

SESS. II., 1887.
NEW ZEALAND.

STATE FOREST DEPARTMENT.

(PROGRESS REPORT OF THE), FOR YEAR ENDED 31st MARCH, 1887, BY T. KIRK, F.L.S., CHIEF CONSERVATOR OF STATE FORESTS.

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

DURING the year a large amount of solid work has been accomplished, although but little of it is of a showy character. New forest regulations have been brought into force throughout the colony, with satisfaction to that portion of the community most directly interested, the enormous waste and robbery carried on for many years past have been greatly reduced, and the income for the first year has exceeded the amount anticipated, although it was late in the season before the regulations were generally enforced. Lastly, the formation of new plantations has been commenced.

REVENUE.

The income for the year ended the 31st March, 1887, was estimated in last year's report at £3,500. Notwithstanding the depressed condition of the timber trade, the amount actually received is £3,874, of which one-half was paid during the last quarter of the financial year, that is, after the new regulations came into force. The additional amount required to carry on work is obtained by debentures issued under sections 7 and 8 of the State Forest Act. If the cost of the agricultural section be deducted from the total expenditure, the outlay on forestry proper for the last year exceeds the income by the sum of £845 only. Forest revenue is derived almost exclusively from royalties on timber, and, as these are extremely low—only 3d. per 100ft. superficial for the common kinds—it is obvious that no hindrance is thrown in the way of the converter.

EXPENDITURE.

The total expenditure for the year amounts to £5,770 9s. 11d., which may be divided as under:—

	£	s.	d.
Office, including salary of Chief Conservator	...	...	868 6 6
Conservation	...	...	1,261 6 4
Plantations	...	...	2,181 15 8
Preparation of plates for "New Zealand Forest Flora"	...	...	407 18 6
Agricultural Section, and items not connected with State forests	...	...	1,051 2 11
	<u>£5,770 9 11</u>		

Conservation comprises the salaries and travelling expenses of Rangers and Foresters, whether permanent or temporary. The salaries of nurserymen, the cost of cottages, fencing, seeds, tools, labour, and travelling expenses are charged under "Plantations." The items under "Agriculture" will receive attention in a separate paragraph. A further sum of £69 19s. 4d., interest on debentures issued, has to be added to the amount stated; but, as it is charged under permanent appropriations, it is not shown above.

STATE FOREST REGULATIONS.

During the past year the different provincial regulations for obtaining timber from State forests have been abolished, and one uniform code has been brought into force throughout the colony. It was not to be expected that such a radical change could be made without a certain amount of opposition; but it is only just to say that any prejudice that may have been raised disappeared at once when the regulations were fairly discussed. The Hon. the Commissioner of State Forests met the principal sawmillers of the Marlborough District at Havelock, when a solitary concession was suggested, which it was found could be readily granted. I had the pleasure of meeting the chief sawmillers of Southland, a district in which timber conversion is almost exclusively restricted to State forests, when each regulation was carefully considered on its merits. Two emendations were suggested, one of which has been adopted and the second partially adopted. In no single instance has it been found necessary to modify any of the principles involved, while in practice the regulations have worked smoothly, and have proved satisfactory alike to the sawmillers and the department. Some of the principal timber merchants stated that, in their

opinion, the regulations would place the trade on a more satisfactory basis, as they would prevent the large amount of unlicensed cutting that had been carried on for years, while the mere fact of all timber being valued and paid for before felling would place all members of the trade on a footing of equality. While these direct advantages have been gained, it is worth while to point out that the regulations are sufficiently elastic to admit of such modifications being effected as may from time to time be required by the varying conditions of trade and the constant increase in the demand for timber. A striking proof of the value of the new code is afforded by the fact that a large area, prematurely abandoned as having been cut out, has been taken up afresh, and is being properly exhausted.

KIOREROA RESERVE.—SCHOOL OF FORESTRY. (3,891 acres.)

In the report on the capabilities of this block (C.—3c) laid before the Commissioner of State Forests, June, 1886, I pointed out that it would be absolutely necessary to provide a section of first-class land suitable for experimental grounds. This was warmly taken up by the County Council and inhabitants of Whangarei, so that when visiting the reserve in October last I was requested to attend a public meeting and state the objects of the School of Forestry and Agriculture, the mode of working proposed, and the particular purposes for which a section of good land was required. It afforded me great pleasure to comply with the request, the result being that I was invited by the Chairman of the County Council to accompany a party of settlers to inspect several sites that had been offered for the purpose, when a section of 100 acres of first-class volcanic land with a fine aspect was approved by all parties. The cost has been defrayed partly, I believe, by subscription, partly by a grant from the County Fund, and the site has been placed at the disposal of the Government for the purposes of the School of Forestry. I was given to understand unofficially that the Council would be favourably disposed towards contributing to the support of the school when it was formally opened.

Under the instructions of the Hon. the Commissioner of State Forests the vote for buildings was not indented upon except for the construction of a substantial cottage for the resident nurseryman, tool-house with seed-room, &c.

The late period at which operations were commenced rendered planting operations, &c., impossible for the season. A portion of the main reserve, containing about 1,900 acres, is in course of enclosure by a substantial wire fence carried on puriri posts. This encloses some of the best and some of the worst land on the entire reserve. Six hundred acres, at least, are in course of being cleared, ploughed, and harrowed for sowing or planting during the coming season. Five acres in a sheltered situation have been trenched for the first orchard, and will be planted as soon as possible. Two hundred, or if possible two hundred and fifty, acres additional will be ploughed and planted this season, as well as another piece of ground trenched for orchard-work. The high rates required for trenching in this district will probably render it necessary to adopt other methods.

It is satisfactory to be able to state that, on the whole, the quality of the soil on this reserve is much better than was at first anticipated. The nurseryman reports that, out of 600 acres for first ploughing, 330 acres are of medium quality, 120 really good, a small patch of twenty acres exceptionally good, and 130 acres very poor; but there is no doubt that even this very poor land can be made to yield a net annual profit of £2 per acre from wattle-growing.

It is proposed to devote the whole of the profits from fruit-grounds, wattle plantations, and other sources as soon as they can be brought to the bearing point, to the maintenance of the school, so as to render it self-supporting at the earliest possible date. Steps are already being taken to utilise the experimental grounds placed at the disposal of the department by the County Council; and it is confidently anticipated that year by year good results will be shown. The cultivation of common and sub-tropical fruits will be greatly facilitated through the experiments carried on in this section. It is not possible to estimate the advantages that have been lost to agriculture and fruit-culture in the colony by the absence of experimental grounds such as are now in course of formation at Whangarei.

The sum of £947 7s. 9d. has been directly expended on the reserve during the season.

WAERENGA PLANTATION RESERVE.

The work effected on this reserve has been the experimental planting of red-gum amongst the manuka without preliminary preparation of the soil, ploughing and sowing with black-wattle and red-gum (*Eucalyptus rostrata*), clearing to prepare for ploughing during the present season, and fencing. This reserve is clothed in all parts with fern or manuka, the latter varying in height from a few inches to 4ft. or 5ft. The soil is of very poor quality, consisting of a stiff, arid, hungry clay, which in many places crops out on the surface, but in others is covered with a thin layer of poor soil, except in a few narrow gullies, where it is 1ft. in depth. Active operations were commenced in September; but, owing to the continuous heavy rain which set in during August and continued until November, the progress was extremely slow, as neither ploughing nor planting could be carried on. The sudden cessation of rain was followed by an intense drought, so that the surface became too hard to allow of ploughing being continued, while the young plants suffered severely. It will be seen that this result was inevitable when it is stated that from the 1st November to the 31st March the nurseryman reports that rain fell only on seven days, as under: 22nd November, light, drizzly showers most of the day; 24th, a light shower, lasting for a few minutes; 28th, a light shower, lasting for a few minutes. 2nd December, two light showers, lasting for a few minutes; 11th, light drizzle during morning. 1887: 5th February, rather heavy rain for half the day; 3rd March, light rain during half the day. The general results are, however, better than could have been anticipated under such unfavourable conditions.

Owing to the peculiar configuration of the reserve, and the fact of its being intersected by the Waikato Railway and several roads, the extent of fencing is unusually large in proportion to the

area. A substantial seven-wire fence carried on puriri posts has been erected on nine miles of the boundary-lines, but a small portion of the cost will have to appear in next year's accounts. The remainder of the fence will be completed during the month of May.

A fire-belt, composed of English broom, backed by fuchsia and Bedford willow, will be formed along each side of the railway and the various road-lines. This is of great importance, as the reserve is unfortunately situated in one of the driest districts in the Waikato.

A small cottage has been erected for the nurseryman in charge.

About sixty-one thousand seedlings of red-gum were planted amongst the manuka without any preparation of the ground. Holes were dug at 5ft. apart and small seedling plants inserted; but, owing to the protracted drought, during which the clay surface was simply baked, the proportion of failures is unusually large. About thirty-six thousand are reported by the nurseryman to be living. The experiment involves results of considerable importance, and will be repeated during the coming season, it is to be hoped, under more favourable conditions. Should it prove even moderately successful we shall be able to plant manuka land with eucalypts and other trees, allowing 700 plants per acre for £1 15s., without incurring the cost of clearing or ploughing. The large number planted per acre would allow of a wide margin to cover failures of most kinds, as even 350 established plants per acre would require a certain amount of thinning.

The nurseryman reports that the black-wattle plantations have improved considerably since the rain fell, and that failures are not sufficiently numerous to require the work to be done again. I may state that in the Waikato the golden wattle (*Acacia pycnantha*) suffers severely from frost—at least in the young state; so that until further evidence is available it will be advisable for cultivators in that district to sow only the black wattle (*Acacia decurrens*).

The direct expenditure on this reserve amounts to £764 10s., to which must be added the sum of £274 paid from the vote for the "unemployed," chiefly for clearing and burning manuka.

SCHEDULE OF RESERVES ADMINISTERED UNDER "THE NEW ZEALAND STATE FORESTS ACT, 1885."

This enumeration (see Appendix to this report) includes the reserves gazetted under old provincial or general ordinances, as well as those directly proclaimed under the State Forests Act.

At present many of the small reserves are unclassified, so that it is not possible to give an accurate estimate of the quantity of timber in the hands of the department; but it may be stated that more than fully two-thirds of the total area have been reserved for climatal reasons or the conservation of the water-supply of various districts. Reserves of this class rarely contain any large quantity of valuable timber, as they chiefly occupy the crests and steeper slopes of mountain ranges or other positions unsuitable for settlement and unfavourable to the luxuriant growth of our indigenous timbers, although in many localities these may be advantageously replaced by other kinds.

PROPOSED OPERATIONS.

It is proposed to restrict planting and replacement operations to the following reserves for the present season:—

KIOREROA RESERVE.

To complete the fencing of the area already in hand, and to sow about five hundred acres of wattles and three hundred acres of jarrah, also to plant about ten acres of fruit-trees. To commence the enclosure of the experimental grounds, and to plant a number of economic plants which have already been acquired or are on their way out from England and other countries. A narrow fire-belt to be formed where necessary.

PUHIPUHI FOREST, MATANGINUI.

It is intended to commence the enclosure of about twelve hundred acres of this forest, at present covered with fern or burnt kauri, at the south-east angle of the main area; to plough about two hundred acres and plant with jarrah this season, the greater portion of the remainder to be planted with jarrah or Californian red-wood as fast as the plants can be raised. The outer margin to be surrounded with a fire-belt.

WAERENGA.

It is proposed to complete the fencing of the entire reserve, to fix gates to the different sections, and to commence the formation of fire-belts. To sow about four hundred acres with black wattle and five hundred acres with red-gum and ironbark; also transplant three thousand English oak, preparatory to planting-out next year. A large number of red-gum and ironbark, now in the nursery, will be planted out in continuation of the experiment commenced last year.

MANIOTOTO.

The Maniototo District comprises about two hundred thousand acres. The whole of this large area does not contain a single patch of native forest or even a single native tree. Around the stations and settlers' homesteads a few willows, oaks, and other trees have been planted, and are, for the most part, in a flourishing condition when in sheltered situations, although at elevations not exceeding 1,200ft. even the larch is killed by spring frosts or burnt by the heat of summer. Agriculture is obviously carried on under difficult conditions. No district in the colony stands in such need of the ameliorating influence of masses of woodland as this and other parts of Central Otago. Timber for building purposes or for mining cannot be obtained except by railway from Invercargill or Dunedin to Palmerston or Dunback Railway-stations, whence it has to be conveyed by drays for distances of from fifty to a hundred miles, at rates that are almost prohibitive. Under these conditions many houses are built of sun-dried brick. It has been determined to commence the formation of plantations on reserves at Gimmerburn in this district, where it is intended to plough and subsoil about two hundred acres this season, and erect about four miles of fencing, also to erect

a cottage for the nurseryman. It is intended to plant the two hundred acres first ploughed with red- and cider-gums (*Eucalyptus rostrata* E. Gunnii). Subsequently English oak and ash will be largely planted, with sundry quick-growing pines. These reserves are situated in such a position that it will be possible to irrigate portions of them during the summer at a small expense.

It would be difficult to overrate the value of plantations in this district if looked at simply from a climatal point of view: the continuous droughts of summer and the excessive frosts of winter would be mitigated, and great facilities afforded for the extension of agriculture. From a commercial point of view the advantages are equally great. The cost of firewood and fencing-stuff is so high that even the first thinning of the plantations would find a ready market, while an important item of freight would be prepared for the railways of the future.

ESTIMATED REVENUE FOR THE CURRENT YEAR.

It is estimated that the forest revenue for the year ending the 31st March, 1888, will amount to £4,800. Should trade exhibit any marked improvement a larger sum may be anticipated. The depression in the kauri trade during the past year has been of an extreme character, and at present no revenue is obtainable from the kauri in the hands of the Government.

FIRES.

The Rangers in the employment of the department have discharged their duties efficiently during the past year. It is matter for special congratulation that not a single acre of kauri forest under the control of the Chief Conservator has been destroyed by fire, although, unhappily, a large extent of forest in private hands has been swept away. The only loss of importance has occurred in Hawke's Bay, where a small section of totara has suffered severely, owing to fire having spread from adjacent sections which were being cleared by settlers. No other loss of timber by fire is known to have occurred in State forests.

PROSECUTIONS.

It has been found necessary to take proceedings against four persons guilty of illegal cutting during the past year. Convictions were obtained in three cases, and fines varying from £3 to £8 inflicted, while most of the timber cut was seized and sold. In the fourth case a conviction was not obtained owing to the absconding of the culprit, who is known as an old offender, so that his having left the district must be considered satisfactory. A portion of the timber felled by him was seized before he was able to remove it.

VALUATIONS.

The valuation of standing timber, based upon actual measurement, is a new feature in dealing with New Zealand timber-trees, as it throws a fair portion of the waste in manufacturing on the shoulders of the converter. Hitherto, however wastefully a bush may have been worked, or however carelessly a saw-mill may have been managed, all the loss has fallen upon the forests. Under the new arrangement the forest will be more thoroughly cut out, and in many instances greater care will be taken to prevent waste in conversion.

A table is appended showing the value of areas taken up by sawmillers in the Southland District during the last quarter of the year. Unfortunately, the Southland forests have been excessively wasted by illegal cutting in past years, so that it is not easy to find large areas of virgin forest near any of the settled districts. The eyes have been picked out. In many instances portions of the areas stated here had been cut by the sawmiller under the old regulations, the old boundaries having been adopted in order to save the expense of survey fees. From these causes it is not possible to form an exact opinion on the average value per acre from present data, and several years must elapse before the first of these disturbing causes ceases to operate.

The following is a return of saw-mill areas exceeding 60 acres for which licenses were granted during the quarter ending the 31st March, 1887, in the State forests, Southland District:—

No. of Application.	Name of Sawmiller.	Locality.	Area.			Amount of Valuation.		
			A.	R.	P.	£	s.	d.
121	McCallum and Co. ...	Seaward Bush ...	200	0	0	51	3	3
122	Findlay and Co. ...	" ...	200	0	0	358	8	0
123	A. Tapper ...	" ...	122	0	0	178	18	6
124	W. Guthrie and Co. ...	Winton Forest ...	100	0	0	163	10	0
125	John Murdoch ...	" ...	190	0	0	118	0	0
126	McCallum and Co. ...	Seaward Bush ...	200	0	0	80	17	6
127	John Murdoch ...	" ...	200	0	0	495	12	5
128	Morton Mains Company ...	Oteramika Bush ...	200	0	0	218	5	0
129	Dunedin Iron- and Wood-ware Company...	Seaward Bush ...	200	0	0	124	17	3
131	H. A. Massey and Co. ...	Mabel Bush ...	200	0	0	181	6	3
132	J. H. Dawson and Sons ...	Seaward Bush ...	200	0	0	114	17	2
133	Boyd and Edwards ...	Spar Bush ...	200	0	0	124	16	3
134	W. Egerton ...	Winton Forest ...	200	0	0	84	19	0
136	John Murdoch ...	Stewart Island ...	66	3	16	78	15	0
137	Small and Co. ...	Waimatuka ...	104	3	6	33	8	4
139	John Murdoch ...	Seaward Bush ...	198	3	27	323	12	6
143	McCallum and Co. ...	" ...	97	2	0	206	10	6
144	Colonial Bank of New Zealand ...	" ...	200	0	0	237	5	3

LEASING FOREST LANDS.

Under the State Forest Act the powers of the Commissioner to lease any portion of forest land except to sawmillers is limited to twenty acres. It is found by experience that it is desirable this limit should be abolished. In all forests there are numerous areas either bare or covered with worthless scrub, which cannot be improved by the department for some years on account of the want of funds. Power should, I think, be given to lease areas of this kind for a short time in cases where adjacent settlers might find it beneficial to take them up. Two applications to occupy land of this kind have been made; in one of these the applicant expresses his readiness to plant a portion of the area under the instructions of the department, but as the area applied for exceeds the stated limit there is no power to accept the offer.

KAURI-GUM LICENSES.

In the interests of village settlers the Hon. the Commissioner of State Forests has given instructions to issue free licenses to dig kauri-gum during the months of May, June, July, and August. Fern land, cleared patches, and scrub within the boundaries of the forests are to be thrown open without restrictions, the only limitation being that digging amongst growing kauri, whether old or young, is strictly prohibited. This is absolutely necessary as the kauri is extremely sensitive to any disturbance of the surface or to destruction of the light undergrowth; slow premature decay being the result of interference with either. This point is of importance when the necessity of preserving the kauri in order to afford employment to a large number of working-men is kept in view.

A NEW SPECIES OF TOTARA.

During the progress of inquiries directed to ascertain the cause of the remarkable variation in the durability of totara timber from different localities in the colony it was discovered that two distinct species of *Podocarpus* have been confused under the name of totara. The Hawke's Bay and Wairarapa Districts especially have long been famous for the durability of their totara when used for bridges and other large works. Totara from Otago and other localities is more lightly valued. The Hawke's Bay timber belongs to the true *Podocarpus Totara*, which occurs, sometimes mixed with the other species, from Auckland to Catlin's River. The other, which I have named *P. Hallii*, is the only species in Southland and Stewart Island, but is also found as far north as the Bay of Islands, and is frequent in mountain districts. It is distinguished from the true totara by its thin papery bark, larger leaves, and pointed fruit, its timber is lighter and apparently more suitable for piles than *P. Totara*, but less valuable for heavy constructive works. It is named after Mr. J. W. Hall, of the Thames, who has cultivated it for some years, and strongly advocates its specific validity. Drawings and descriptions will be included in the first division of the "Forest Flora of New Zealand," now nearly ready for issue.

THE AGRICULTURAL SECTION.

It has already been stated that the total expenditure under this section during the year amounts to £1,051. This includes salary and travelling expenses of the officer in charge. Payments to Mr. Alderton for reports on American fruit-culture, the purchase of Mr. Maskell's work on scale insects, salary of Mr. Schoch, and purchase of mulberry-trees, &c., with smaller items of a similar character. As none of these are connected with forestry, their being charged to the forest account places the department at a decided disadvantage, especially as debentures have to be issued to meet them.

FRUIT SECTION.

Under instructions from the Hon. the Commissioner of State Forests, Mr. Maskell's work on the Scale Insects of New Zealand has been purchased and printed with coloured plates at the cost of the department. It will be issued at a low price, and it is hoped will prove of assistance to fruit-growers.

A large amount of information with regard to the habits of certain injurious insects and fungi has been collected by the Chief Conservator, and will be arranged for publication in a popular form at the earliest possible date.

I have to express my satisfaction with the conduct of the officers of the department during the past year. I believe that all have endeavoured to discharge their duties in an efficient manner, in some cases under trying circumstances.

I have also to acknowledge the assistance given by officers of the Survey Department, especially by Mr. McKerrow, Surveyor-General, Mr. S. P. Smith, Assistant Surveyor-General, Mr. H. J. H. Elliott, Under-Secretary for Crown Lands, and Mr. J. Spence, Chief Surveyor, Southland. The last-named gentleman was indefatigable in his efforts to smooth the difficulties incidental to the enforcement of new regulations.

AN ACCOUNT OF THE MANUFACTURE OF CRUDE POTASH IN AMERICA.

The following interesting account of the American method of manufacturing crude potash has been written by Mr. H. D. Twohy, of the Forests Department, and is printed for the information of settlers:—

"SIR,—In compliance with your instructions I visited several makers of potash, and obtained the following information as to the process commonly employed:—

"Having selected a central position with a large permanent supply of water, a rough shed is erected, a flat-topped horizontal brick or stone-arched flue, terminating in a stack, is put up and five potash-kettles weighing 12cwt. each are set in line along the flue 2in. apart from flange to flange. Commencing at the furnace-door the kettles are numbered 1, 2, 3, 4, 5, each kettle beginning with No. 2, being set 2in. lower than the one proceeding it for the purpose of distributing and equalising

the heat—the kettle-bottoms being about 2ft. above the bottom of the flue. A stout three-ply crossed and battened wooden floor, rising 1 in 12, is then laid down on each side of the flue at a distance of 4ft. from the mason-work. This floor is thus laid down to intercept any leakage of the lye. On these floors are built eight rough wooden bins, known as 'leaches,' of 60 to 70 cubic feet capacity each, four on each side of the flue, hopper-shaped, with a batter of 2in. to the height for sides and backs, the bottom having the same slope as the floor. The whole breadth of the front of each leach is cut away for 1in. above the bottom—some making the upper edge of the opening serrated. These openings permit the escape of the lye into a rough wooden trough made of hollow logs, split in half, or of lumber, the cross-section measuring 48 square inches. These troughs terminate in large cast-iron receivers sunk in the earth. The ashes, without exception 'domestic,' having been hauled by the 'ashery' wagons, are stacked in immense mounds on each side of the building for convenience in filling the leaches. Finally a hand-pump and hose are connected with the water-supply.

"In commencing operations the first step is to lay down in the bottom of each leach a rough filter consisting of two layers crossed of inch splints; on these is laid a 2in. layer of straw, over which is spread evenly and loosely two bushels of dry air-slaked lime. Commencing with the bins known as No. 1 tier on the left of the flue, the ashes are thrown into the leaches to a depth of 1ft., and then tramped down till solid. A second layer 2ft. in thickness is similarly treated, the bins are then filled up and tramped for the last time, the ashes being then within 4in. of the top of the bins. Water is then pumped in till they are full. In the course of a few hours the lye begins to flow into the receivers, and when good ashes are being treated should stand at 20° Baume; water is added from time to time to the leaches till the lye stands at 5° Baume. As soon as the receivers are full, the lye is ladled into the kettles, commencing with No. 1, till they are half filled and the fire is kindled. Fresh lye is added as evaporation proceeds, care being taken to prevent the kettles boiling over by the addition when required of a little resin or a tablespoonful of pine-tar. The receivers being emptied, water is added to the ashes till the resulting lye stands at 0° Zero of the scale. This weak lye is pumped into No. 2 tier of bins already filled, the ashes in No. 1 tier being thrown out and the bins refilled with a fresh supply.

"The spent ashes fetch from 4s. to 6s. per ton, are eagerly sought by fruit-growers, are largely advertised in American agricultural papers, and, after being carried seven hundred miles by schooner and canal-barge, are retailed in car-load lots at 1s. 3d. per bushel to the market-gardeners on Long Island, New York. They still contain potash sufficient for making soft-soap.

"The lye in the kettles having boiled for a period varying from six to nine hours, according to the strength of the lye and the intensity of the fire, black salts begin to collect at the bottom of the kettles. These salts have a thick syrup-like appearance, and are dipped out from time to time into coolers. As soon as sufficient salts are on hand those in Nos. 3, 4, and 5 kettles are ladled into Nos. 1 and 2. A little water is added, and when this is evaporated the salts collected in the coolers are cautiously added a little at a time to the mass, which in a short time melts. In about three hours' time the contents of the kettles are of a rich yellowish brown tint, and present an appearance not easily described. A little fat is thrown into the kettles, which, catching fire, burns off the impurities, which, owing to their lighter specific gravity, form a scum on the surface. Ebullition ceases, and the contents of the kettles are at once dipped as rapidly as possible into cast-iron coolers, where it stands for twenty-four hours, when it is fit to barrel. Immediately the potash is ladled out of the kettles, the fire is drawn, and spent ashes thrown into the furnace, the kettles being re-filled when cool.

"Great caution is necessary during the process to prevent injury to the kettles while at a red heat, and to avoid being splashed with the fiery alkaline liquor, weak acetic acid or vinegar being kept at hand for use in case of need. There should be three receivers to every five kettles, and the coolers should be in duplicate sets; in addition there should be several long-handled iron dippers 6in. by 8in. Any potash which before barrelling may be exposed for any length of time to the action of the air should be covered with unslacked lime to prevent the access of moisture. The furnace-door should be 18in. by 20in., a plate of sheet-iron hanging by a chain from the roof serving both as door and damper, a single horizontal bar across the furnace-door 1ft. above the bottom answering as a grate-bar.

"Good wood ashes, such as hickory or maple, turn out 5lb. potash to the bushel; that from black ash, 6lb.; very good ashes, 7lb.; that from swamp elm, 9lb. This last explains why elms attain their greatest dimensions when growing over shales rich in potash.

"The time required for converting 250 bushels of ashes will average forty hours, the consumption of fuel being three cords (384 cubic feet) of good hard wood. The output of such a plant as I have described, working night and day, will be 36cwt. per week. The barrels are of oak with oak hoops, air-tight, and weigh from 85lb. to 100lb., holding about 6cwt. of potash. The spot cash price at 4½d. per lb. averages about £5 15s. per barrel, the freight per barrel by rail to Montreal, distant about four hundred miles, being 7s.

"All of which is respectfully submitted.

"T. Kirk, Esq., Chief Conservator, State Forests."

"HENRY D. TWOHY.

APPENDIX.

SCHEDULE OF RESERVES ADMINISTERED UNDER "THE NEW ZEALAND STATE FORESTS ACT, 1885," ETC.

MONGONUI COUNTY.				RODNEY COUNTY.			
Survey District—		Acres.		Survey District—		Acres.	
Kaeo	2,112			Tangihua, Block XVI.	7,225		
Whangaroa, Block II.	1,292			Ruakaka, Block XII.			
Takahue, Blocks IX., XIII.	4,160			Matakohe, Block IV.			
Maungataniwha, Blocks VI., VII., IX., X.	3,097			Waipu, Blocks I., IV.,			
Takahue, Blocks XII., XIII., XV., XVI., XVII.	8,243						
Maungataniwha, Kaeo, Omapere, and Maungamuka, chiefly climatal (part in Hokianga County)	16,024						
Hokianga and Whangape (part in Hokianga County)	7,700						
Whangape (part in Hokianga County)	4,660						
Total	47,288						
BAY OF ISLANDS COUNTY.				EDEN COUNTY.			
Survey District—				Survey District—			
Omapere, Block VIII.	640			Otahuhu, Lot 182, Section 10, Parish of Waitemata (part in Manukau County)	11		
Motatau, Block XVI.	594			Lot 68A, Section 10, Suburbs of Auckland	0 $\frac{3}{4}$		
Mangakahia, Block IV.				Waitemata, Parish of Takapuna	3		
Total	1,234			"	1		
HOKIANGA COUNTY.				"	2		
Survey District—				"	5		
Punakitere, Blocks IX., XIII.	928			"	2		
Waoku, Blocks V., IX., X.	3,510			Total	24 $\frac{3}{4}$		
Waoku, Blocks V., VI., VII., X., XI.	3,692						
Waoku, Block XII.	150						
Waipoua, Block XII., Section 1	754						
Maungataniwha, Kaeo, Omapere, and Maungamuka (included in Mongonui County, in which part of reserve is situated).							
Hokianga and Whangape (included in Mongonui County, in which part of reserve is situated).							
Whangape (included in Mongonui County, in which part of reserve is situated).							
Total	9,084						
WHANGAREI COUNTY.				MANUKAU COUNTY.			
Survey District—				Survey District—			
Matakohe, Block VII. (part in Hobson County)	352			Opapeke, Lot 154, Parish of Maungatawhiri	106		
Parua, Block XIV.	883			Opapeke, Lot 48A, Blocks XI., XII., Parish of Otatau	500		
Tangihua, Block V.	180			Otahuhu (included in Eden County, in which part of reserve is situated).			
Parua, Block I., Section 39	277			Total	606		
Mangakahia, Block VIII. (part in Hobson County)	163						
Parua, Block I., Section 1	2,054						
Mangakahia, Blocks XIII., XIV. (part in Hobson County)	2,195						
Opuawhanga, Blocks V., VIII.	1,580						
Parua, Block XI.	1,345						
Whangarei, Blocks I., II.	723						
Whangarei, Block XI.	1,600						
Parua, Blocks XI., XII.	19,290						
Puhipuhi Forest (kauri)	3,891						
Kioreroa Reserve (school of forestry)	34,533						
Total							
HOBSON COUNTY.				RAGLAN COUNTY.			
Survey District—				Survey District—			
Matakohe, Block VII. (included in Whangarei County, in which part of reserve is situated).				Karioi, Section 1, Block X.	640		
Mangakahia, Block VIII. (included in Whangarei County, in which part of reserve is situated).							
Maungaru, Blocks VIII., XII.	6,265						
Tangihua, Blocks I., III., VII., X.							
Mangakahia, Blocks XIII., XIV. (included in Whangarei County, in which part of reserve is situated).							
Raihu, Blocks III., IV.	5,450						
Total	11,715						
				WAIPA COUNTY.			
				Survey District—			
				Puniu	50		
				"	81		
				"	1		
				Hamilton	118		
				Total	250		
				THAMES COUNTY.			
				Survey District—			
				Tairua, Blocks X., XI., XIV., XV.	5,000		
				TAURANGA COUNTY.			
				Survey District—			
				Tauranga, Parish of Te Papa	6		
				Aongatete, Parish of Apatu	541		
				Total	547		
				WAIKATO COUNTY.			
				Survey District—			
				Parish of Whangamarino, Waeranga Reserve	1,830		
				WAIPAWA COUNTY.			
				Survey District—			
				Makaretu, climatal	5,200		
				Tahoraite, climatal	8,900		
				Woodville, chiefly climatal	5,900		
				Wakarara, climatal	67,400		
				Woodville, Section 38, Block I., timber reserve	15		
				Total	87,415		
				HAWKE'S BAY COUNTY.			
				Survey District—			
				Pohui, Section 26, Block XIV., timber reserve (part in Wairoa County)	32		
				WAIROA COUNTY, HAWKE'S BAY.			
				Survey District—			
				Pohui, Section 26, Block XIV. (included in Wairoa County, in which part of reserve is situated).			
				Waiau, Section 5, Block 10	123		

TARANAKI COUNTY.
Six miles around summit of Mount Egmont,
chiefly climatal

Acres.
72,332

WAIRARAPA WEST COUNTY.
Survey District—
Waiohine, Eritonga, and Akatarawa, chiefly
climatal 36,400
Pakuratahi and Akatarawa, chiefly climatal .. 13,800
Rimutaka, Wairarapa, Oneke, Pencarrow, and
Belmont, chiefly climatal 31,400
Total 81,600

WAIRARAPA EAST COUNTY.
Survey District—
Makuri, Block I. 200

OROUA COUNTY.
Survey District—
Gorge, climatal 3,580
Gorge, Kairanga, Mangahao, and Aruwaru,
climatal 25,200
Gorge 1,100
Pohangina, Block VII. 1,000
Total 30,880

MANAWATU COUNTY.
Section 46, Township of Foxton 10a. 18p.

SOUNDS COUNTY.
Elliott Peak, climatal 11,500
Mount Stokes, climatal 6,800
Total 18,300

MARLBOROUGH COUNTY.
Survey District—
Wakamarina and Onamalutu, climatal .. 5,760
Onamalutu and Mount Rintoul, climatal .. 37,100
Linkwater, climatal 960
Heringa, climatal 12,800
Wakamarina, climatal 7,000
Linkwater and Cloudy Bay, climatal .. 6,000
Wakamarina 21,000
Wakamarina and Heringa 900
Total 91,520

WAIMEA COUNTY, NELSON.
Survey District—
Wai-iti, Block III., Sections 3, 4, 6, 11, 14, 15 .. 662
Wai-iti, Block III., Section 157, Square 2 .. 188
Wai-iti, Block VI., Section 9 182
Wai-iti, Block VII., Sections 6-9, 14-16, 29-31 .. 1,245
Wai-iti, Section 213, Square 2 272
Wai-iti, Block X., Sections 4-6, 8-11, 17 .. 1,843
Wai-iti, Block XI., Sections 33-34 292
Gordon, Block XI., Section 35 1,392
Total 6,076

WESTLAND COUNTY.
Survey District—
Otira, No. 212 (in red), Block VI., timber reserve .. 40
Otira, No. 213 (in red), Block VII., timber reserve .. 40
Total 80

SELWYN COUNTY.
Plantation reserves vested in county on the 14th Sep-
tember, 1886 (see *Gazette* No. 48, of the 16th September,
1886, page 1120) :—

Part Rural Sections.	Area.	Part Rural Sections.	Area.
A. R. P.	A. R. P.	A. R. P.	A. R. P.
26409 ..	35 2 23	33877 ..	
26610 ..	33 2 27	27014 ..	
27204 ..	36 0 14	24065 ..	
26234 ..	33 0 15	24066 ..	
26110 ..	123 2 9	27516 ..	126 3 6
26674 ..		30546 ..	
30632 ..	26 0 24	27013 ..	
23598 ..	106 1 9	27512 ..	
23599 ..		24233 ..	
23830 ..		25447 ..	
22706 ..		27513 ..	
12903 ..		28025 ..	
12904 ..		32835 ..	
14949 ..			
19049 ..			
28124 ..			

SELWYN COUNTY—continued.

Part Rural Sections.	Area.	Part Rural Sections.	Area.
A. R. P.	A. R. P.	A. R. P.	A. R. P.
29059 ..	172 1 15	29063 ..	140 0 11
29060 ..		26817 ..	
26982 ..		29046 ..	
32707 ..		26836 ..	
27107 ..		29045 ..	
27108 ..		26834 ..	24 3 29
27109 ..		27172 ..	
27110 ..		31642 ..	
26987 ..		31124 ..	
26981 ..		33908 ..	
29069 ..	224 3 9	33908A ..	151 0 7
27006 ..		31125 ..	
26876 ..		20323 ..	
32836 ..		29091 ..	
24239 ..		33882 ..	
27858 ..		26989 ..	419 2 35
27859 ..		33054 ..	
32837 ..		27001 ..	
26893 ..		26996 ..	
30548 ..		26997 ..	
29062 ..	29101 ..	26998 ..	33055 ..
33915 ..		26999 ..	
29101 ..		33055 ..	
26876A ..		33912 ..	

Reserve.	Area.	Reserve.	Area.
A. R. P.	A. R. P.	A. R. P.	A. R. P.
Part 1579 ..	807 0 0	Part 1766 ..	98 1 19
1741 ..	95 0 0	1778 ..	491 2 7
Part 1742 ..	71 1 30	Part 1779 ..	412 0 0
Part 1743 ..	20 1 35	1796 ..	106 1 31
Part 1744 ..	37 0 0	1797 ..	113 2 11
Part 1745 ..	15 3 0	1798 ..	58 3 12
1746 ..	176 0 0	Part 1800 ..	18 2 0
1747 ..	186 2 30	1809 ..	448 0 0
Part 1748 ..	60 0 0	1810 ..	83 3 0
Part 1749 ..	76 0 0	1811 ..	320 0 0
Part 1751 ..	110 0 0	1812 ..	168 0 0
Part 1752 ..	80 0 0	1813 ..	116 0 0
1753 ..	48 0 0	Part 1814 ..	159 1 29
Part 1754 ..	561 2 6	1817 ..	49 2 24
Part 1755 ..	273 0 28	1829 ..	781 3 14
1756 ..	173 2 22	1830 ..	889 1 31
1757 ..	442 0 0	1834 ..	606 1 10
1758 ..	350 0 0	2469 ..	21 3 26
1759 ..	210 2 0	2575 ..	32 1 22
Part 1760 ..	131 0 0	2576 ..	143 1 24
1761 ..	43 0 0	2577 ..	33 2 0
Part 1762 ..	456 0 0	2661 ..	209 1 19
Part 1763 ..	1,038 3 0	2662 ..	29 0 19
Part 1764 ..	1,012 0 0	2676 ..	22 1 4
Part 1765 ..	1,527 0 0	2677 ..	5 1 13
			15,075 0 19

ASHBURTON COUNTY.

Plantation reserves vested in county on the 14th Sep-
tember, 1886 (see *Gazette* No. 48, of the 16th September,
1886, page 1120) :—

Reserve.	Area.	Reserve.	Area.
A. R. P.	A. R. P.	A. R. P.	A. R. P.
1767 ..	94 0 9	2565 ..	315 3 20
Part 1769 ..	194 3 0	2567 ..	1,338 3 0
Part 1770 ..	546 0 0	2568 ..	92 0 0
1772 ..	191 0 0	2569 ..	29 0 0
1773 ..	117 2 27	2570 ..	15 0 0
1774 ..	416 0 0	2571 ..	56 0 0
Part 1775 ..	46 0 0	2573 ..	100 1 0
1780 ..	38 2 0	2589 ..	742 1 20
1782 ..	246 0 0	2590 ..	1,329 2 14
Part 1783 ..	73 2 30	2591 ..	306 1 18
1826 ..	115 0 0	2592 ..	213 2 29
1827 ..	85 0 0	2647 ..	5 0 0
1905 ..	47 0 0	2670 ..	220 3 0
2560 ..	197 3 37	2671 ..	98 3 0
2561 ..	244 3 8	2672 ..	81 1 0
2562 ..	35 0 21	2673 ..	126 2 0
2563 ..	77 3 2	2674 ..	242 1 0
2564 ..	299 0 33		
			8,378 3 28

ASHLEY COUNTY.

1579 (in red) (part in County Selwyn) ..	1,477
1737 (in red) ..	50
1738 (in red) ..	50
1739 (in red) ..	50
1740 (in red) ..	50

ASHLEY COUNTY—continued.				Acres.
1839 (in red)	..	..	..	76
Survey District—				
Mount Thomas, chiefly climatal	..	..	..	7,200
Mount Thomas and Upper Ashley, chiefly climatal	..	..	..	6,000
Kowai	..	..	..	432
1752 (in red)	..	..	..	90
Total	..	..	..	15,475

GERALDINE COUNTY.				Acres.
1838 (in red)	..	..	..	100
1859 (in red)	..	..	..	50
1862 (in red)	..	..	..	122
Survey District—				
Rangitata	..	..	..	192
Tengawai (part in Mackenzie County)	..	..	..	90
Total	..	..	..	554

MACKENZIE COUNTY.				Acres.
1840, plantation reserve	..	..	..	115
1843, plantation reserve	..	..	..	100
1844, plantation reserve	..	..	..	134
1845, plantation reserve	..	..	..	366
Survey District—				
Tengawai (included in Geraldine County, in which part of reserve is situated).	..	..	..	715
Total	..	..	..	715

WAIMATE COUNTY.				Acres.
1815 (in red)	..	..	..	226
1849 (in red)	..	..	..	23
Total	..	..	..	249

LAKE COUNTY.				Acres.
Section 11, Block XIX., Town of Arrowtown	..	..	..	22
Survey District—				
Eyre, Eyre Forest, chiefly climatal	..	..	..	46,700
Total	..	..	..	46,722

WAIKOUAITI COUNTY.				Acres.
Survey District—				
Waikouaiti, Section 2, Block X., chiefly climatal	..	..	..	2,516
Waikouaiti, Section 10, Block XI.	..	..	..	1,407
North Harbour and Blueskin, Sections 64 and 65, Block VIII.	..	..	..	40
North Harbour and Blueskin, Sections 44, 66-75, Block VIII.	..	..	..	200
Silver Peak, North Harbour, and Blueskin	..	..	..	2,085
Silver Peak, Section 1, Block VII.	..	..	..	908
North Harbour and Blueskin, Section 32, Block III.	..	..	..	903
Waikouaiti, Section 1, Block X.	..	..	..	699
Total	..	..	..	8,758

TAIERI COUNTY.				Acres.
Survey District—				
Dunedin and East Taieri, Sections 1, 2, 60, 77, Block V.	..	..	..	411
Strath-Taieri, Sections 18-20, Block II.	..	..	..	39
Strath-Taieri, Sections 21, 22, Block II.	..	..	..	70
Strath-Taieri, Sections 53-55, Block V.	..	..	..	66
Sutton, Sections 18-20, Block XIII.	..	..	..	78
Sutton, Section 50, Block IV.	..	..	..	24
Sutton, Section 9, Block II.	..	..	..	106
Total	..	..	..	794

MANIOTOTO COUNTY.				Acres.
Survey District—				
Maniototo, Section 24, Block XIV., plantation reserve	..	..	..	69
Maniototo, Section 25, Block XIV., plantation reserve	..	..	..	51
Maniototo, Section 16, Block XIII., plantation reserve	..	..	..	41

MANIOTOTO COUNTY—continued.				Acres.
Gimmerburn, Sections 25-28, Block VI., plantation reserve	..	..	..	67
Upper Taieri, Section 17, Block VI., plantation reserve	..	..	..	54
Upper Taieri, Sections 18, 19, Block VI., plantation reserve	..	..	..	31
Blackstone, Sections 5, 15, 16, Block XIII., plantation reserve	..	..	..	100
Blackstone, Sections 25-29, Block XV., plantation reserve	..	..	..	119
Blackstone, Sections 6-19, Block XVI., plantation reserve	..	..	..	63
Poolburn, Section 1, Block II., plantation reserve	..	..	..	34
Lauder, Section 56, Block III., plantation reserve (part in Vincent County)	..	..	..	52
Lauder, Section 19, Block IV., plantation reserve (part in Vincent County)	..	..	..	63
Lauder, Section 15, Block V., plantation reserve (part in Vincent County)	..	..	..	30
Blackstone, Section 52, Block II., plantation reserve	..	..	..	44
Gimmerburn, Sections 1, 3, 4, 6, 7, and part of 2, Block VI.	..	..	..	1,176
Upper Taieri, Sections 1-5, 12-14, Block VI.	..	..	..	1,965
Total	..	..	..	4,023

VINCENT COUNTY.				Acres.
Survey District—				
Lower Hawea, Sections 30A and 31, Block V., plantation reserve	..	..	..	42
Lower Hawea, Sections 32, 33, Block V., plantation reserve	..	..	..	68
Lower Hawea, Section 15, Block VI., plantation reserve	..	..	..	22
Tarras, Sections 16-18, Block XIII., plantation reserve	..	..	..	105
Tiger Hill, Sections 15, 16, Block IV., plantation reserve	..	..	..	73
Lauder, Section 56, Block III., plantation reserve (included in Maniototo, in which part of reserve is situated).	..	..	..
Lauder, Section 19, Block IV., plantation reserve (included in Maniototo, in which part of reserve is situated).	..	..	..
Lauder, Section 15, Block V., plantation reserve (included in Maniototo, in which part of reserve is situated).	..	..	..
Total	..	..	..	310

WALLACE COUNTY.				Acres.
Survey District—				
Longwood, partly climatal	..	..	..	50,250
Wairaki	..	..	..	1,140
Takitimo	..	..	..	1,660
Jacob's River Hundred, Blocks VIII., XIII., XVII.-XXII.	..	..	..	24,500
Aparima Hundred, Blocks I., III.-VII.	..	..	..	15,500
Survey District—				
Oreti	..	..	..	380
Longwood, larger portion climatal	..	..	..	81,600
Letham Bush, Wairaki	..	..	..	2,800
Woodlaw Forest, Wairio	..	..	..	3,960
Waiau, portions of Longwood, Raymond's, Woodlaw, Broadlands, and Lonneker Forests	..	..	..	16,950
Takitimo, Bellemont, Taylor's, Blackmount, Princhester's, and Takitimo Forests, large portion climatal	..	..	..	37,440
Centre Hill, climatal	..	..	..	5,500
Total	..	..	..	241,680

SOUTHLAND COUNTY.				Acres.
Forest Hill and Winton Hundreds	..	..	..	2,400
Oteramika Hundred	..	..	..	2,830
Survey District—				
Hokonui and Forest Hill, chiefly climatal	..	..	..	13,250
Hokonui Bush, Waimumu, chiefly climatal	..	..	..	9,800
Hokonui	..	..	..	960
Invercargill Hundred, Blocks XXII., XXIII., XXIV.	..	..	..	11,400
Invercargill Hundred, Sections 43-49, Block X.	..	..	..	792
Invercargill Hundred, Sections 1, 2, 6, Block XVIII.	..	..	..	246
Campbelltown Hundred, Blocks VIII., IX.	..	..	..	6,700

SOUTHLAND COUNTY— <i>continued</i> .		SOUTHLAND COUNTY— <i>continued</i> .	
	Acres.		Acres.
Oteramika Hundred, Blocks II., III., IV., V., VII., IX., X., XI.	10,450	Survey District—	
New River Hundred, Block XXI.	1,700	Hokonui, Croydon, Okaiterua, Otapiri, Hokonui, Heale Ridge, and Centre Bushes, large portion climatal	12,880
Winton Hundred, Blocks II., III., VIII.	6,200	Total	113,058
Survey District—		Stewart Island and adjacent islands, including Cooper, Native, Pearl, Owen's, and Long Islands, contain a comparatively small quantity of convertible timber	376,400
Waimumu, Dunsdale and other forests	11,400		
Lindhurst, Dunsdale and other forests	2,950		
Forest Hill Hundred, chiefly climatal	16,900		
Survey District—			
Taringatura, Hillend Forest	1,000		
Mabel Hundred, Blocks II., V.	1,200		

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