimes with trunks 40ft. long, and from 3ft. to 4ft. in diameter, affording timber of durable quality, as it contains a large quantity of resin. The sawmillers are of opinion that timber from these large specimens is equally durable with matai, and might be advantageously utilized for railway-sleepers and similar purposes. As a general rule, the timber produced by trees of smaller dimensions is preferred by the carpenter, on account of its being more easily worked.

The great abundance and regular growth of red-pine of moderate dimensions is most remarkable, and greatly facilitates profitable conversion. It might be expected that sawmillers would be able to give some definite estimate as to the average yield of converted timber per acre, but they are by no means agreed on the subject, as their estimates varied from 3,000 to 25,000 superficial feet. Mr. Murdoch, who is regarded as the founder of the Southland timber-trade, and who is the largest millowner in the district, stated that he considered the average amount of royalty ought to be £2 per acre or rather more, at the low rate of 3d. per 100 superficial feet, paid by the Southland millers. This would require a yield of 16,000ft. of manufactured timber. My own estimate, based upon the actual measurement of standing timber, leads me to consider the average minimum yield per acre between 20,000ft. and 21,000ft. It will be necessary to consider the subject at greater length in another part of my report.

Compared with the red-pine, totara and black-pine and other convertible timbers are rare; they usually sell at more than double the price of red-pine, but the sawmillers pay the same low rate of royalty as on the red- and white-pine, 3d. per 100 superficial feet.

White-pine sometimes occurs in greater abundance and of larger dimensions, usually of excellent quality. It sells at the same rate as red-pine. Miro may often be found of good dimensions; although seldom converted, it is now in demand for marine piles, and fetches a fair price.

At present nothing has been done in the way of utilizing the tops and waste branches for the manufacture of charcoal, tar, or pitch, &c., and no attempts have been made to extract the resin which is so abundant in the red-pine that it forms solid masses in any shakes or cracks that may be developed during the growth of the tree.

The Seaward Forest is of a remarkably level character, so that the construction of tramways is rendered easy and inexpensive. In some places it is swampy, and everywhere sufficiently moist and cool to encourage a most luxuriant growth of arborescent ferns.

LONGWOOD FOREST.

The Longwood Forest is by far the largest in Southland: it extends from Jacob's River to the Waiau; its extreme length from north to south being about eighteen miles, and its breadth about sixteen; so that, although of irregular outline, its boundaries include half a million acres, but the timber on certain portions is of indifferent quality, and a considerable acreage has been alienated. About 120,000 acres have been reserved for sawmill leases; at the present time five mills are working on Crown land and two on freehold. The gradual exhaustion of the Seaward Forest, combined with the increased facilities for cheap transport afforded by the opening of the railway from Riverton to Orepuki, will speedily lead to a large development of the timber-trade in this district.

The Orepuki Railway traverses the forest from Riverton to the Orepuki Goldfield and Coal-mines, a distance of about eighteen miles, thus affording a ready means of transport to other parts of the colony, and facilitating shipment coastwise from Riverton, Invercargill, and the Bluff.

The forest rises from the sea-beach to near the crests of the Longwood Ranges, and in some places is rather broken by deep hollows. Between Riverton and Orepuki there is a large extent of level land, in which the timber presents similar features to that of the Seaward Forest, but in many it is of somewhat larger dimensions, although in this respect there is a great amount of variation. This may be seen alongside of the railway-line. A few miles from Riverton much of the standing timber is of fair or even large dimensions, although in some cases the trees are scattered, but after passing Colac the trees are thickly set, straight and clean grown, of long length but of small diameter, rather too small, in fact, for profitable conversion: again, between Pahia and the Round Hill the trunks are above the average in diameter and length, while the quality is remarkably good. So far as I was able to examine the forest, it was composed of red-pine, white-pine, matai, miro, totara, akamai, broadleaf, and iron-wood—the most abundant being generally the red-pine and akamai.

The silver-beech descends nearly to the sea-level, about Lake George, where it is confined to the neighbourhood of the lake. In all probability it will be found in larger quantity on the upper portions of the Longwood Range. It is plentiful on the eastern and northern margins of the forest, and, notwithstanding its perishable character, is largely used for fencing purposes. The ironwood or rata (*Metrosideros lucida*), is but rarely utilized in the district; it is dense, heavy, and durable, but its great weight increases the cost of conversion to such an extent that it is rarely seen at the saw-mill. Like its congener, the pohutukawa of the north, it exhibits a marked preference for the vicinity of the sea, but ascends the mountains to the altitude of fully 3,000ft., and is not unfrequent throughout the Southland forests. It is especially plentiful on the Native reserves of Oraka and Kawakaputaputa, where it will doubtless be utilized for shipbuilding at no distant day.

The akamai or kamai of the bushman is plentiful, and in some sections of the Longwood attains large dimensions. Although durable it cracks badly when exposed to the atmosphere; but there is reason to believe that this peculiarity is largely due to the felling and conversion of the logs during the period of active growth. The bark contains over 12 per cent. of tannin. If this timber could be generally utilized for sleepers or similar purposes I am convinced that the value of the southern forests would be increased some 15 or 20 per cent.

In the vicinity of the Orepuki gold mines the forest is of a mixed character, the rimu or white-pine attaining large dimensions, and affording timber of excellent quality; broadleaf is also common, with black-pine and miro, affording an abundant supply of high-class timber for both gold and coal miners. About Pahia, and between Pahia and the Round Hill diggings, the timber is of still larger dimensions. Totara is met with, but was not abundant in any part of the forest visited by me.

I am unable to state the extent of the forest-area reserved for mining leases, but it is very small when compared with the total.

THE HOKONUI OR DUNSDALE FOREST.

This fine forest occupies the northern slope of the valley of the Hedgehope, about twelve miles from Gore, and extends in a north-west direction to within ten miles of Limekilns. It contains about 34,000 acres, of which 21,000 acres have been set apart as a permanent forest-reserve, portions of the remainder having been alienated from time to time. The forest is somewhat broken, but not to such an extent as to render the removal of logs a matter of difficulty. In some respects it bears a close resemblance to the forest at the base of the Longwood Range, but the timber is generally of larger dimensions, the soil being of somewhat better quality.

In some parts of the forest red-pine logs of long lengths, and squaring 24in. by 24in. and 26in. by 26in., are not unfrequent, and are well grown; white-pine, although not abundant, is usually of large dimensions; matai or black-pine occurs in larger quantities than usual, and is for the most part of large size; kamai often attains exceptional dimensions; ironwood is comparatively rare in those parts of the forest which I was able to examine, but its absence was more than compensated by the occasional occurrence of clumps of tooth-leaved beech of good growth, and by a fair sprinkling of totara of medium size. Thickly-set red-pines of long lengths, but small diameter—characteristic of the Seaward Forest and the lower parts of the Longwood—are altogether wanting; but the quality of the timber is not surpassed by that of any Southland forest, while the large proportion of matai and totara increases the value of the block.

The destruction of any large portion of the forest would involve serious results to many settlers in the valley of the Dunsdale and the Hedgehope, as well as in the lower part of the Titipua. The Hedgehope takes its rise near the north-eastern corner of the forest, and, after flowing through the low lands on its eastern and southern sides, is joined by the Dunsdale Stream, and continues its course until it falls into the Titipua. Under existing circumstances the lower parts of the valleys are liable to floods. At the date of my visit numerous indications were observed of the roads having been recently covered with water. The denudation of the slopes now covered with forest would cause the floods to be of more frequent occurrence and of greater magnitude, so that serious losses would speedily result, and the prosperity of the district be directly affected. On the other hand, the gradual replacement of large portions of the existing forest by deciduous trees, especially oaks, would tend to mitigate the evil, and at the same time be productive of good commercial results.

THE TIMBER-INDUSTRY OF SOUTHLAND.

The number of sawmills now in operation in the district is thirty-six, giving employment to about seven hundred men and boys, including those working in the bush.

It is not easy to give precise statements as to output, wages, &c., owing to the reticence of sawmillers in affording information on these points. Making a fair allowance for loss of time, the average amount paid weekly for wages will not be less than £1,200, and may be fairly estimated at

£65,000 per annum. Higher sums have been stated, ranging to £80,000 or even £85,000, but these are not supported by evidence. The total output may be estimated at 24,000,000 superficial feet of inch thickness per annum; of this, nearly 21,000,000ft. pass over some portion of the Southland railways. Excepting less than 500,000ft. shipped from Stewart Island, coastwise, the remainder, say 300,000ft., passes into consumption direct from the various mills.

Including dressed stuff, flooring-boards, mouldings, &c., with the higher-priced timbers—totara and matai—6s. per 100 superficial feet would be a rather low average; but this would give an aggregate of £72,000 as the annual value of the converted timber. To this must be added the value of piles, chopped firewood, split fencing stuff, and shingles, which at present I have been unable to ascertain.

The first sawmill in Southland was erected about 1860 by Mr. John Murdoch, who now owns six mills in various parts of the district. In 1862 the sum of £175 was received in payment for license-fees, but a period of depression set in, so that the total amount received during the six years ending 1870 was only £38. The amount paid during 1873 was £118, but the effect of the public works policy was felt during the next two years, and new mills were erected in all directions. The amount paid for license-fees rose in 1875 to £1,355; in 1880 to £1,538; and for the year ending the 31st December, 1884, to £2,052; but, from causes which will be stated in their proper place, this sum does not nearly represent the fees due, even under the extremely favourable conditions imposed by the Crown.

Six of the Southland mills are working entirely on timber obtained from private forests. The others are working under the Southland Timber Regulations of the 27th July, 1882, but occasionally purchase logs from settlers, and in a few instances have secured the right to cut timber in private forests. Under the official regulations land is leased to sawmillers in blocks of 200 acres on payment of a royalty of 3d. per 100 superficial feet on all timber converted. The cost of the survey is borne by the licensee, and arrangements are made by which an additional area not exceeding 600 acres may be reserved for his exclusive use, but he is not allowed to commence cutting upon a second section of 200 acres until the first is worked out: he is required to produce a certificate from the Ranger, showing that all convertible timber has been fairly cut out, and that no trees under 12in. diameter have been wilfully injured: he is not allowed to convert timber for other than local sawmill purposes. Totara or miro piles, firewood, fencing stuff, &c., can only be cut under a special license. On the other hand, he pays no royalty on the timber required for the construction of his tramways, &c., and is at no expense for fuel for his furnaces.

The royalty is charged on converted timber only, so that the sawmiller is at no loss on account of faulty logs or waste, and is not called upon to pay royalty on any standing timber that may be destroyed by fires on sections held under the regulations. Payment of royalty is (or should be) made monthly in all cases; each sawmiller is provided with a "production-book," in which he is instructed to enter the quantity of timber converted each day, and to forward a copy for each month to the Inspector of Forests before the seventh day of the following month, the penalty for omitting to comply with this regulation or for making a false return being forfeiture of the license and a fine not exceeding £50; but, except in the case of an absconder, I am not aware of any instance in which this penalty has been inflicted. About three or four years ago motives of economy led to the dismissal of the Inspector or Ranger, as it was considered that the returns made by sawmillers were sufficiently exact to be relied upon for showing the amount of royalty due in each case. Unhappily, considerable abuses have crept in through the adoption of this course, and, as previously intimated, the amounts paid for royalty have in some cases been considerably below the amounts actually due. In others, the totara and matai have been taken out of the sections, leaving large quantities of red- and white-pine standing, but altogether insufficient to pay another sawmiller for taking up the abandoned ground.

When on a private visit to the district in 1882 I examined a large forest-section, which had been treated in this way a few miles from Winton, the best paying timbers having been removed, the common rimu and kahikatea left standing. Another instance was made public during my official visit to Southland, and illustrates this form of abuse in a striking manner. Particulars may be found in a report of a meeting of the Southland Waste Lands Board, published in the *Southland Times* of the 30th January. A sawmiller applied for an extension of his area, which was objected to by the Ranger, on the ground that he had only paid royalty on 141,194 superficial feet, while the quantity on the section was estimated at 1,400,000ft. It was stated that the discrepancy was partly due to the quantity of timber left standing; but it is evident that such a ridiculous return—less than 4s. per acre—would never have been made had an efficient system of supervision been in force. Many cases occurred in which timber for fencing, firewood, and special purposes was openly taken from Crown lands without leave or license; the unlawful removal being aggravated by the wanton destruction with which it was sometimes accompanied. Offences of this kind can only be prevented by efficient supervision.

The Waste Lands Board now appears to be fully aware of the importance of protecting the rights of the public in this matter, and has recently ordered a sawmiller whose returns had been proved incorrect to make good his deficiency, which, with the costs of the inquiry, amounted to £143. Other cases are, I believe, in course of investigation. It must not be supposed that the abuses I have unwillingly described are characteristic of the entire body of sawmillers in Southland; on the contrary, they must be regarded as the acts of individuals, and possibly enough may in some instances have arisen from carelessness induced by the absence of supervision. Having had much intercourse with individuals connected with all departments of the trade, I am well assured that it comprises men as high spirited and honourable as can be found engaged in any other business.

The sawmills are efficiently managed and usually well equipped, so that no fault can be found with the way in which the timber is manufactured. Frame-saws, however, are but rarely used; their general introduction would enable the converters to turn out superior stuff for cabinet-work, and would greatly reduce the amount of waste.

In small mills there is usually found a breaking-down bench, with double circular saws working one above the other so as to cut deep logs; a circular saw with rack-bench; a small circular saw adapted for cutting small stuff as palings, &c., and a small American planing-machine fitted with revolving cutters. In the larger mills the machinery is mostly of a similar kind but is more powerful and of a more varied character, comprising moulding-machines and occasionally others for special work. All breaking-down work is effected at the circular-saw bench. The breaking-down frame-saw, so common in the Auckland District, is quite unknown in Southland; the logs being of small dimensions its need has not been felt at present. Its general use, however, would prove economical with regard to power, and greatly diminish the waste which is inseparable from the mode now adopted.

The tramway is an important adjunct to the mill, and forms a material item in the sawmillers' plant. It is constructed of split or rarely of sawn sleepers, placed from 24in. to 30in. from centre to centre, and sawn rails 3in. by 4in., which are laid in notches cut in the sleepers and secured by wooden wedges tightly driven home. The flat nature of the lowland bushes in Southland renders the construction of tramways very easy—probably from 16s. to 19s. 6d. per chain may be taken as a fair average of the cost of construction. Cases were named in which the actual cost was much lower, but it is to be feared that the results were hardly satisfactory. The highest amount mentioned to me was £1 2s. 6d. per chain. I was, however, assured that, even with wages at 10s. per day, any tramway, with wooden rails in the district, might have been constructed at the rate of £1 1s. per chain. Wooden tramways are worked by horse-power, but in two or three cases, where the mill is at a considerable distance from the railway, light iron rails are used so as to allow of traction by steam-power. The cost of rails alone was stated to be £300 per mile.

Felling is now generally effected with the saw, a small scarp being first cut on one side of the tree with the axe. This mode has come into general use since 1877, and is attended with a considerable saving of timber in felling, while it is more economical than the axe. The trunk is cross-cut into suitable lengths for the mill, but the branches and tops are left to rot on the ground. The logs are hauled by horses or bullocks to a loading-place alongside the tramway, but it is rarely found profitable to haul logs from a greater distance than ten chains on each side the tramway. This fixes the maximum proportion of tramways actually required at half a chain per acre.

In one or two instances the millowner contracts for the felling, logging, and haulage to mill, and conversion at a fixed rate, but usually the felling, logging, and haulage alone are contracted for, or conversion may be effected under a separate contract. A few mills are worked entirely by day-labour.

In a bush worked in a systematic manner and under favourable circumstances the entire cost of production from felling to conversion need not exceed 3s. per 100 superficial feet loaded on the railway-trucks; in all probability the actual cost would be found to range from 3s. to 4s. To this must be added a percentage for interest on cost of machinery and plant, depreciation for wear and tear, accidents, loss of time, and bad debts. As good red-pine has been recently placed on the railway-trucks at 4s. 6d. per 100 superficial feet, it is clear that the sawmillers' profits are at times of an attenuated character. Even accepting the general average of 6s. per 100ft. inclusive of dressed stuff, they can scarcely be considered commensurate with the capital involved, the risk incurred, and the skill required for efficient working.

The Southland timber-trade is certainly in a depressed state at this time, but this depression is caused simply by over-production. The facilities for the production of manufactured timber at a cheap rate, the large extent of country opened up by direct railway communication, with the low rates of freight charged, and the facilities afforded for shipment to more distant districts attracted many persons to invest in the business, so that the supply is in excess of the demand, and timber has occasionally to be sold at unremunerative prices. The depression, however, is only comparative. I was informed that the average rates of wages for benchmen were 9s. per day of eight hours, for bushmen and labourers 8s. per day. The mills were working full time at the date of my visit.

The rapid development of the Southland trade has closed the mills in Catlin's River, annihilated the coastal timber export of Westland, and greatly restricted that of Marlborough and Nelson. The timber converted in the Otago District does not amount to more than one-fourth of the annual output of Southland; so that Southland practically supplies the markets of the southern portion of the colony, from Invercargill to Ashburton, with red- and white-pine, and exports cargoes to Lyttelton and other ports farther north. Here, however, she has to compete with the mills of Queen Charlotte Sound, the Wairarapa, and the Manawatu.

The quantity of timber shipped from Southland ports coastwise during the year ending the 31st March, 1885, was 1,659,038 superficial feet; to foreign countries, 1,107,674 feet. There can be no doubt that the foreign trade is capable of considerable expansion. One of the most important factors in the extension of the Southland timber-trade has been unquestionably the great extent of railway-communication in the South Island, and the low rates charged for freight. For instance, timber is carried from Invercargill to Ashburton, a distance of 340 miles, at 6s. 11d. per 100 superficial feet. The gradual extension of railways in the interior of Otago and in South Canterbury will afford new openings for the Southland sawmillers.

In no other part of the colony are the conditions of production so favourable to the sawmill as in Southland; he has an unlimited supply of excellent timber, at a merely nominal charge for royalty; ample areas of forest-land are reserved for his exclusive use; he has the command of railway-carriage at low rates, to an extent far surpassing that enjoyed by any other timber-producing district, while he possesses great facilities for shipping timber coastwise or to foreign ports. The total area of forest-land granted for sawmill leases during the three years ending the 30th September, 1885, is 5,901 acres, so that, including mills working on private land, over 2,000 acres of forests are denuded yearly in Southland alone.

STEWART ISLAND.

Stewart Island belongs to the Southland District, being separated from the mainland by Foveaux Strait, about twenty miles across; and from the extent of its forests and the durable quality of its timber demands special notice here. It has an area of about 640 square miles; the northern and southern portion being more or less covered with timber. A band stretching from the head of Paterson's Inlet to the Ruggedy Mountains, and Mason's Bay on the west coast, consists of swamps, or is clothed with manuka of no value. Ironwood is abundant, straight, and often of large dimensions: it not only fringes the coast-line, but in many places ascends to 2,000ft. Red-pine is plentiful in many places, in others somewhat scattered; kamai is common everywhere; miro is not uncommon; but matai or black-pine is decidedly rare, and white-pine appears to be unknown on the island. Manoa, one of the most durable timbers in the colony, is said to occur in some quantity on the western side of the island, the trunk being occasionally 3ft. in diameter; yellow-silver-pine is not uncommon. Inaka (*Dracophyllum longifolium*), the grass-tree of the settlers, is plentiful, and attains a larger size than in any other part of the colony; its timber is valued for inlaying and fine cabinet-work.

Two sawmills are working in Paterson's Inlet and Half-Moon Bay; but according to the returns their output is small, amounting last year to less than 11,000 superficial feet each per week. The highest amount of royalty paid in any one year was £198 in 1880. For the current year the amount received is at the rate of £14 per month. Practically, the proprietors of these mills enjoy an unlimited license to cut timber wherever they please. Owing to their insular position, and the cost of the surveys necessary to define the boundaries, their areas have never been defined, and I have no knowledge of the extent of their cutting, or the way in which their sections have been worked. The total sum received for royalty from the 1st January, 1880, to 31st August, 1885, amounts to £825.

I was unable to visit Stewart Island during my official inspection: my knowledge of its forest-resources is derived entirely from private botanical explorations during January and February, 1882, and January, 1884. It is very desirable that the extent of forest at Port Adventure, Port Pegasus, and other places in the south as well as the north-west should be ascertained with as little delay as possible.

 OTAGO.

THE Provincial District of Otago has an area of 13,759,000 acres. It is estimated that over 3,000,000 acres are more or less clothed with forest, but from this area great deductions must be made on account of the inaccessible position of a large portion, and the inferior quality of all mountain-forest when considered with regard to conversion.

More than four-fifths of the entire forest-area lie on the western side of the district, and may be roughly described as bounded by the sea from the mouth of the Hollyford River to the mouth of the Waiau, and on the eastern side by the Mararoa to its junction with the Waiau, and by the Waiau to the sea.

The district on the western banks of these rivers comprises the most difficult and inaccessible portion of the colony. At present I have been unable to visit the Sounds of the south-west corner officially, but a flying visit in January, 1884, led me to conclude that the quantity of really good timber in positions fairly easy of access would not be large, except at Martin's Bay. Time, however, did not allow of my travelling inland, so that I had no opportunity of forming a definite idea of the nature of the forest in the upper part of the Hollyford Valley. So far as the data collected warrants me in forming an estimate, I do not think the area of really good forest will exceed 1,250,000 acres; in all probability it will fall below 1,000,000 acres.

DISTRIBUTION OF FORESTS IN OTAGO.

WEST OF THE WAIU AND MARAROA.

The great preponderance of forest-land in the western portion of the district has been stated above; and, although but little can be said at present respecting the nature of the forest on the seaward side, it may be advisable to indicate the position of the chief sections on the inland, preparatory to a more detailed description of selected forests.

At the northern extremity of Lake Wakatipu a large extent of forest-land extends up the valleys of the Dart and Routeburn nearly to Lake Harris; the western flank of Mount Earnslaw and the slopes of Mount Alfred being clothed with tooth-leaved beech and other kinds. Forest of a similar character occurs in the Greenstone Valley, and extends to the Hollyford. In a southerly direction the Dunton Forest, between the Te Anau and Mavora Lakes, is one of the most valuable forest-areas in the district. The Waiau Forest extends from the Waiau westward to Preservation Inlet, and in some respects may be looked upon as a western extension of Longwood Forest (Southland). Nothing can be stated at present as to the character of the forests on the western side of Te Anau and Manipouri Lakes.

EAST OF THE WAIU.

In the north small forest-areas occur in the valley of the Matukituki, on Lake Wanaka, and the Dingle and Timaru on Lake Hawea, but are little more than of local value. The Wakaia Bush

covers about 2,500 acres, and is situated nearly in the centre of the district. Rankleburn Forest, on the Pomahaka, lies to the south-east; and still farther to the south are the extensive forests of Catlin's River and the Tautuku Bush, the area of which exceeds that of all other forests in the eastern district put together. A small forest area at Otepopo completes the enumeration, and, with the exception of certain water-reserves at Silverpeak and Blueskin, is the only piece of bush between Catlin's River and the Waitaki.

So far as natural forest is concerned, the interior of Otago, from the eastern side of Lake Wakatipu to the mouth of the Waitaki, and from Lake Hawea to the Mataura Falls, may be considered practically as a treeless district, the only natural forests being the small areas of Waikaia, Rankleburn, and Otepopo, with the water-reserves at Silverpeak. At the present moment no other district in the colony stands in greater need of plantations, or would derive greater benefit from their formation.

It will be advisable to state the chief characteristics of some of the principal forest-areas. I select for this purpose Dunton Forest, Dean Forest, and Catlin's River Forest.

DUNTON FOREST.

This grand beech forest is of very irregular outline, and occupies the area between the northern portion of Te Anau Lake and the Mararoa River. Its area has been estimated at fully 220,000 acres, but in all probability the proportion of first-class timber does not exceed 100,000 acres. This, however, can only be ascertained by a more detailed examination than I was able to make.

In nearly all parts the outskirts of the forest consist of mountain-beech (*Fagus cliffortioides*), here termed white-birch, usually of small size, the trunks being rarely more than 20ft. in length and 18in. in diameter. Penetrating this belt, which in some places is very thin but in others of considerable width, magnificent specimens of tooth-leaved beech (*Fagus fusca*) are to be seen forming the staple of the forest, although interspersed with patches and scattered trees of mountain-beech. In this district it is termed red-birch, but in other parts of Otago it is called black-birch. The trees are of good dimensions, trunks 60ft. long, squaring from 18in. by 18in. to 26in. by 26in. Still larger specimens were observed, but in some parts of the forest the dimensions stated would be a fair average. I have nowhere seen tooth-leaved beech of superior quality, and but rarely of equal excellence. Trunks 62ft. in length have been split into posts, rails, gate-heads, &c., without a single foot of waste in the entire length. This superior quality, combined with good dimensions, is found in great abundance. Mr. McQuillan, a shepherd, thoroughly acquainted with the district, assured me that tooth-leaved beech of equal dimensions extended along the margin of the lake for fully ten miles. I believe it would not be difficult to mark out the boundaries of a block from eight to ten miles in length by six in width, of which three-fourths would be covered with timber of the dimensions given.

Occasional specimens and small clumps of the silver-beech are mixed with the others, but, as already stated, tooth-leaved beech is by far the most abundant. In other parts of the forest the trees are of smaller dimensions, say 15in. to 18in. in diameter, with a few larger trees amongst them, but with comparatively few saplings, the trees being remarkably thick on the ground.

A striking proof of the value of the tooth-leaved beech is to be seen at the old Te Anau home-stand. The high paddock-fence was erected twenty years ago, and is now in good condition; the rails, 1ft. wide, are as good as when first used, but some of the posts, which are much too light for such heavy rails, are giving way from the great strain upon them. With a very small amount of repairs the fence would last another ten years; I have no doubt that it would have lasted for forty years had the posts been of proportionate dimensions to the rails.

On the margin of the forest the mountain-toatoa (*Phyllocladus alpinus*) sometimes attains large dimensions; trunks nearly 12in. in diameter were observed in several places.

Another endemic conifer (*Dacrydium Bidwillii*) attains its maximum dimensions in the Te Anau District, where it is unusually abundant, occurring in rather swampy parts of the forest in the vallies of the Eglinton, the Upukerora, Glen Echo, the Windy Valley, &c. It is termed "tar-wood" and "bog-pine" by the shepherds, and forms a dome-shaped symmetrical shrub, 6ft. to 12ft. high, often 20ft. or more in diameter. Its economic value is small except for firewood, but it will certainly come into general use for ornamental planting.

DEAN FOREST.

Dean Forest is a portion of the great Waiau Forest District, and extends from the mouth of the Waiau River westward along the shores of Te Waewae Bay for about ten miles, and for about the same distance inland. In some parts it comprises considerable tracts of level land; in others it contains deep hollows, and on the western side will probably be found of a somewhat broken character.

The northern margin of the forest consists chiefly of silver-beech (*Fagus Menziesii*), which in some places forms a belt two miles wide; the trunks averaging from 25ft. to 30ft. in length, and from 18in. to 30in. in diameter; everywhere associated with a luxuriant growth of young plants in all stages of development.

Inside the belt the beech is entirely replaced by pines of various kinds: matai, totara, red-pine, and white-pine. Much of the totara is of large dimensions; trees 20ft. to 35ft. long, squaring from 15in. by 15in. to 30in. by 30in., are not unfrequent in the lower parts, while larger specimens are occasionally found; and in certain places specimens were found of greater lengths, suitable for marine piles.

In many places black-pine (*Podocarpus spicata*) was plentiful, forming the prevailing timber, but was remarkable on account of the short average length of the trunks, which in many clumps did not exceed 20ft., although the diameter was above the average, ranging from 24in. to 72in.;

trees squaring 30in. by 30in. were not unfrequent. In many cases these short logs were curiously fluted and gnarled without being actually distorted. If converted they would doubtless realize high prices for cabinet-making.

So far as my exploration extended red-pine was comparatively rare, and the same must be said of white-pine; both, however, were of good size and quality. Akamai, also, was comparatively rare, so that in this respect Dean Forest presented a strong contrast to Seaward Forest and others in Southland.

CATLIN'S RIVER OR TAUTUKU FOREST.

With the exception of Stewart Island this is the most southerly forest district in New Zealand, and is the largest forest-district on the eastern side of the Waiau River. Its extreme length from east to west is about forty miles, its greatest breadth from north to south is about fifteen; its approximate area is estimated at 560 square miles, but large deductions must be made before arriving at the actual area occupied by convertible timber. It lies on the sea-margin and has two safe harbours: Catlin's River, near its north-eastern boundary, and Waikawa, on its western side; so that it is easy of access from the sea. A good road traverses the country between Balclutha and the head of Catlin's River, and a railway is in course of construction; but west of Catlin's River roads have not been constructed, and tracks lead but a very short distance into the forest. The western portion, however, is now being explored with a view to settlement, and a pioneer-track has been recently cut from the Waikawa River to the north-east end of Tautuku Bay, a distance of eighteen miles and three-quarters. I believe the track is now in course of extension to Catlin's River.

My examination of the forest of this district was restricted chiefly to Catlin's section, Glenomaru, and Woodlands, which I found to vary in character to a considerable extent. The chief timber is red-pine, which, generally speaking, is sound and of good quality; old trees being charged with resin. White-pine is plentiful in certain places, and for the most part of superior quality to the white-pine of the Southland forests. Totara occurs in scattered patches or small groves; it is less abundant than either the red- or white-pine, and is restricted to smaller areas; usually it is found in valleys or on low rounded ridges. At the date of my visit the tramway of the mill working on the Owake had reached several patches of good totara, with trunks averaging 30ft. to 45ft. in length and from 30in. to 36in. in diameter, remarkably clean and well-grown, adapted either for piles or constructive purposes. Black-pine is of plentiful occurrence in many places, but occasionally is of rather small diameter, well adapted for piles where great lengths are not required. Kamai is abundant in some parts of the forest and retains unusual dimensions; in others it is comparatively rare. Ironwood is large and fine, in the forest often with long straight trunks 24in. to 36in. in diameter: at the heads and other places near the sea the trunks are short, gnarled, and distorted, sometimes from 4ft. to 5ft. in diameter. Broadleaf (*Griselinia littoralis*) is not unfrequent, and is split for fence-posts and sleepers.

In many places a long spur, or hill-side with a gradual slope, may be found occupied almost exclusively by red-pine, or white-pine, or totara, &c., but for the most part the forest is of a mixed character, so that it is difficult to say which kind predominates.

Much of the red-pine is coarse-grained and of rough texture, especially when growing on rocky hill-sides; but this is compensated for to some degree by the large proportion of figured wood, which is valued at £1 10s. per hundred superficial feet for the purposes of the cabinetmaker. I was informed that a shipment to Melbourne realized £2 per hundred superficial feet; at this time all furniture-wood is worked up in Dunedin by the proprietors of the mill.

The moki or makomako (*Aristotelia racemosa*) is utilized in Catlin's River, and affords the chief portion of the charcoal used in the manufacture of gunpowder at the Catlin's River powder-mills. In this district it is one of the first plants to make its appearance after the forest has been destroyed, and speedily forms an erect dense growth 10ft. to 15ft. high; the stems are from 2in. to 4in. in diameter, and are chopped, peeled, and cut into 4ft. lengths at £1 10s. per cord, delivered at the landing. I was assured that one man and two boys could prepare two cords per day, but the sticks have to be conveyed several miles by boats, and, in the event of meeting with a contrary wind or being stranded on a shoal, the trip may require three or even four days, including return: in addition a sum of £1 per acre has to be paid for royalty.

The mahoe (*Melicytus ramiflorus*) and the totara are also employed in the manufacture of charcoal for special kinds of gunpowder. Tooth-leaved beech is reported to be found in the southern parts of the forest, but none came under my own observation. I was assured also that totara was more plentiful farther to the south and west.

It is not easy to form any definite ideas as to the extent of forest, which has been cut out. Some years back licenses were issued at £5 per annum each, empowering the holder to cut wherever he pleased in the district, and to any extent, a system well adapted to spoil any forest. One result of this has been that a few of the best trees have been picked out here and there in places easy of access, the smaller and less valuable timber being left untouched; probably one thousand acres have been cut over in this fashion. Most of the area cut over by the millowners has been honestly cleared, the amount of waste being considerably less than in some of the Southland bushes. In all probability the total area of the forest more or less completely cut out, including sections alienated, will not fall short of 10,000 acres; but it must be remembered that this is only approximate. With my present imperfect knowledge I am unable to form a trustworthy estimate of the total area available for the sawmiller.

Catlin's River was formerly the seat of an extensive timber-trade; I was informed by Captain Haywood that at one time from six to ten timber-laden craft might be seen lying inside the heads during the prevalence of southerly winds. During my visit in 1876 the industry was in a flourishing condition, but on my recent visit only a single mill on the banks of the river was in working order,

and that, unhappily, for only four days in the week. Two others were in operation in distant parts of the district. The great extension of the railway-system in the South, and the low rates of freight, have enabled the Southland sawmillers to drive all the less-favoured competitors out of the market, although with but little benefit to themselves. Under existing conditions red-pine can hardly be manufactured in Catlin's River under 5s. 6d. per hundred superficial feet.

It should have been stated that much of the denuded land by the water's edge was more heavily timbered than the greater portion of the interior of the forest, as well as more easily accessible; the proportion of red-pine also appears to have been larger.

There can be no doubt that on the completion of the railway to Catlin's River the timber-trade of the district will speedily revive. Good sites for sawmills may be found at numerous places along the line, and as they are gradually brought into requisition clearing and settlement will be carried on conjointly, the settler finding a market for much of his produce brought to his own door, and having the command of carriage for his surplus by water as well as by rail, for the development of an export trade will be the inevitable concomitant of any large expansion of the inland trade. Even at the present time fully one-half of the timber-yield of the Otago Provincial District is produced in the north-eastern portion of the Tautuku Forest.

LAKE WAKATIPU.

The western banks of the lake, between Kingston and Half-way Creek, were formerly adorned with patches of mixed scrub, here and there interspersed with trees of moderate dimensions, and at the mouths of gullies occasionally blending with large clumps of mountain-beech. At the lake-level, as well as at considerable heights, the effect was delightful, the vegetation adding an element of beauty to the scene, and softening the ruggedness of the steep declivities. When the mountain rata, myrtle, olearia, veronica, and other shrubs were in bloom, patches of crimson and white brightened the effect, and the attention of travellers was at once arrested by the exquisite beauty and grace which adorned the broken rocks and rugged slopes. Unhappily much of this beauty has been destroyed. Licenses to cut firewood amongst the small shrubby growth have been granted and acted upon without the slightest supervision having been exercised. At the date of my visit many cords of firewood were stacked waiting removal by boat, the greater part of it consisting of sticks not more than from four or five inches in diameter, but obtained only by the complete sacrifice of one of the most charming features of that part of the lake. But this destruction, for which the pretence of utility might possibly be pleaded in justification, is not sufficient to satisfy the instinct of the white savage. As soon as the firewood has been removed, a lighted match is applied to the mass of tops and spray not deemed of sufficient value to defray the cost of removal; the mountain-slope is quickly lighted up with a bright blaze, and any renewal of the natural growth is rendered next to impossible; charred stems of palm-lilies (*Cordylina*), rata, beech and other small trees are all that remain to tell of the luxuriant vegetation which once clothed the slopes. The ashes however, facilitate a luxuriant growth of groundsel, thistles, pipiriri, and other weeds, diversified only by scattered bushes of bush-lawyer, and similar unwelcome growths. The transformation is now complete, the grace and beauty of nature are replaced by rugged untidiness, and one of the most attractive features of the lake destroyed for ever. This wanton denudation is not simply a blot on the district, it is a slur on the colony at large, and should be arrested without further delay. The lakes belong to the colony, and their natural attractions should be carefully preserved for the benefit of the colony.

At the northern end of the lake abundant supplies of good firewood can be procured with but little trouble, and without causing any loss of picturesque effect. It is therefore desirable that all licenses to cut firewood on the southern banks of the lake should be cancelled with as little delay as practicable, and steps taken to renew vegetation on the denuded portion at as small a cost as possible.

LAKE WANAKA.

A few miles from Pembroke, at the southern extremity of Lake Wanaka, a small island known as Manuka or Pigeon Island attracts the attention of tourists, from the picturesque effect produced by its irregular outline and somewhat broken character. Its area is probably between three and four hundred acres; it was formerly clothed with forest and scrub, a large portion of which however, is now reduced to charred and blackened trunks. It was let as a sheep-run, with a proviso, as I was informed, that the lessee should not be allowed to fell any except dead trees for firewood or other purposes; but this attempt to preserve the natural attractiveness of the island has been frustrated, doubtless by accident or carelessness, and one of the most charming features in Lake Wanaka has been hideously disfigured, to the great regret of many of the residents in Pembroke.

Looking at the increasing number of tourists attracted to these lakes from all parts of the world it appears most desirable that steps should be taken to renew the arboreal vegetation in the island and prevent its destruction in future.

THE TIMBER-TRADE IN OTAGO.

From a return prepared by the Commissioner of Crown Lands for Otago, I find that eleven saw-mills are in operation in the district, while two others are returned as not working. The total number of men employed is stated to be 101, and the annual output slightly exceeds 7,600,000 superficial feet. I fear, however, that this quantity is an over-estimate under existing conditions; on the other hand, the number of men and boys employed is certainly below the mark, if it is intended to include those employed in the bush. Although six mills are stated to be worked by engines of

6-horse-power only, the number of men may safely be increased to 160, and will then contrast poorly with the 700 men and boys employed in Southland.

The most striking feature in the Otago timber-trade is the concentration of production about Catlin's River, although sawmills are widely scattered. There are four mills at Catlin's River; at the date of the returns two of these were not in working order, but, as one of them has since resumed operations, the annual output of the three mills may be estimated at 5,784,000 superficial feet: the remainder of the Otago District, with nine mills, producing 1,882,000 superficial feet only. These outlying mills can only supply local demands; the output of the largest is estimated at 450,000 superficial feet, and the output of one mill is returned at only 60,000 superficial feet. The annual average for each of the nine mills is 209,000ft.

One of the mills at Catlin's River is the property of the Iron and Woodware Company of Dunedin, and is probably the finest sawmill in the Otago Provincial District. It was not pleasant to see so fine a property standing idle. Another good mill belonging to this company was situated on the Upper Owahe River, and was also idle at the date of my visit, owing to the impossibility of procuring logs with sufficient rapidity to keep the mill going more than four days in the week at most. From the mill to the present bush-workings is a distance of fully five miles; horses can only bring two loads per day, and under other unfavourable conditions it is not possible that the mill can be worked at a profit. I have therefore heard with pleasure that the mill has been taken down and re-erected on a more favourable site. The manager informed me that the mill was capable of converting 50,000 superficial feet per week. When in full working order the output of the Catlin's River mills would be greatly in excess of the produce of the entire district at the present moment.

Until within the last five years the timber-trade at Catlin's River was in a prosperous condition, and in all probability gave employment to nearly two hundred men and boys, including the sailors engaged in conveying the timber coastwise, fully a dozen small craft being engaged in the trade at one time. It is not too much to say that, were it not for the large proportion of furniture-wood in the forest, every mill would be closed at the present moment, except possibly one working on half-time to supply local demands. This has been brought about by several causes: the great extension of the trade in Southland, where red-pine is usually less scattered, and can consequently be manufactured at lower rates; the great advantage of extended railway-communication, coupled with low rates of freight enjoyed by the Southland sawmillers; the uncertainty of coastal communication, which at present forms the only mode of transport for timber from Catlin's River.

At the present time I fear timber could not be manufactured at Catlin's River so cheaply as in Southland, so that a profit must be looked for from the larger proportion of totara and matai, and especially of woods suitable for furniture.

On the completion of the railway from Balclutha to Catlin's River the timber-industry will be placed in a favourable position for supplying Dunedin and places farther north, although production may be slightly more expensive than in Southland, as the difference in freight will be slightly in favour of the Catlin's River mills, and competition will be conducted on equal terms. I anticipate a very large expansion of the Catlin's River trade as soon as the district is placed in direct communication with the railway-system of the South Island, and this in its turn will lead to a partial revival of the coastal trade. A mill was formerly in operation at Waikawa, but has been abandoned for some years. I am informed that another mill is in course of erection at that port by a Southland sawmiller.

Tooth-leaved beech and silver-beech, with such stray pines as may be found in the bush, are converted for common use in certain localities, as at McBride's bush, at the head of Lake Wakatipu, where a small sawmill is worked by water-power, and, I believe, managed on co-operative principles to a certain extent. The available timber in the vicinity of the mill is worked out, so that logs have to be hauled some distance by oxen, then placed in a tramway to be taken to the head of the lake and floated to the mill. When converted the timber is boated or floated to Queenstown, where it sells for about 12s. or rarely 14s. per 100 superficial feet, having to compete with red- and white-pine from the Southland mills. A similar instance occurs on the Matukituki River on Lake Wanaka, the converted timber being floated to various places on the banks of the Clutha. It is stated that a large amount of timber found a market in this way formerly, but the quantity must be very small at the present time. It is almost superfluous to remark that Otago had no export trade worth mention. The value of timber shipped for foreign ports during the year ending the 31st December, 1884, being only £429.

Sawmill licenses in Otago are granted for sections of one or two hundred acres, at the rate of £1 1s. per acre, payable in three annual instalments. Licenses are granted to split or cut firewood, fencing, &c., on sections 200ft. square, on payment of £2 10s. per annum. The total receipts from both sources amount to rather more than £500 per annum.

CANTERBURY.

THE proportion of forest-land in the Provincial District of Canterbury is less than in any other part of the colony, large portions of the district being absolutely divested of trees, except where small plantations have been made by settlers. The district has an area of 8,693,000 acres, of which 374,350 acres are considered to be more or less clothed with forest; but, as the chief forest-areas are situated in mountainous country, the quantity of timber available for the purposes of the saw-miller is extremely small.

DISTRIBUTION.

About three-fifths of the entire forest-area are comprised in the north-western section of the district, and form the Oxford, Waimakariri, and Alford Forests. The larger portion of the remainder lies in the south-western section, chiefly in the mountain-valleys of the Makaroro, Wilkin, and Hunter Rivers. A still smaller quantity is comprised in the south-eastern section, and consists chiefly of small blocks at Waimate, Peel, Geraldine, and on Banks Peninsula. With these trivial exceptions, amounting at most to about 9,000 acres, the vast district from Lake Ohau to Lake Ellesmere, a distance of nearly a hundred and fifty miles, is destitute of natural forest.

THE MAKARORA VALLEY.

The Acting Commissioner of Crown Lands, Mr. W. Kitson, kindly placed at my disposal a copy of an excellent report on the forests of this district by Mr. J. H. Baker, Chief Surveyor, which enabled me to make the most of the restricted opportunities afforded by a hasty visit, attended by continuous heavy rain and flooded rivers.

The lower part of the Makarora Valley is destitute of forest for fully six miles from the head of Lake Wanaka. At a little above this point much of the forest has been worked out by a sawmill now abandoned, although a block of about 100 or 120 acres—chiefly red-pine, matai, and totara, mixed with silver-beech—has been left untouched, probably from its having passed into private hands. Above this point the forest consists chiefly of silver-beech (*Fagus fusca*), here called white-birch, mixed with kamai. Here and there a totara or black-pine of small dimensions may be met with, and small mountain-toatoa on the road to the Haast Pass. Cedar (*Libocedrus Bidwillii*) may be found, but the staple is everywhere the silver-beech, which, on the river-flats and lower slopes, is of large size and excellent quality, but gradually diminishes in dimensions as it ascends the mountain-sides. Ironwood or mountain-rata is plentiful some miles up the valley, and occasionally of large growth, often growing in inaccessible situations.

I have nowhere seen silver-beech of better quality. Its fissile properties are most remarkable: it may be split into thin even shingles with the greatest of ease—more easily, in fact, than many of the pines, and for roofing purposes will last as long as ordinary red-pine. Practically it is the only timber available in the district for general work. I anticipate that it will form a special export before the lapse of any lengthened period. The flooded state of the Makarora prevented me from crossing that river to examine the valley of the Wilkin, where, I was informed that a sawmill was in operation, logs being obtained from Government forests without the formality of paying royalty.

For all practical purposes this district is without supervision, its isolated position and the difficulty of access render it unprofitable to send a Ranger to collect the trivial sum that would accrue from royalty, and prevent infringement of Crown rights. In view, however of the prospective advance in the value of silver-beech for special purposes, it will be less difficult to exercise proper supervision.

OXFORD FOREST.

The Oxford Forest may be described as occupying the southern slope of Oxford Hill, and extending in a north-westerly direction from the River Ashley to the Waimakariri, a distance of sixteen or seventeen miles. Its area was originally about 57,000 acres, but such large portions have been alienated that the area remaining in the hands of the Crown is comparatively small, and comprises but little timber of first-class quality, all the lower portions of the forest having been disposed of, only the higher slopes remaining in the hands of the Crown.

Oxford Forest is essentially a beech-forest, composed of a single species—the entire-leaved beech (*Fagus Solandri*), which ascends from the plains to the crest of the hills. On flats by the edge of the river it is mixed with red- and white-pine, occasionally a little matai and totara, but entire-leaved beech is the prevailing tree throughout, with the exception, perhaps, of a few isolated patches: pokaka, small mountain-toatoa, &c., occur sparingly. Practically the lowland flats have been cut out, but a large quantity of good timber remains in wide, open gullies. In situations of this kind the trunks vary from 35ft. to 40ft. in length and from 18in. to 30in. in diameter. Occasionally trees 60ft. or 70ft. high may be found with trunks 36in. or more in diameter, but they are decidedly rare, although I was assured that formerly they were plentiful on the flats. In exposed places and on the higher slopes the trees are, of course, smaller, often not exceeding 20ft. to 25ft. in length and 12in. or 13in. in diameter.

Young trees with smooth bark are termed “white-birch;” when the bark becomes corrugated and black the tree is the “black-birch” of the bushman; if with a tinge of brown or red it is “brown-birch” or “red-birch;” occasionally trees are found carrying a yellow lichen, and are termed “yellow-birch.” The terms most generally applied were “white-birch” and “black-birch.” As the entire-leaved beech is the only species found in the Oxford Forest, it would be difficult to find a more striking instance of the uncertainty attending the use of ordinary names.

Considerable difference of opinion has been expressed with regard to the value of the timber of entire-leaved beech. Instances are to be seen in all directions about Oxford, in which fences of this timber have perished after an existence of five or six years; so also with sleepers, piles, &c. On the other hand, I have seen fences that have stood for twenty years, and will last for another year or possibly for two. At View Hill I examined a sheep-yard fence which had been erected for twenty-one years, and appears likely to last for ten or twelve years longer. Gate-posts, piles, &c., give the same result with regard to durability.

The use of immature timber, or of timber cut during the summer months, or of timber grown in wet situations, may possibly account for some instances of early decay, although neither cause can possibly cover the entire ground. In all probability this premature decay originates in the use of unripe timber. The time required for maturation after the tree has attained full dimensions is

uncertain, but in all probability in this species is very short, and when full maturity is attained decay speedily ensues. Timber used before the period of maturation would speedily decay, and the same result would be experienced if decay is allowed to commence before conversion.

It is, however, worthy of note that the small trees on the highest slopes, when ripe, afford timber of equal durability with that grown on the lower levels. The difference in durability even when trees are grown in close proximity has long been recognized by the old settlers, who term the trees affording durability "old-man birch," and pay double rates for fencing stuff split out of them. Whenever trees are cut down in the Oxford Forest the open area is speedily covered with a dense crop of seedlings.

BEALEY FOREST.

This is a mountain-forest extending along the left bank of the Waimakariri from the valley of the Poulter to the Bealey, and thence to the source of the Waimakariri. The following remarks apply to the portion situated east of the Bealey, and clothing the slopes of the mountains from 1,800ft. to the limit of arboreal vegetation, 4,000ft.

This, like all alpine forests, is a beech-forest, and is composed of two species: mountain-beech (*Fagus cliffortioides*), and tooth-leaved beech (*Fagus fusca*). It is the only forest in the Canterbury District in which tooth-leaved beech occurs in large quantities. The bulk of the forest consists of mountain-beech of good quality, and of the largest size attained by that species, trunks from 30ft. to 50ft. long and from 15in. to 24in. in diameter being not unfrequent in level places in the lower and middle portions of the slopes. Usually they are of smaller dimensions, and at greater heights become dwarf and scrubby. The most remarkable feature of the forest is the occurrence of a zone or belt of tooth-leaved beech between 2,300ft. and 3,000ft. Occasionally this is interrupted, and the species represented by scattered clumps or even by solitary trees. The timber is of exceptionally good quality, dense and even in the grain, with an unusually small proportion of sapwood. The trees are from 50ft. to 70ft. high, with clean straight trunks 15in. to 36in. in diameter. A good proof of its durability was afforded by trunks cut down sixteen years ago and left in the forest: these are still sound and good, in one or two cases still retaining the wooden wedges which were driven to split them. Seedlings and young trees occur in profusion in all open parts of the forest. This forest contains a larger quantity of valuable timbers than is usually found in forests of a similar character. Its position renders it of great importance from a climatic point of view, and the destruction of any large portion would be speedily followed by evil results in the heavier floods of the Waimakariri.

THE TIMBER-TRADE IN CANTERBURY.

No timber is being cut in the State forests of Canterbury under license at the present time. The land is sold at £2 per acre, including timber. In view of the limited extent of forest in the Canterbury District, it is difficult to understand why such a one-sided arrangement should have received the sanction of successive Provincial Governments.

Twenty-one sawmills are in operation. The average output of each is less than 500,000ft. per annum, the total not exceeding 9,893,000 superficial feet. Oxford is the chief centre of the industry, nine mills being situated in the district, most of the timber converted consisting of entire-leaved beech, with a very small proportion of red- and white-pine, matai, and totara. Six mills are situated at Little River and other parts of Banks Peninsula,* which together yield fully two-thirds of the timber converted in the Canterbury District; but, while the produce of the former district is restricted almost exclusively to beech, the produce of the latter consists exclusively of pine, chiefly totara and red-pine, beech being exceedingly rare in that district. The forests of Banks Peninsula, however, are nearly worked out, so far as the sawmiller is concerned at least. The remaining mills, six in number, are chiefly situated to the southern portion of the district, and, with one exception, appear to be of small capacity.

The number of men and boys employed in the district is stated to be 263. The local trade has undergone some diminution of late years, and in one or two localities has died out altogether, as, for instance, at Alford Forest, a beech-forest of similar character to Oxford Forest. This is chiefly due to the competition of the Southland timber-merchants, facilitated by the great development of railways. As already stated, all the sawmills are working on private land. In some cases the sawmillers have acquired the freeholds, in others they have purchased the timber at a fixed price per acre; but most frequently a royalty is paid on the converted timber, a stipulation as to the minimum monthly payment being inserted in the agreement.

In the Oxford Forest the royalty is 1s. per 100 superficial feet; the actual cost of production is about 7s. 6d. per 100 superficial feet, inclusive of royalty. The average selling prices are 10s. 6d. to 12s. 6d. per 100ft. for boards and scantling of good quality, 6s. per 100ft. for inferior. The waste in the conversion of beech, especially into sleepers, is larger than with pine; but here, as elsewhere, the competition is so keen that, with the limited demand for timber of this kind, the sawmiller is unable to obtain an equitable return for his outlay of capital and labour.

The Oxford sections were mostly purchased at the upset price of £2 per acre. One instance was mentioned to me in which 300 acres had recently changed hands at £6 per acre on account of the timber. Another block leased to a sawmiller, with right to remove timber, was returning £6 10s. per acre for royalty. In another case a sawmiller was paying £3 10s. per acre for the timber on a large block. Before the development of the railway-system from £8 to £10 per acre was frequently paid for timber alone, and in one or two instances it is stated that £15 was given.

* Two of these are probably the largest in the provincial district. The total yield is nearly equal to that of the nine Oxford mills, Oxford and Banks Peninsula.

I was assured by a sawmiller that he had cut over 20,000 superficial feet to the acre, and that he considered sections capable of yielding quite as much were still to be had. I have no doubt whatever that on the worked-out flats even larger returns than this were not uncommon, but only two or three sections of standing timber likely to give such a yield came under my notice. I am inclined to think that from 14,000ft. to 17,000ft. per acre would be a fair average.* The increasing number of beech-sleepers required for railway-purposes alone must of necessity add to the value of all beech-forest sections, like the Oxford Forest, in the close vicinity of a railway.

WESTLAND.

WESTLAND forms the western slope of the Southern Alps, from the Grey River southwards to Big Bay, a distance of nearly two hundred miles. The area is estimated at 3,045,000 acres, of which 1,897,558 acres are covered with splendid forest, and still remain in the hands of the Crown, in addition to 632,519 acres of lowland scrub or inferior forest.

Practically the lowland portion of the district forms a vast forest, occasionally broken by a patch of open land, an extensive swamp, or a river-bed. As the mountains are ascended the timber decreases in size, and, speaking generally, is of little value for conversion above 2,000ft. The limit of arboreal vegetation is, however, somewhat higher than on the eastern side of the mountains, and may be stated, I think, at 4,300ft., although I am not prepared to speak positively on this point, which is one of considerable interest.

The traveller in Westland has his attention constantly arrested by the occurrence of large patches of pines of unusual lengths, and remarkably close set, forming forest of great density, and affording a larger return per acre than is given by the same kind in any other part of the colony. Another peculiarity is afforded by the abundance of red and yellow silver-pine (*Dacrydium Westlandicum* and *D. intermedium*), both timbers of great durability, the former being known as the Westland pine. It is not restricted to this district, but is plentiful in some parts of the Nelson province. Another tree but little known elsewhere is the native lilac (*Quintinia serrata*, var. *latifolia*), which forms a small tree with a trunk sometimes 15in. in diameter, and affords a timber sufficiently durable to be used for fencing-posts, sleepers, &c.

In low alluvial or slightly undulating districts the principal timber-trees are frequently found occupying narrow belts, one kind exhibiting a marked preponderance, sometimes amounting almost to the exclusion of others; thus, a belt of totara may be succeeded by one of red-pine, and that again by a belt of quintinia, followed in its turn by a belt of cedar, &c.

The red-pine is the prevailing tree over large portions of the district: large areas are clothed with long straight clean-grown stems, standing thickly on the ground, and yielding timber of first quality, straight and close in the grain, firm and silky. The white-pine or kahikatea is frequently found attaining the height of from 80ft. to 100ft. or more, and equal to the rimu in growth and quality; it is most frequent on the margins of rivers or swamps, but is not confined to situations of this kind. Totara is comparatively local; large blocks of good trees are rare; trees of smaller dimensions, say with trunks 12in. to 24in. in diameter, are more frequent, especially in the vicinity of rivers, although not actually on their margin. Scattered trees of large dimensions are not unfrequent in many districts. Matai or black-pine, generally speaking, is less plentiful than totara and is often scattered. Kawaka or cedar (*Libocedrus Bidwillii*), although often local, is much more frequent, and sometimes occurs in considerable quantity. In exposed places, at elevations above 1,500ft., it is sometimes not more than 6ft. high, but fine trees with trunks 24in. to 30in. in diameter are plentiful. At lower levels it is one of the most valuable timbers in the district. Westland pine or silver-pine (*Dacrydium Westlandicum*) is scattered throughout the district, sometimes in clumps or narrow belts, at others solitary trees only are found. Yellow silver-pine (*D. intermedium*) is most frequent on elevated terraces; at present it has not been utilized in any other district, although it occurs from the Great Barrier to Stewart Island. These "silver-pines" must be classed amongst the most durable pine-timbers known, and whenever occurring in quantity ought to be carefully conserved.

Ironwood or rata (*Metrosideros lucida*) is plentiful, ascending to 3,000ft., and varying greatly in character. The northern rata (*M. robusta*) is also found in the district, but is rare and local. Kamahi (*Weinmannia racemosa*) is plentiful and often attains large dimensions. *Quintinia serrata*, var. β , locally termed "white-birch" and "native lilac," is plentiful, and attains larger dimensions than in any other part of the colony. Broadleaf (*Griselinia littoralis*) is common, usually with short, stout, distorted trunks, which split freely and form durable posts, sleepers, house-blocks, &c. Mountain toatoa (*Phyllocladus alpinus*) is plentiful from the sea-level to 3000ft., but is usually of small size, so that it is only adapted for special purposes, notwithstanding its remarkable toughness.

Large tea-tree or rawiri (*Leptospermum ericoides*), forms clumps or small groves, but the trees of large size are local.

Tooth-leaved beech (*Fagus fusca*), locally termed "black-birch" and "red-birch," is plentiful at Lake Brunner, the Teremakau Paddock, and other parts of the Teremakau Valley, often attaining large dimensions. It is also found about Greymouth and in many other places, but appears absent from large areas. Mr. Mueller, the chief surveyor, informed me that it occurred in great abundance in the Valley of the Arawata, near the southern boundary of the district, ascending to between 2,000ft. and 3,000ft., many of the trees exceeding 100ft. in height and from 2ft. to 6ft. in diameter.

* At a royalty of 1s. per 100ft. this would give £8 per acre for timber alone.

Entire-leaved beech (*Fagus Solandri*) occurs in the Grey Valley and on many terraces, but is remarkably local.

Mountain-beech (*Fagus cliffortioides*) is common on the mountains, ascending to fully 4,000ft.

Silver-beech (*Fagus Menziesii*) descends nearly to the sea-level at Jackson's Bay and other places, but, like the other species, is absent from extensive areas. It will probably prove to be the most frequent species between 1,500ft. and 3,000ft.

In addition to the above, a considerable number of shrubs and small trees afford ornamental woods adapted for the purposes of the cabinetmaker for veneering, marqueterie work, &c., and will doubtless be converted for commercial purposes at no distant date.

THE TIMBER-INDUSTRY IN WESTLAND.

A few years back the timber-trade of Westland was in a flourishing condition, and gave employment to a large number of men and boys; the local trade was brisk, and large shipments were made coastwise. At the present time most of the mills are not working more than one-third time, and some even less. After considering the vast extent and varied nature of the timber-resources of the district, it must be admitted that this is a most anomalous state of affairs, but the causes of the unfortunate decay of the trade are not far to seek.

Thirteen sawmills are in operation in the Westland District, but many of these are working only one-third time or even less. One large mill, not included in the total stated above, has been closed for more than a year. The mills are capable of converting 11,500,000 superficial feet per annum, and when in full work would employ over three hundred men and boys. The actual output at the present time scarcely exceeds 3,000,000 superficial feet, while the number of men employed is reduced to ninety-one,* conversion being restricted to sufficient to meet local demands, the coastal trade having completely passed away.

The mills are furnished with good machinery, and are efficiently managed. I have nowhere seen wide boards more evenly manufactured. In Mr. Malfroy's stock I noticed a large quantity of red-pine boards beautifully sawn, 22in. to 26in. wide, nearly every board exhibiting more or less figure, and adapted for the best class of ornamental cabinet-work; these were selling at 9s. 6d. per 100 superficial feet, a low price for timber of such excellent quality and exceptional width.

The bushes are managed in a similar manner to those of Southland. Falling is chiefly effected by sawing. It is worthy of mention that the saw was first adopted for this purpose in Westland, from whence its use has extended to other districts. The tramways are worked by horse-power.

The average quantity of timber per acre is very high on the flats and lower levels, and may be estimated at 40,000 superficial feet for red- and white-pine. Near Lake Brunner several acres of red-, white-, and black-pine gave over 80,000 superficial feet to the acre. Mr. Malfroy informed me that he had recently purchased 300 acres near Hokitika, which would average fully 70,000ft. per acre for the entire block. On the other hand, much of the timber on the slopes of the ranges is of small dimensions, and very often scattered. The cost of producing manufactured timber under these circumstances is low, not exceeding 4s. per 100 superficial feet, and might be easily reduced if the mills could be kept fully employed.

Notwithstanding its isolated position, Westland formerly possessed a large coastal trade. This was gradually destroyed by the expansion of the Southland trade, which placed Westland at a serious disadvantage, and gradually forced her out of the markets. The development of the coal-trade has aggravated the depression, as it has induced an advance in the rates of freight coastwise, which timber-merchants are unable to pay under the competition to which they are subject from sawmillers in Southland and Marlborough†.

Under these circumstances it is no matter for surprise that Westland sawmillers are anxiously looking forward to a time when direct railway-communication will be established between the West Coast and Christchurch. It is estimated that fully 12,000,000 superficial feet per annum will be loaded on the trucks. It is, however to be feared that sufficient allowance has not been made for the competition between Westland and Queen Charlotte Sound. Red- and white-pine can be shipped from Havelock to Lyttelton and sent by rail to Christchurch at a cost certainly not exceeding the cost of transport by rail from Hokitika; so that, practically, Marlborough is equally well situated for supplying Christchurch and stations as far south as Timaru and northwards to Waikari.

The total quantity of timber imported into Lyttelton is about 20,000,000 superficial feet; but this includes kauri and other special timbers, Tasmanian hardwood, &c. Making a fair allowance for special timber, which would not be affected by Westland competition, I fail to see an opening for more than 5,000,000ft. from Westland under existing conditions.

One of the first results of the construction of the West Coast Railway would be the establishment of sawmills on the Arnold River, Bell Hill, and Crooked River, which would be able to send timber into Christchurch at equally low rates with the Hokitika sawmills.

But, for all this, I believe there is a large opening for the Westland sawmillers. The improvement of the ports of Greymouth and Westport will attract vessels of a larger class, and bring about a reduction of freight to Australian ports, so as to facilitate the development of a large export trade; while the completion of the Hokitika and Greymouth Railway will allow of white-pine being forwarded to Greymouth for shipment at almost nominal rates—10d. per 100 superficial feet for freight. In view of the completion of this railway at no distant date, it is desirable that

* The quantities stated are those given in the return carefully prepared at my request by the Commissioner of Crown Lands. It should, however, be mentioned that one of the largest sawmillers assured me the total output did not exceed 2,500,000 superficial feet.

† Southland sawmillers can load timber on the railway-trucks at 4s. 6d. per 100 superficial feet, but timber could not be placed on the Hokitika Wharf at less than 5s. 6d. under present conditions.

steps should be taken to ascertain the conditions of the chief Australian markets, and to what extent the ordinary timbers of New Zealand would find ready sale.

The freehold may be acquired in Westland for £1 per acre, including the timber. Licenses to cut timber are granted for one year, on payment of a fee of £5 or 10s. per month, but no definite limitations are made with regard to area. Practically the licensee has liberty to cut wherever he pleases within the boundaries described in his license, no supervision being attempted. The fees received for timber-licenses appear to have averaged £65 per annum for the last three years. The sum of £ per annum is received for pastoral leases, and should, I think, be regarded as forest-revenue in this district.

NELSON.

THE area of the Provincial District of Nelson is estimated at 7,000,000 acres; the forest lands still in the hands of the Crown comprising an area estimated approximately at 3,290,000 acres; but this quantity includes good forest, mountain-forest, scrub, and patches of timber in gullies, &c., so that it is extremely difficult to form an approximate estimate of the acreage of timber available for profitable conversion; in all probability it will not exceed one million acres.

In some districts the Nelson forests closely resemble the best forests in Westland in their general character and in the large return of convertible timber yielded per acre, but this is by no means their general character. The western side of the district and the valley of the Grey and the Buller exhibit a large preponderance of tooth-leaved and entire-leaved beeches, except on low alluvial lands near their mouths and at the entrance of their tributaries. In many localities the trees are of small size, and, although valuable for mining purposes, are not adapted for profitable conversion except under special circumstances.

The forest comprises the same kind of timber-trees as those of Westland, although they occur in different proportions, as already stated. In addition, some parts of the district contain large quantities of the northern rata (*Metrosideros robusta*), which often forms grand symmetrical stems of great length and girth, a specimen measured at Mokohinui was 35ft. to the first branch and 54in. by 54in. for the whole length. Frequently, however, when the tree commences life as an epiphyte the stems are distorted, being developed solely from aerial roots, which descend the tree to obtain nourishment from the soil. Frequently two or more roots are given off on different sides, when the supporting tree sooner or later becomes strangled in their iron embrace. Occasionally, near the sea, it forms small groves with trunks of considerable length and from 12in. to 18in. in diameter, affording useful timber for a variety of purposes. The timber is dense, compact, and durable, while the leaves and twigs contain large quantities of an essential oil, which in all probability possesses similar properties to that of the Eucalyptus. Another tree found in Westland, but more plentiful in Nelson, is the pukatea (*Laurelia novæ-Zelandiæ*) which affords a durable timber adapted for the purposes of the cabinetmaker, the boat-builder, and for general use. Nails may be driven into wet or dry boards without causing the slightest tendency to splitting; it is also difficult of combustion. At present it has not come into general use.

The tawa (*Beilschmiedia Tawa*) is a northern tree, which finds its southern limit in the northern parts of Marlborough and Nelson, occurring more sparingly in the latter district than in the former, where it can scarcely be said to enter into the composition of the forest. The karaka (*Corynocarpus laevigata*) is of still rarer occurrence in Nelson. The southern palm, the nikau (*Rhopalostylis sapida*), is of rare occurrence in Westland, but frequent in many parts of the Nelson District, where it attains a large size, and sometimes develops a larger inflorescence than I have seen elsewhere. A characteristic of the Nelson forest is the abundance of the kouwharawhara (*Astelia Solandri*), an epiphyte which grows on the limbs of trees, and presents the appearance of a gigantic bird's-nest.

With a few intervals, forest is almost continuous along the western side of the district, especially the northern portion, and the valleys of the principal rivers. There is a large extent of forest in the central part of the district, with stretches of open land. Many valleys, as the Riwaka and Takaka, were formerly filled with a dense growth of valuable mixed forest. In the Aorere Valley there is a vast amount of timber with large patches of open country. About twelve or fifteen miles up this valley the forest becomes remarkably dense, and the proportion of rata exceptionally large. In the Amuri, and generally in the southern and eastern parts of the district, the extent of forest-land is comparatively small.

The abundance of tooth-leaved, entire-leaved, beeches on the western side of the district has been already mentioned, but it must not be supposed that the forest consists exclusively of these timbers: isolated pines occur everywhere, and large patches of red-pine are not unfrequent in low flat valleys, with a fringe of white-pine along the course of the rivers, and patches of the same in swampy places. The beeches, however, are far the most abundant. Black-pine and totara are comparatively rare. Both forms of silver-pine are generally distributed, in some places occurring in considerable quantity, and the low land for some miles along the mouth of the Buller is covered with a luxuriant growth of mixed pine, white-pine predominating in the moist places, red-pine in the drier. Fine specimens of the northern rata are not unfrequent. Higher up the valley the pines become local, being chiefly restricted to strips of level land at the base of the mountains, or to gentle slopes, where the rimu sometimes ascends to 2,000ft. In some of the valleys of the tributary streams there is a larger extent of pine than in the main valley, where the mountain-slopes are chiefly clothed with tooth-leaved and entire-leaved, silver-, and mountain-beeches, which vary to a great extent in quality and growth.

The Big Forest, which extends from the Hope River to the source of the Buller at Rotoiti, and from there to the eastern side of the Tophouse Road, is essentially a beech-forest in its highest levels; in fact, beeches of one kind or other are the preponderating trees; but the forest possesses some features which must receive special attention.

The mountain-beech is restricted to the higher levels, and runs out below 4,000ft. Tooth-leaved beech ascends to nearly 3,000ft. In some parts numerous large patches of well-grown trees, from 30ft. to 40ft. clear in the trunk, and from 12in. by 12in. to 22in. by 22in., with occasional specimens of larger dimensions, may be found at an altitude of fully 2,000ft. Silver-beech appears to run out at somewhat lower levels than the tooth-leaved, and in this forest does not attain its largest dimensions. Entire-leaved beech is frequent.

In swampy places, at all levels above 1,000ft., patches of bog-pine or tarwood are common, but trees rarely attain the size of the fine specimens in the Te Anau. This is the only locality in which this plant was observed in abundance in the Nelson District, although I believe it is equally plentiful in the West Wanganui District.

Large patches of kawaka (*Libocedrus Bidwillii*) were scattered through the forest. The tree is termed by the bushmen and shepherds "bastard totara," and the timber has been utilized for telegraph-poles, house-timbers, posts, shingles, &c., for all of which it is highly esteemed. It affords better shingles than any other timber in the colony; the wood splits easily and evenly into very thin sections, and the shingles are rarely warped by the sun. It usually occurs between 1,200ft. and 2,500ft., and rarely attains large dimensions. Large patches will average not more than from 20ft. to 30ft. high, and from 12in. to 20in. in diameter. Trunks 2ft. in diameter may occasionally be seen, but so far as my observation extended are decidedly rare.

Large areas chiefly consisting of red- and white-pine are found in the lower parts of the forest, but beeches are the prevailing trees. In some parts the red-pine ascends to nearly 3000ft., but it is decidedly rare above 2,300ft. Totara and black-pine are unfrequent. Unquestionably the most valuable forests in the district are situated on the south-western boundary. Red-, white-, and black-pines, of long length and large dimensions, form dense forests above Arnold River, Bell Hill, and Crooked River. They resemble the best forests in the Westland District, and are not surpassed by any in the South Island. I was informed that totara occurred plentifully, but very little came under my personal observation.

A peculiarity in the application of the term "rimu" and "red-pine" in the Nelson District requires to be mentioned in order to prevent confusion. The red-pine of Southland and other parts of the colony (*Dacrydium cupressinum*) is here termed rimu exclusively; and the black-pine or matai (*Podocarpus spicata*) of the other parts of the colony is here termed red-pine.

THE TIMBER-INDUSTRY OF NELSON.

The Commisioner of Crown Lands for Nelson found unexpected difficulty in obtaining a return of the sawmills in operation in the district, so that I am compelled to fall back upon the summary published in the statistics of the colony for 1884, and supplement it with some details that came under my own notice.

The summary states that twenty-two sawmills are in operation in the district, and afford employment to 139 men and boys. The total output is stated at 5,260,000 superficial feet, but I think this is decidedly an under-estimate. The Takaka Valley is perhaps the most important centre of timber-conversion in Nelson. The level portion of the valley has long been freehold. It was formerly covered with fine timber—red-, white-, and black-pine, and totara. Much of it has been cut out for sawmilling purposes, and a large area has been brought under cultivation. In some cases the sawmiller has acquired the freehold; in others he purchases the timber from the owner, who is benefited by the purchase-money, and has his land cleared of all heavy timber into the bargain.

Six sawmills are now in operation in the valley, and produce about 3,000,000 superficial feet per annum; this itself is more than half the amount stated in the summary. A light iron tramway, nearly eight miles in length, and worked by steam-power, conveys the timber to the Port of Waitapu, from whence it is shipped to Nelson and other places. The rate of freight is 1s. 3d. per 1,000ft. per mile, with a further charge of 6d. per 1,000ft. for wharfage. The tramway was constructed by a local company, with some assistance from the Government; but it was found necessary to mortgage the property in order to obtain funds for its completion, so that at present the original shareholders are not receiving an adequate return for the capital invested; but it has unquestionably proved of great benefit to residents, as the trade could not have been developed without its construction. Three of the sawmills are directly connected with the tramway; timber from the others has to be conveyed to the nearest point by horse-power. At the date of my visit Mr. Petersen was cutting in splendid clumps of totara, which, however, was proving less profitable than was anticipated, owing to its having been allowed to stand after full maturity had been attained. Some of the trunks had a narrow cone of decayed heartwood ascending about 2ft. from the base, but not more than from 2in. to 4in. in diameter. The unavoidable waste was out of all proportion to the small quantity of timber actually decayed.

Mr. Baigent, the proprietor of a sawmill at Wakefield, states that he converts about 500,000 superficial feet of timber per annum, of which 400,000ft. consists of rimu, 50,000ft. matai and white-pine, 50,000ft. tooth-leaved beech. Totara is practically worked out in the Wakefield District. Mr. Baigent has thoughtfully preserved a few fine specimens, an example which might be followed in other districts with advantage to the colony.

Referring to the railway-returns for the year ending the 31st March, 1885, I find that 3,945½ tons of timber, equivalent to 1,893,720 superficial feet, passed over the Westport railway during the year. On the Nelson and Belgrove line 2,509½ tons, equivalent to 1,204,560 superficial feet, were

carried during the same period. Fully two-thirds of the entire amount were loaded at Wakefield. Taking these figures we have—Waitapu, 3,000,000ft.; Westport, 1,893,720ft.; Nelson, 1,204,560ft.: total, 6,098,280ft.

A large amount of timber is used in Reefton and other parts of Nelson for mining purposes. It was assured that the Keep it Dark Company alone paid £800 per annum for timber, so that the aggregate value of the timber used in mining districts must amount to a large sum. Making a fair allowance for timber of this class, and for ordinary building timber, passing into local consumption direct from the mills, there can be no hesitation in estimating the total output of the Nelson District at 7,000,000 superficial feet per annum. To the above must be added an undetermined quantity used for shingles, fencing, firewood, &c., of which 3,520 tons passed over the Nelson and Belgrove Railway during the year ending the 31st March, 1884.

It has been already stated that in many cases sawmillers have acquired the freehold of a certain amount of forest-land, in others the growing timber is purchased from the owner. Sometimes, however, the mills are supplied with logs from land leased under timber-license at the rate of 4s. per acre per annum, and recently land has been taken up for sawmill purposes under the agricultural leasing regulations at the annual rental of 10 per cent. on its assessed value, equivalent to 3s. per acre; but no supervision is exercised over the working. About fifty acres are now under lease for sawmill- or firewood-cutting, the annual rents for which amount to £10. Miners have the right to cut timber on the land comprised under their leases without special payment, but in most cases the timber is quickly cut out, and, as a rule, further supplies are obtained from Crown lands without the formality of paying royalty or license-fees.

There is no apparent obstacle to the production of large numbers of railway-sleepers of the best quality at profitable rates to the resident settlers on the West Coast, as tooth-leaved and entire-leaved beeches are abundant in the Mokihinui, Ngahakawau, and other districts. Coasting-craft and small steamers can enter the rivers at high-water, and load in safety, taking their departure with the following tide unless hindered by contrary winds.

MARLBOROUGH.

THE Provincial District of Marlborough comprises 2,560,000 acres, of which rather more than one-fifth is covered with forest of varying quality.

Nine-tenths of the forest is situated in the northern portion of the district, occupying the greater portion of the country between the Pelorus Sound and the Wairau River. The patches of forest occurring in the Kaikoura Mountains and in the interior of the district are of no great extent, and possess merely a local value.

In their general character the Marlborough forests resemble those of Nelson, but, owing to the greater abundance of tawa in certain districts, often make a close approach to the forests of the North Island in general appearance. A large portion of the forests consists chiefly of tooth-leaved and entire-leaved beech, as in Nelson, and a further resemblance is shown in the occasional occurrence of red-pine, white-pine, and kamai; although entire mountain-slopes are often covered with beeches alone in the upper part of the Mokutapu Valley. In the lowlands the beeches are of large size, and pines are of more frequent occurrence.

In the best mixed forest the timber is often of unusually large dimensions, and exceptionally good quality. Large portions of the Kaituna Valley have been cut out, but some of the virgin forest still remaining is amongst the finest in the district; red- and white-pines of the largest size form the staple, and are interspersed with beeches of large dimensions. Many of the pines exceed 80ft. in length, and square from 24in. to 36in. at the base. In many places the forest is extremely dense. Near Mr. Hornby's sawmill I counted eleven stumps on a space measuring 26ft. by 12ft.; a single stump only was less than 2ft. in diameter; the others ranged from 24in. to 40in. Mr. Hornby assured me that numerous trees on the site of his mill had given between three and four thousand feet of boards and scantling.

The forest-land in the district may be conveniently divided into—(1.) Alluvial lands, such as the Kaituna Valley, described above. (2.) Level terrace-land, usually containing a large proportion of pines intermixed with beech. The pines under favourable conditions approach those of the low alluvial land in luxuriance of growth, but most frequently they are of smaller dimensions. (3.) Hill-sides, consisting almost entirely of beech, which varies greatly in size and quality.

The Rai Valley is a fine forest, estimated to contain about 46,000 acres, of which few sections comprising about 1,000 acres have been sold, the remainder is still in the hands of the Government. In the lower parts it contains large quantities of fine pines mixed with tawa and occasionally with beeches. The pines are for the most part of good quality and of good lengths, especially the white-pine, but occasionally the trees are somewhat scattered, although not to such an extent as to materially diminish the average return per acre.

Tawa is largely converted in this district, and is chiefly shipped for Christchurch, where it is locally employed in the manufacture of dairy-ware, tubs, buckets, &c. It sells at the same rates as red-pine. It is abundant in some parts of the Rai Valley, although not usually attaining the large dimensions which it frequently exhibits in the North Island.

THE TIMBER-TRADE IN MARLBOROUGH.

Fourteen sawmills are in operation in the district, and afford employment to about 175 men and boys. The annual output is estimated at 8,606,340 superficial feet. Five are situated in the

Kaituna Valley, the remainder in the Pelorus or in other parts of the Sounds, excepting two small mills south of the Wairau.

Sawmills were established in this district in very early days, the large supply of good timber growing in situations easy of access, and the facilities for shipping coastwise having proved irresistible inducements. It is therefore no great matter for surprise that most of the forest near the sea has been practically worked out. I was informed that one sawmiller had contemplated the advisability of starting a mill in the Aorere Valley, Nelson, but was debarred by the absence of a wharf.

I was unable to obtain particulars of the quantity of timber shipped coastwise. It is supposed, however, to have slightly diminished of late years on account of the increased local demand. The greater portion of the timber manufactured in the upper part of the Kaituna Valley is sent to Blenheim by timber-waggon, and passes into consumption direct.

Most of the mills are working upon freehold land, in some cases on payment of a royalty to the owners, the rate varying from 6d. to 1s. per 100ft. Sawmillers can work on Government land on payment of a royalty of 6d. per 100 superficial feet; but the measurement is left entirely to the sawmiller, who forwards a return to the Commissioner of Crown Lands once every six months. I was assured by one of the largest firms in the trade that the logs were invariably measured at the small end—a mode of measurement which would horrify a timber-merchant in England. The annual amount received by the Crown for royalty is about £390.

In a comparatively short time the bulk of the trade in the Pelorus will be concentrated under two firms, most of the available forest belonging to the Crown in that district having been cut out, with the exception of the Rai Valley. Under the old Provincial Government contracts were entered into for the construction of roads and bridges, and the contractors taking payment in land-scrip, much of which was ultimately purchased by sawmillers and others at low rates. In some cases the land is covered with splendid timber, so that the purchasers have been able to secure valuable portions of the public estate at but trivial cost. A large area of timber-land in the Upper Pelorus, originally alienated under this regulation, is now held by the owners for sawmill purposes, and will prove of great value.

Mixed pine- and beech-land is supposed to yield from 12,000ft. to 15,000ft. per acre on the average; but the lowlands in the Kaikoura Valley must have afforded much higher returns, some portions certainly exceeding 40,000 superficial feet per acre. A cleared section of about fourteen acres was pointed out to me by a sawmiller, who had purchased the timber upon it at a royalty of 8d. per 100ft., and who stated that it had produced over £10 per acre: this would be equivalent to upwards of 30,000ft. per acre, although it was not nearly so good as a piece of untouched forest leased by the same individual.

The district has long enjoyed a special reputation for the high quality of its white-pine. A variety of this timber has a stouter grain than white-pine grown elsewhere, and is of a yellowish tint; it is also more durable. The bark is said to be much rougher than in the ordinary form; it is chiefly found in the moister valleys. By some of the bushmen it is said to be the male plant, while others insist that it is the female; but the sex of the plant has no direct connection with the durability of the timber. I purpose making a microscopical examination of the timber of the different varieties during different stages of growth in the hope of arriving at some definite conclusion.

Less than 950,000 superficial feet of converted timber passed over the Blenheim and Picton Railway during the year ending the 31st March, 1885. Firewood carried during the same period amounted to 6,180 tons. From a return prepared by the officers of the Customs, I find that the shipments of timber from the Sounds coastwise for the year ending the 31st December, 1884, amounted to about 3,000,000 superficial feet.

FORESTS ON THE LINE OF NORTH ISLAND CENTRAL RAILWAY.

POUREWA AND MANGAONE VALLEYS.

THE lower portion of the Pourewa Valley is mostly clothed with mixed forest, consisting of red-, white-, and black-pines, tawa, miro, and northern rata. The red-pine is usually of splendid quality and very large dimensions. In some places tawa is the prevailing tree, but in this district it is deemed of little value except for firewood. Good specimens of black maire (*Olea Cunninghamii*) are occasionally seen, but are not frequent; the white maire (*O. lanceolata*) is still more rare. Red- and white-pines, with trunks from 40ft. to 65ft. long, and squaring from 16in. by 16in. to 24in. by 24in., are not uncommon in the rich level lands; frequently the white-pine attains still greater heights.

The forest is very dense in many parts, and the underwood unusually close; occasionally the konini (*Fuchsia excorticata*) may be seen with a stout trunk over 30in. in diameter; the kupapa (*Passiflora terandra*) often with a perfectly straight naked stem over 90ft. long, losing itself in the top of a lofty pine, from which its pendant slender branches and glossy leaves hung down in a cloud, while the stem itself, notwithstanding its diameter was only four inches, was as rigid as that of the pine which supported it.

On the slopes of the hills the pines as a rule are gradually displaced by entire-leaved beech, sparsely intermixed with the more valuable tooth-leaved beech; the former is mostly of rather small dimensions, while the latter, although somewhat larger, never exhibits its greatest luxuriance. Totara is nowhere plentiful, although scattered trees are to be found.

At the Pokiore loghouse a natural clearing is surrounded by fine timber, especially at the back of the house. On the base of the hill white-pine mixed with totara, matai, and red-pine form a

remarkably dense piece of forest; in some places the trunks are not more than from 6ft. to 10ft. apart, and would give a return of fully 60,000 superficial feet to the acre. In general appearance it reminded me strongly of some of the best parts of the Westland and Nelson forests, although the trees were of inferior height. Unfortunately the area is small, but forms a valuable Native reserve. This fine section, however, speedily thins out as it ascends the hill, and is succeeded by a belt of fine tea-tree, much of which is suitable for small piles. Tipau, hinau, rewarewa, &c., are not unfrequent, and are gradually succeeded by entire-leaved beech, as already described.

In its general features the forest of the Mangaone bears a considerable resemblance to those of the Pourewa. The pines are frequently of large size, but as they often grow on steeper declivities are not unfrequently scattered; tawa and northern rata are abundant. But the most valuable feature of this valley is the abundance of black maire (*Olea Cunninghamii*), which frequently attains large dimensions. It affords a compact dense timber of great durability, and is now coming largely into use for the framework of railway carriages, waggon, &c., for which purpose it is second only to the puriri. White maire (*O. lanceolata*) is occasionally met with, and the narrow-leaved maire (*O. montana*) is still rarer.

The general quality of the timber in this valley is excellent, and the dimensions are unusually large, especially of the pines, black maire, hinau, and rata; much of the latter formed straight symmetrical trunks.

RANGATAUA FOREST.

Rangataua Forest is situated on the south-western slope of Ruapehu, and on the Karioi side consists almost exclusively of silver-beech, which forms a belt fully half a mile in width. The trees are frequently of large dimensions; in a few places specimens were observed with trunks from 4ft. to 6ft. in diameter, although somewhat below the usual height.

Inside the forest the silver-beech is replaced by white-pine and rimu of exceptionally large size, but in some places rather scattered, so that frequently the tops are larger than usual. Many stems were fluted, wrinkled, or warted, so that in all probability a large proportion of figured wood, suitable for ornamental cabinet-work, would be obtained. The matai was frequent and of fine growth.

I observed a few scattered trees of totara, and measured a beautifully-symmetrical specimen, 60ft. to the first branch, and 36in. by 36in. I was assured that patches of good specimens occurred in other parts of the forest, but failed to come across a good clump even.

Tooth-leaved and entire-leaved beeches occur in larger or smaller patches, but rarely attain more than average dimensions. At greater altitudes mountain-beech replaced all other kinds, and runs out at about 4,000ft.

Black maire is not infrequent up to 2,000ft., although not nearly so plentiful as in the Mangaone Valley and in the Maire-pai Forest. Trunks from 22in. to 32in. in diameter were observed on Ruapehu. White maire occurred sparingly. Kamai, here called tawhero, was common, but rarely of large size. I was assured that totara was more plentiful to the north and north-west of Karioi, but, owing to the flooded state of the creeks and the absence of any passable track through the forest, I diverged from the central railway-line and passed round the southern and eastern flanks of Ruapehu to Waimarino.

The abundance of first-class convertible timber of large dimensions at an altitude of 2,000ft. and upwards was quite unexpected by me. As the forest extends for many miles along the railway-line, it may be expected to contribute largely to the traffic, while the mere fact of its being traversed by a railway will afford facilities for conversion and carriage to a port of shipment.

WAIMARINO.

At Waimarino the railway enters the forest at an altitude of 2,546ft., the forest in this place consisting chiefly of kaikawaka (*Libocedrus Bidwillii*), a handsome conical-headed tree, termed cedar by the bushmen. The cedar extended for fully a mile; the trunks averaged from 30ft. to 40ft. in length, and from 15in. to 24in. or 30in. in diameter. One fine specimen was 4ft. in diameter but only 25ft. in length. In the South Island this tree affords timber of great durability, fully equalling totara in this respect. It is, however, rather short in the grain, and therefore unfitted for constructive works in which great strength is required.

Crossing the Makaretu Stream and ascending the opposite bank, moderate-sized specimens of the Westland silver-pine (*Dacrydium Westlandicum*) were found, but much scattered, and nowhere in large quantity. Its occurrence at so great an altitude as 2,500ft., was quite unexpected; and, on account of its great durability, it is to be hoped that it may be found in abundance. The largest specimens observed were from 30ft. to 35ft. high.

From Waimarino the forest extends for many miles, consisting of large red- and white-pine, totara, and matai of fine growth, with the addition of tawa.

On the table-land between the edge of the forest and the base of Ngaruhoe large patches of good pines occurred, mixed with fine kaikawaka, totara, Westland silver-pine, broadleaf, &c., all of which ascended the mountain to fully 3,000ft., when they are gradually replaced by mountain-beech, which runs out a little below 4,000ft. Above 2,700ft. the patches of forest are often fringed by fine specimens of the toi (*Cordylina Hookeri*), a grand palm lily, with leaves from 4ft. to 6ft. long and from 5in. to 6in. wide, which afford a fibre of great strength and remarkable elasticity.

On a run leased from the Natives at Tongariro by Messrs. Studholme and Morrin numerous clumps or patches of totara of rather small size were dotted over the grass country. They rarely exceeded 35ft. to 40ft. in length and 2ft. in diameter, but would be of considerable value for small piles and other purposes. The patches which were sometimes of considerable size exhibited a remarkable undergrowth of broadleaf, large-leaved matipo, and various panaces, &c.

The margin of the forest to the west of Tongariro consisted chiefly of totara, often well grown and of fairly good dimensions, stretching for a considerable distance.

After crossing the Wanganui River the ordinary pines were found in great abundance, mixed in some places with good totara and maire. In a patch of forest at the back of Pouaru, kahikatea, totara, and matai of large size were thinly scattered through a dense undergrowth of matipo, broad-leaf, and koromiko. Some specimens of totara were from 3ft. to 6ft. in diameter, kahikatea 3ft. to 5ft., and maire 3ft. to 4ft.

THE MAIRE-PAI FOREST.

This is a mixed forest, somewhat broken, and destitute, so far as my observations extended, of beeches and rata.

On the ridge much of the timber is kamai, of small size, chiefly valuable for its bark, which contains 12 per cent. of tannin. On the slopes and in the lower parts good red- and white-pine occur, and fine matai with trunks 40ft. to 50ft. long and from 24in. to 30in. in diameter. Occasionally the rima and kahikatea were scattered, when they were usually of large size, from 4ft. to 6ft. in diameter. Patches of totara, with trunks from 2ft. to 3ft. in diameter, were met with in several parts of the bush. Tawa occurred in small quantity, and specimens of titoki, a rare tree in the district, were observed at an altitude of 1,500ft. Black maire was scattered through the forest, and sometimes attained exceptional dimensions; a group of three fine specimens measured from 25ft. to 30ft. in height to the first branch and 24in. by 24in. for their entire length. A larger specimen growing in close proximity was hollow; several specimens had short robust trunks 48in. by 48in. Tipau (*Myrsine salicina*) was plentiful and of large size. Although this forest contains a large quantity of really fine timber the proportion of scrub is unusually large.

NGAREWI.

Descending to the valley of the Pungapunga I passed through a magnificent grove of totara. Unfortunately the rain was pouring in torrents and the swampy forest was converted into a quagmire, so that my examination was conducted under difficulties, and I was unable to form any definite idea of the quantity of totara, but have no hesitation in saying that I have seen no finer trees in any part of the colony. Grand columns from 60ft. to 90ft. to the lowest branch and from 3ft. to 6ft. in diameter at the base were to be seen on all sides; in the higher parts no other tree occurred, but on the lower levels kahikatea and matai of exceptional dimensions were sparingly interspersed. Totara of smaller dimensions was observed, mixed with red-pine and kahikatea, in other parts of the valley, and I was informed that it was equally plentiful in the Tuhua District.

WAIMIHA.

A considerable extent of native forest, the title to which is still unsettled, lies between the Native settlement of Waimiha and Ascension Tunnel. The staple on the low ground and on the hills alike consists of tawa, often of exceptionally large size, with small kamai. Pines were mixed with the tawa throughout; in some places the totara formed large patches, the trunks varying from 2ft. to 4½ft. and 5ft. in diameter, some of the specimens being unusually fine; numerous rimu with trunks exceeding 4ft. in diameter; matai and kahikatea being somewhat rare. A few good specimens of black maire were observed in different parts of the block. The excellent quality of the timber, its large dimensions, and its accessible position render this block of considerable value, more especially as the quantity of available timber in other parts of the district is extremely limited.

AUCKLAND.

The northern provincial district comprises 17,000,000 acres, and includes the most valuable forests in the colony. The area covered by forest is estimated by the Chief Surveyor to contain 7,200,000 acres, of which about 1,606,350 acres, including reserves, are still held by the Crown.

Forest-areas are more evenly distributed in the Auckland District than in any other part of the colony, with the exception of Westland and possibly Taranaki. Still extensive areas in the Taupo, Waikato, and other portions of this provincial district are practically destitute of timber, while large tracks of forest-land have been alienated.

A remarkable feature of the forests of the northern district is that, while they possess timber-trees not found in any other part of the colony, they comprise as well all the kinds found in other provincial districts: the rimu, matai, and kahikatea of Southland; the white and yellow silver-pines of Westland; the tooth-leaved, entire-leaved, and mountain beeches of Otago and Nelson; the totara and tawa of Marlborough and Wellington are associated with the kauri, tamekaha, and puriri peculiar to the North. Taking the intrinsic values of the different timbers into account, it would not be easy to find such a remarkable peculiarity in the distribution of timber-trees in any other part of the Australian Colonies.

The kauri is by far the most valuable timber-tree in the colony, and occurs from the North Cape to Te Aroha Mountain, a few small clumps and isolated trees being found as far south as Maketu on the eastern coast and Kawhia on the west. Its geographical distribution in the colony is practically the same as that of the mangrove and rock-oyster. As a general rule the kauri forms large clumps or groves scattered amongst other trees rather than continuous forest; but there are notable excep-

tions: in some instances the groves are expanded into extensive forest, and afford one of the grandest sights in the vegetable world. Magnificent columns, from 50ft. to 60ft. to the first branch, and from 4ft. to 8ft. in diameter, rise in rank after rank, the bold, glossy foliage being altogether unlike that of any other tree in the forest. The timber is, perhaps, the most valuable of all the pines, combining great strength and durability with a texture at once compact and silky.

The puriri has been called the New Zealand oak on account of its hardness and durability; it should rather be termed the New Zealand teak, as its timber bears a close resemblance to that of the Indian teak, and to which, in fact, it is closely related. It is a noble tree, with smooth bark and compound leaves of the deepest green; the timber is the strongest and most durable grown in the colony; it is used for a great variety of purposes, and is unequalled for railway-sleepers. It is not absolutely restricted to Auckland, as it occurs sparingly at Waitara in Taranaki. It ascends from the sea-level to 2,000ft., and on good soils affords large timber in all situations between these limits.

The pohutukawa (*Metrosideros tomentosa*) is another tree characteristic of the Auckland District, but also found in small quantity in Taranaki and, I believe, in Nelson also. It is almost exclusively confined to sea cliffs and beaches, but occurs sparingly on Lakes Taupo and Tarawera, and along the course of the outlet from the latter lake to the sea. Its trunk is often of large size, and affords a timber of extreme density and durability greatly valued by the shipbuilder.

The tanekaha (*Phyllocladus trichomanoides*), one of the "celery-topped pines," is a fine, straight tree, 50ft. to 60ft. high, but rarely exceeding 3ft. in diameter; the timber is white, dense, heavy, and of great strength. It occurs from the North Cape to Kawhia, and was observed by Mr. Travers in a single habitat in Nelson. Its bark is highly valued for special purposes, and contains from 26 to 28 per cent of tannin. In 1883 it was exported to the value of £2,177, and is stated to be worth from £30 to £50 per ton in London.

Tarairi (*Beilschmiedia Tarairi*). The tarairi frequently attains 60ft. in height, with a trunk from 2ft. to 3ft. in diameter. It occurs from the North Cape to Poverty Bay, and affords a fissile but compact white timber, largely used for ship's blocks and general turnery.

The mangeao (*Litsea calicaris*) ranges from the North Cape to Rotorua, and usually attains rather smaller dimensions than the tarairi, but the wood is of superior quality for ships' blocks and other special purposes.

Other timbers of value for special work will be described in their proper place. Generally speaking, the northern forests are of a mixed character, except in the kauri districts, and bear a great resemblance to the best forests in the Kaituna Valley, Marlborough, the ordinary pines usually attaining very large dimensions, and being intermixed with tawa, tarairi, tawhero, &c. It will therefore be unnecessary for me to describe this mixed forest in detail.

THE PUHIPUHI BLOCK.

This fine kauri-forest is situate between Whangarei and Kawakawa, and comprises an area of 20,000 acres, of which about 12,000 acres are covered with kauri. I was assured that the area of kauri was fully 16,000 acres, but it is to be feared that this is an over-estimate.

The trees vary greatly in size. In some portions of the forest the trees in large sections were under 3ft. in diameter and remarkably uniform; in others they were much larger. I measured numerous trees with trunks from 48ft. to 60ft. clear of branches, and squaring upwards of 48in. by 48in. One fine symmetrical tree tapered so gradually that the diminution of girth was not obvious at first sight: its height to the first branch was 85ft., and its dimensions 36in. by 36in. One short columnar trunk was only 24ft. in height, but squared 97in. by 97in. But, although these giants are numerous in some places, the bulk of the forest, so far as I was able to examine, consisted of trees of smaller dimensions, say, from 30ft. to 50ft. in length and 36in. by 36in. It is certainly the finest forest in the hands of the Government.

A few ordinary pines are occasionally intermixed: kahikatea, rimu, and totara, but the aggregate is not large; moreover, with the exception of totara, the ordinary pines are but little valued in kauri districts.

The manao (*Dacrydium Kirkii*) occurs sparingly on several sections, and affords one of the most durable pine-timbers known. It belongs to the group of native silver-pines, and is remarkable for its dimorphic foliage. The lower leaves resemble those of the silver-pines of the northern hemisphere, while the upper leaves approach those of a cypress. Rewarewa (*Knightia excelsa*) occurs sparingly; tawari (*Ixerba brevifolia*), neinei (*Dracophyllum latifolium*), tipau, and tarairi are more or less plentiful in different parts of the forest.

The undergrowth consists chiefly of a small tree-fern (*Dicksonia lanata*), with trunks from 4ft. to 9ft. high; kauri grass (*Astelia trinervia*), the leaves of which are sometimes from 8ft. to 10ft. long; and cutting-grasses (*Gahnia setifolia* and *G. xanthocarpa*); with various small shrubs.

Portions of this forest have been destroyed by fire, but the aggregate is much less than I had been led to expect. In one instance, a section comprising from 150 to 180 acres has been cleared by fire maliciously kindled, as I was informed, by a Native, who considered that his personal interest had not received sufficient attention in the division of the purchase-money. Apart from this, the destruction caused by fire is but small. No gumdiggers were observed during my visit, although I came across several deserted huts.

The forest has been placed under the supervision of E. Erunehua, who receives a small annual payment from the Crown Lands Department, and performs his duty faithfully.

The greater portion of the forest is tolerably level, so that tramways will be of easy construction where required. Most of the timber can, however, be got out by the creeks, which, although rough in some places, can be rendered suitable for driving at a small outlay.

The distance between the forest and the present terminus of the railway at Kamo is about ten miles, so that the timber will have to be carried about seventeen miles by rail before shipment; the cost of railway-freight being 1s. 3d. per 100 superficial feet.

Exaggerated statements have been made as to the quantity of timber contained in this forest, some of them ranging above 600,000,000 superficial feet. My examination of the forest was not sufficiently complete to allow of my forming more than an approximate calculation, but I am not inclined to estimate it at above 300,000,000 superficial feet. At the low royalty of 3d. per 100ft. paid by the Southland sawmillers, this would give £45,000 as the value of the standing timber. For the present it should be strictly preserved, and the services of E. Erunehua might be advantageously retained for this purpose.

OMAHUTA

The Omahuta Block comprises 7,800 acres, situate near the head of the Maungakama River, Hokianga Harbour. Its greatest length is from north to south, about six miles, and its greatest breadth about two and a half miles from east to west.

A large quantity of kauri occurs on various parts of the block, and in some parts the trees are of large dimensions. Where kauri does not predominate most of the forest is of a mixed character. Large portions of the block are open manuka or fern, especially on the extreme northern and southern portions.

Puriri (*Vitex littoralis*) occurs but sparingly on the block, although it is plentiful on the low grounds by the river. Toatoa (*Phyllocladus glauca*) is frequent in a few places.

A few fine specimens of the manoao (*Dacrydium Kirkii*) were observed in various parts of the forest, some of them with trunks three feet in diameter. The tanekaha was of more frequent occurrence, and the southern palm (*Rhopalostylis sapida*) exhibited great luxuriance.

The Omahuta Creek rises near the north-east corner of the block, and runs in a south-westerly direction through the middle portion. The southern portion is drained chiefly by the Pukekohe, which joins the main creek near the boundary of the block. As both creeks have numerous tributaries, the greater portion of the timber could be got out with but little difficulty.

The proportion of young kauri in various parts of the block is unusually large. Two sections of considerable extent consisted chiefly of rickers, which ought to be carefully preserved. A large quantity of kauri is growing close to the main creek, forming a tolerably compact block of about a mile square or more. Large quantities are growing on the banks of the Pukekohe. The total quantity on the block may be roughly estimated at 40,000,000 superficial feet, but much higher figures were named.

Large quantities of timber on this block have been destroyed by fires caused by kauri-gum-diggers. At the date of my visit at least forty diggers, chiefly Natives, were working on this and adjacent blocks without paying anything in the shape of royalty. I was informed that large quantities of gum had been taken from Crown lands in the district during the last two or three years.

WAIKOROPU.

This block adjoins the Omahuta Forest, and is of similar character, but the proportion of trees of large dimensions is somewhat greater. In one or two places large trees averaged four or five to the acre, and would give a return of from 50,000 to 55,000 superficial feet. The total quantity would be much larger than in the Omahuta Block. The timber could be got out of the forest with but little trouble.

KAUAEORURUWAHINE.

This forest block is situated on the West Coast, on the southern margin of Whangape Harbour, and comprises 12,800 acres, of which 4,660 acres on the eastern side have been set apart as a forest reserve. On the western side it abuts on the sea-beach, except where it is bounded by Native reserves.

The block is much broken, in many places running up to sharp ridges 1,200ft. to 1,500ft. high; in the folds of which clumps of good kauri extend over from five to twenty or thirty acres, being scattered in this way over the greater portion of the western side, and forming patches of greater size in wide hollows. I am not able to give even an approximate estimate of the total quantity, and owing to continuous heavy rain was unable to reach the eastern side of the block, where the kauri is said to be remarkably fine and abundant. The position is very difficult of access, and it is unlikely that this block will be indented upon for some years to come. The outlet will be into Whangape Harbour; but I fear it will be difficult to get the logs into the water.

The block was being worked for kauri-gum, I believe by Natives exclusively. Fully a dozen huts were observed in different parts of the block, and, judging from the state of the track, a large quantity of gum must have been taken out. It is only fair to say that Maori diggers are far more careful with regard to fire than Europeans; no trees have been destroyed by fire in the Kauaeoruruwahine.

TURUA.

The Turua Sawmills are situate on the River Thames, at the margin of a grand kahikatea forest, the property of Messrs. Bagnall and Co.

It is scarcely possible to imagine a greater contrast between any two kinds of forest than that afforded by the kauri and kahikatea. The straight close-set trunks of the white-pine have but little top, and the greyish-green foliage closely resembles that of a cypress. The massive columns of the kauri often carry a large much-branched head, clothed with large coriaceous green leaves. In Messrs. Bagnall's bush the trees grow closely together, averaging from 40ft. to 50ft. long, and from 2ft. to 3ft. in diameter. The average yield per acre is fully 25,000ft. Mr. Bagnall informed me that in some parts of the forest the return was from 75,000 to 120,000 feet per acre.

The timber is of excellent quality and very even in the grain. In some places the white-pine is mixed with pukatea (*Laurelia novæ-Zelandiæ*), with a light undergrowth of Coprosmas of various kinds.

The annual output of the mill is about 2,000,000 superficial feet, much of which is shipped for Christchurch, a large proportion consisting of dressed flooring-boards. A large quantity is also exported to Queensland.

Messrs. Bagnall are large manufacturers of the Langstroth hive, for which the white-pine seems specially adapted.

The bush was worked in the most systematic manner, and with an absolute minimum of waste, every available stick being taken out. The tramways are excellent, and are laid with iron rails.

EXTENT OF KAURI-FOREST.

Owing to the peculiar habit of the kauri in forming small clumps or patches scattered through mixed forest, and to its wide range of dimensions, it is not easy to form an accurate estimate of either the average return per acre or the total quantity of kauri-forest. If large areas are taken the acreage return will seem very small—for instance, a block of 30,000 acres is estimated to contain 100,000,000 superficial feet, an average of 3,333ft. only, while in another district 6,000 acres may yield 120,000,000ft. or 20,000ft. per acre. Patches varying from 40,000 to 70,000 superficial feet per acre are not uncommon. For good continuous kauri-forest 20,000 superficial feet per acre would be a rather low average, but much of the land classed as kauri-forest may have only one or two trees per acre, equivalent, say, from 3,000 to 5,000 superficial feet.

The following approximate estimate has been prepared at my request by Mr. S. P. Smith, Chief Surveyor, Auckland:—

In the hands of Government ...	...	...	...	36,470 acres
Owned by Europeans ...	...	...	...	58,200 „
Owned by Natives ...	...	...	...	43,800 „
Total ...	...	...	...	138,470 acres.

Mr. Smith states his belief that a considerable proportion of the kauri-forests still in the hands of Natives is subject to rights by Europeans to cut timber therefrom, and adds, “In making up this estimate I exclude forests in which the timber, as far as my knowledge goes, is scattered, and not likely to pay for working at present, and take only that which is fairly accessible.” I believe Mr. Smith's estimate to be well within the mark, but shall have to return to the subject on a future page.

THE TIMBER-INDUSTRY IN AUCKLAND.

It is to be regretted that at present accurate statistics of the timber-trade in Auckland are not to be obtained. I am indebted to the Commissioner of Crown Lands in Auckland for a return compiled under his instructions, which states the annual output to be 112,000,000 superficial feet, and the number of men employed 8,000, which appears to be an over-estimate, possibly caused by gumdiggers being included. The return drawn up by the Registrar-General states the number of sawmills to be forty-three, of which eight are worked by water-power; the annual output is stated to be 48,631,206 superficial feet, and the number of persons employed 1,443 men and 35 women. These are very much below the proper numbers. I hope to present an approximate return with my final report on the Auckland District.

The total value of timber exported from Auckland is returned at £135,952, or more than five times as much as all the rest of the colony put together, a statement that shows the vast importance of the conservation of the kauri-forests in the interests of the Auckland settlers, as well as of the colony at large.

The large dimensions of the kauri increase the cost of bringing timber to the mill; and in many cases the difficulty is further increased by the broken character of the forest, which renders the construction of tramways almost impossible, so, that speaking in general terms, tramways, invariably used in the south, are rare in the north. The mill is usually erected on the banks of a creek or navigable river, so that the logs may be floated down. If the trees are growing on the banks of a stream, they are felled, cross-cut into suitable lengths, and the logs rolled into the water. When growing at some distance from water it is necessary to construct “rolling roads;” these are broad tracks from 30ft. to 40ft. wide, in which every advantage is taken of the natural incline of the surface, and from which all trees have to be removed, the stumps cut level with the surface, inequalities roughly levelled, and large holes filled up. The logs are forced along these roads by “timber-jacks” until they reach the water. In this way the logs are moved with great ease; the bushmen exhibit a great amount of dexterity in their work, and move the largest logs with a speed which surprises any one who witnesses it for the first time. In no other part of the colony is the jack used for moving timber to any extent—in fact, its use is but rarely required on account of the smaller dimensions of the logs—but I never saw it used with equal dexterity, or with a greater amount of intelligence in England. If the creek contains water of sufficient depth to float the logs, they are simply rafted to the booms at the mill, to be converted as fast as required. It often occurs that the creeks are too shallow to float the logs, so that they must either be conveyed by a tramway to the mill or to deep water, or must wait until a fresh occurs in the stream, unless driven by water stored at high levels by means of dams. The construction of these dams often involves a considerable amount of heavy work and a serious outlay; in some cases side dams are necessary to collect additional water in the small tributary creeks in order to procure a sufficient volume. When the dam is completed the logs are rolled into the creek, and on the streams being swollen

by heavy rains the sluices of the dams are opened, and the entire mass of logs driven down to deep water.

In broken country, where the mills are dependent upon driving for the supply of logs, a protracted period of dry weather may prevent conversion being carried on for several months, and the men are thrown out of work, while the capital of the proprietor is rendered unproductive for the time. Another source of loss is found in excessive floods, which bring down the logs with such impetuosity that the booms are broken, and hundred of logs are swept out to sea. In the Wairoa (Kaipara) immense rafts of logs brought to the river by its numerous tributaries may be seen towed to the mills by steam-tugs; the quantity moved in this river—as large as the Thames at London Bridge—cannot be estimated at less than 30,000,000 superficial feet per annum.

In some cases all the operations are performed by day-labour, but usually the trees are felled, cross-cut, and rolled into the creeks by contract, the cost varying, according to situation, at from 1s. to 2s. per 100 superficial feet; occasionally higher prices are paid. To this must be added the cost of flotation, which varies greatly according to distance. The cost of constructing a single dam ranges from £250 to £1,000.

In measuring the logs an allowance of from 4in. to 6in. in the girth is made for bark, but generally the mode of measurement appeared to me to be somewhat lax, and to tell rather unfairly against the sawmiller. So large a proportion of the kauri grows on steep declivities and in broken places that the logs are often much damaged before reaching the creek, and if the bed of the creek is rough they become further damaged to a great extent in the process of driving. From this and other causes the loss in conversion is larger than in any other native timber, and cannot be estimated at less than 30 per cent.; in some cases that came under my notice it was over 40 per cent. As the contractor is usually paid for logs without any allowance for damage of this kind, the loss falls upon the converter, and materially increases the cost of manufactured timber. The average cost of conversion may be stated at about 2s. per 100 superficial feet. In one or two instances, where a large supply of logs has been available, the electric light has been brought into use, and the mills worked by relays, so that conversion has been carried on continuously from Monday morning to Saturday night, but I believe that this practice has been found unprofitable on account of the increased percentage of waste in manufacture.

For the last two years prices have been fairly steady, the average rate being 10s. per 100 superficial feet. At some mills 11s. 6d. per 100ft. is charged for boards of first quality, and 7s. for second quality; 10s. may be taken as a fair average.

The manufacture of doors, sashes, &c., has assumed large dimensions in Auckland; in some large factories the timber is dried by hot air, but a difference of opinion exists as to the advantages attending the process. It is contended by some that the strength is diminished by rapid desiccation, but this is denied by those who advocate the method. Large quantities of kauri are shipped to Wellington, Christchurch, and Dunedin, much of which is worked up for doors and window-sashes. Kauri is the chief timber used in most parts of the colony for work requiring high finish, so that, partly on account of the ease with which it can be worked, and partly on account of its superior qualities and greater durability, it enters largely into consumption, and affords employment to a large number of persons in the chief centres of population outside the Auckland District.

Many of the mills obtain their supplies of logs from freehold land; others from lands leased from the Natives or Europeans; or the logs may be supplied by contractors, who obtain them from the most convenient source.

In past years some of the best forest-land was purchased at from 2s. 6d. to 5s. per acre; recently small sections have been purchased from settlers at £1 10s. to £3 per acre; and I was informed that still higher rates are occasionally paid, but the sums stated can scarcely be considered to represent the intrinsic value of the timber. There can be no question that timber is now obtained from positions so difficult of access that a few years ago it would have been pronounced impossible to remove it at any reasonable cost.

On the Thames Goldfield a fee of £1 5s. has to be paid for each kauri-tree used by the miners; but the right to cut ordinary timber free of charge is conferred by the miner's right.

In a few cases a royalty is paid, varying from 3d. to 9d. per 100 superficial feet, or even more in extremely favourable situations. I was informed of an instance in which blocks of land containing over 20,000 acres, belonging to Natives, were leased at a nominal rental of less than £1 per annum, and a royalty of 3d. per 100ft. on all logs taken out of the bush; but, on account of the difficulty attending the removal of the logs, the speculation did not prove lucrative, and operations were discontinued. The lease has still several years to run, but, as the deed contains no stipulation requiring a minimum sum to be paid as royalty, the owners receive about 15s. per annum only, as the present holder of the lease refuses to part with it, except on terms considered beyond its value.

Kauri is often beautifully waved, rhoded, or figured, and occasionally mottled. The mottling in some cases is caused by an excessive development of short branchlets, in others by a rapid development of cellular tissue, preventing the proper expansion of the bark, so that flakes or small portions are enclosed in the growing sap-wood, and indurated by excessive pressure, ultimately forming dark mottling on a light ground. Frequently the effect is intensified by the fragments of bark becoming encased with a film of translucent resin; in course of time the sap-wood becomes lignified and assumes a darker tint, while not unfrequently other portions of the wood are beautifully feathered. Figured and mottled trees are more frequent in rocky situations. Mottled timber is valued at from £3 to £5 per 100 superficial feet for conversion into veneers.

As a rule the common pines are not highly valued in kauri-districts. Rimu is sometimes converted for the purposes of the cabinetmaker, and, as already stated, white-pine is converted at the Turua Mills to the extent of fully 2,000,000 superficial feet per annum; but, except for packing-cases, &c., a very small portion of this passes into local consumption.

At the Turua Mills the supply is obtained from freehold land held by the proprietors, or from land leased by the Natives, or from the settlers; in the latter case the timber is purchased standing, and a royalty of 3d. per 100ft. is paid upon the measured logs, the expense of felling and rafting being defrayed by the purchaser. The cost of felling, conversion and haulage may be estimated at 2s. 6d. per 100ft. for labour only.

The Auckland sawmills must be classed amongst the best in the world; the largest are considered to be unequalled in the Southern Hemisphere. In one or two cases employment is given to nearly five hundred men and boys, and the annual output of each is stated to exceed 8,500,000ft. per annum. At the present time there are numerous mills with an output of 5,000,000ft. and upwards. They are fitted with the most approved machinery, not only for general conversion, but for the manufacture of doors, window-sashes, &c. A readiness to adopt improvements is shown in all directions, and no expense is grudged to secure the most efficient appliances. The large mills in most instances are worked by joint-stock companies, who have managed to secure sufficient kauri to keep their mills supplied for the next fifteen or twenty years at the present rate of consumption. One mill, with an annual output of 5,000,000ft., is stated to have sufficient timber to last for over thirty years, but this is an exceptional case. Large blocks of Native Land on the Cape Colville Peninsula were purchased by the Crown a few years back, subject to the rights of mill-proprietors. I believe that, with possibly two exceptions, all the large mills have sufficient standing kauri to keep them going for the next twelve or fifteen years at least at the present demand.

I have been unable to ascertain the amount received by the Government for the right to cut timber in kauri-forests, but was informed by the Commissioner of Crown Lands that it was very small.

DURATION OF KAURI FORESTS.

Estimating the total extent of available kauri-forest at 200,000 acres (an area greatly in excess of that stated by the best authority Mr. S. P. Smith), and placing the average yield at the high rate of 15,000 superficial feet per acre for all classes, the present demand will exhaust the supply in twenty-six years, making no allowance for the natural increase of local requirements. If, however, the demand expands in the same ratio that it has shown during the last ten years, the consumption in 1895 will be upwards of 240,000,000 superficial feet per annum, and the kauri will be practically worked out within fifteen years from the present date.

Under these circumstances the best interests of Auckland and the colony at large demand the strict conservation of all available kauri-forest. The progress and welfare of the northern district have been largely due to her magnificent forest-resources, and their conservation will prove an important factor in the permanence of her prosperity. The utilization of the ordinary timbers should be encouraged, and it should be an axiom with the settlers not to use kauri when red- or white-pine can be made to answer the purpose. Any steps tending to postpone the period of exhaustion will be of the greatest benefit to Auckland, as a longer period would be allowed for the growth of timber to take the place of the kauri within the restricted limits in which replacement is possible. Should this warning be unheeded, a large displacement of labour will result, and the prosperity of the north will be greatly retarded.

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