

From the above return it appears that all standard survey, consisting of 27,873,090 acres or over one-third of the whole colony, is reliable for the purposes to which it is intended to apply; but this cannot be said of the settlement and section survey, for in minor triangulation, amounting to 12,294,000 acres, or about one-fifth of the whole colony, there are 2,430,000 acres unproven, though half of this is recoverable. In block section survey, amounting to 14,747,920 acres, or about one-fourth of the whole colony, 11,167,966 acres are unproven; but to say this without large qualification would be incorrect, for out of the unproven we must deduct the larger portion of 7,502,966 acres executed by the Native Lands Department, which, being for the extinction or localization of Native claims in large blocks, comes under different conditions from those surveys made for the settlement of Europeans on Crown lands, and to which process this area will yet have to be submitted. Thus the area properly coming under the term "Block Section Survey," and which is unproven, amounts to 3,665,000 acres, exceeding by little of the same class of survey which is noted as reliable. Different, however, is it with the spotting section survey, whose requirements involve the most difficult problem that a colonial surveyor can undertake. Here we see that 896,000 acres only are considered reliable, while 3,207,696 acres are unproven. And taking section survey as a whole—which is really the most important branch directly affecting the community—4,475,954 acres come under the heading "reliable;" 6,872,696 acres, or one-tenth the area of the whole colony, "unproven."

To fix the fault of this unproven work on any one would be difficult, for the political and economical state of a young and struggling colony, it will be already apparent by a perusal of this report, has had much to do with it; and those who have succeeded will be the least inclined to be critical, for they know best what obstacles they themselves had in early days to overcome.

MEASURES PROPOSED.

This brings me to the measures that I have to propose for the future conducting of settlement surveys on the demesne lands of the Crown; and, as I have already prepared specifications for these, I will now only explain the principles that guide me in my recommendations.

When, subject to the approval of Government, I was first asked to take the responsibility of the general survey by the then Secretary for Crown Lands, Mr. W. S. Moorhouse, it was pointed out to me that there was a double duty to be administered to—one in relation to sales and settlement, the other to registration of titles under the Land Transfer Act. With these instructions before me, and in which I understand the present Government concur, it will be seen that the work of the Survey Office is two-fold—one in regard to the settlement of an immigrant people, another in regard to permanently securing their titles, the former requiring rapidity of execution, the latter practical correctness. These circumstances throw responsibilities on the surveyor very different from what fall on him in old and already settled countries; and in respect to the several propositions of a professional nature that have from time to time been laid before the Government I will endeavour to give my reasons clearly in support of the particular system I advocate. Thus, taking by way of illustration the surveys of the United Kingdom of Great Britain and Ireland and the surveys of her powerful colony the Dominion of Canada, we find their approved processes of surveying in no way analogous. In the former, primary, secondary, and tertiary triangulation, spreading from a centre over the country in the course of ninety-one years, has been found applicable. In the latter no such processes are attempted, but traverse block surveys on astronomical bearing are executed whenever and wherever their immigrant settlers fix their locations. Thus the wants of our own countrymen in different conditions ignore cast-iron rules, and demand what is most appropriate to their wants, irrespective of professional survey systems. The Canadian system of survey is now founded on that in use in the United States,* which latter, as long as it is confined to the flat forest lands and the prairies, answers the purpose; but now that the Cordilleras have been reached, the system is at fault, inapplicable, and entirely unavailable.† This was much our case in New Zealand: the simple rectangular section surveys of the New Zealand Company answered very well on the plains, but had to be abandoned when the mountainous districts were reached. This dilemma in the southern portion of the colony occurred in 1856. What had to be done? Primary triangulation, while highly scientific, bore with it the fatal objection, in a colonial point of view, of inertness, tardiness, and great cost. Up to 1861, secondary or here termed major triangulation was initiated, but also had to be abandoned, as it could not, as stated before, keep pace with the dispersive nature of actual settlement. Thus, the approved British and American systems, or even modifications of these, being unsuitable, what was to be done? The plan designed was what is now called that of meridional circuit. This consists of carrying on true bearing by 8-inch theodolites from the initial points of circuits by the most ready roads through the valleys to the spots where the population locate themselves.

And what was the want of the southern districts of New Zealand twenty years ago is now in a greater degree the want of the whole colony. The returns that I have received from all the sub-offices show that there are 1,514,000 acres in 553 different localities, dispersed from Stewart's Island to the Three Kings, stretching over 13 degrees of latitude and 11 degrees of longitude, the surveys of which claims are immediately wanted, hence they can be administered to by no slow measures. Money means time. Now the cost of meridional circuit survey is 3s. 6½d. per square mile, while major triangulation costs £1 7s. 9d.: that is, the former is eight times less expensive than the latter, and hence eight times more expeditious. Thus, what we can do for dispersive settlement in one year by meridional circuit would take eight years by major triangulation. So on grounds of economy of time and money I recommend meridional circuit as our general standard system for the purpose of meeting the large calls on the department as they now stand, though I would prefer major triangulation in parts that can allow of delay, from the fact that by "breaking it down" the work is more homogeneous. But on grounds of correctness there is really little practical difference. Thus, in eighteen comparisons of separate major triangulations in the North Island, the average error was found to be 12·43 inches per

* Manual, by J. S. Dennis, Surveyor-General. Ottawa, Canada, 1871.

† J. D. Whitney, *North American Review*, July, 1875.