

two steel hull equipments; three walking dipper equipments; four drag-line excavator equipments; three combination steam-navvies and drag-line excavator equipments; three gasoline-locomotive equipments; complete equipment for three headings of air-compressors, rotators, drill-steels, &c.; spare parts generally. Office—One photostat equipment; two flow-recorders (clock-driven) equipments; one electric-current meter equipment. It is confidently expected that the new equipment will materially expedite future operations.

The Acting Chief Drainage Engineer, Mr. O. N. Campbell, in association with Mr. R. G. Macmorran, Inspecting Engineer, and Mr. J. W. Harvey, Chief Clerk and Accountant, very capably carried out the duties of the Chief Drainage Engineer during his absence in America.

APPENDIX IV.—SAND-DUNE RECLAMATION.

(R. P. GREVILLE, F.R.G.S., Commissioner of Crown Lands, North Auckland.)

Sand-dune reclamation has been continued during the year on the east and west coasts—on the east coast between Waipu and Marsden Point, and on the west coast south of Kaipara Harbour in the vicinity of Woodhill. Satisfactory and encouraging progress has been made in both places, and large plantations of marram, lupin, and other plants are now firmly established, making the work of future reclamation a much easier problem than when operations were commenced.

In starting reclamation of sand-drifts one of the difficulties generally to be faced is that of obtaining a good supply of sand-binding plants with which to carry on the work. It is this problem which makes it difficult, if not impossible, to commence sand-reclamation works on a large scale, and at the inception it is usually necessary to establish plantations which will form bases of supply for future planting.

The importance and value of this work I think is generally recognized. From my experience I am satisfied that sand-dune reclamation can be regarded as a truly reproductive work, and that where we have a rainfall such as we have in New Zealand the work is not of an experimental nature, and success is assured provided we proceed along the right lines. Where valuable lands are threatened by the spread of drift the work really becomes one of necessity, and the ends to be attained are twofold—first, the reclamation of the sand-dune area, and second, the protection from injury and possibly destruction of the valuable lands now in a productive state.

An important consideration in regard to the reclamation areas is the vital importance of keeping all wandering stock off the area to be dealt with. In the far northern peninsula, extending from the valuable Kaitaia Swamp towards the North Cape, we have several large areas of land, including vast stretches of sand-drift, which are let as grazing-runs at an almost peppercorn rent. This gives the lessees the right of pasturing stock over these sand-dune areas, and makes the problem of the future reclamation of the dunes one of increasing difficulty. It is proposed, as these leases expire, to discontinue them and to take steps as far as possible to prevent the trespass of stock on the areas referred to. It is found that if stock is kept off these sand-dune areas the growth of native plants helps materially to check the sand-drift. This has been particularly noticeable in the Waipu sand-drifts, and in a lesser degree on the Kaipara coast. In the latter place it has not been possible to take effective measures to keep the wandering stock off the land, and in some places the rabbit pest has rather added to our difficulties.

The work in this district is under the charge and direction of Mr. Samuel Stafford, who has made a keen study of the problem, and much of the success attained is the result of his zealous and enthusiastic work.

Up to the end of March the work done on the Waipu coast comprised nine plantations of marram-grass, of a total area of 56 acres, and 291 sacks of lupin-seed harvested and sown in suitable localities. Large numbers of *Hakea siligna*, *elæagnus*, *Pinus radiata*, African boxthorn, and other suitable plants were put in. The total cost of this work up to the end of March was £859 7s. 10d.

On the Kaipara coast there were six plantations of marram-grass established, comprising a total area of 104 acres. Lupin-seed has been sown on large areas, and the plants are thriving well. 503 sacks of seed were harvested and sown, the seed being sown without taking it out of the pod. In addition, half a ton of threshed seed was sown along a continuous line parallel to the coast, extending from near Muriwai to a point about ten miles to the north. The total expenditure on the Kaipara sand-dunes to the end of the financial year was £1,182 14s 10d.

It is proposed during the coming year to commence sand-dune-reclamation works on the Northern Kaipara coast, west of Te Kopuru and Aratapu, the sum of £250 having been placed on the estimates last year for that purpose.

It is also proposed to make a start and establish plantations as a base for future supplies in the far north, between Ahipara and Hohoura. The sand-drift in this region has become a very serious problem, and it is necessary that plantations should be put in hand in order to protect valuable areas of Crown lands from being covered over by the drifting sand.