

especially in the level districts, that to insure the proper connection and record of lands dealt with under the Land Transfer Acts, a system of standard traverses will eventually have to be adopted. At the present time property-owners are put to constant extra expense for want of this, the necessity of which is not often apparent to them. As these surveys, when undertaken—and the time is not far off—will be for the especial benefit of the land-transfer operations, it seems right that the large accumulated assurance fund of that department might reasonably be drawn on to cover a portion of the expense. Such surveys are especially necessary in and around the principal cities, where property is of great value, and where one mistake might easily cost far more than the expense of such a survey.

Triangulation and topographical surveys being in their nature the pioneers of others, the explorations made during the year may be noticed with them. Messrs. Douglas and Harper, in Westland, have been engaged for some time past in explorations of the western slope of the Southern Alps, and in trying to discover a pass over the Southern Alps which would be practicable as a tourist route between the neighbourhood of the Hermitage, Mount Cook, and the glaciers on the west side of the mountains. So far, none has been found, but his topographical work has brought home to us the many beauties of the glaciers and gorges of the West Coast. A map attached shows the result of their season's work, but the numerous photographs they obtained must await publication at a future date. In process of time, as this colony becomes more and more the playground of Australasia, as it must do, these fine glaciers, wild gorges, and beautiful river-bed scenery will be visited by thousands. Mr. Dunnage, of the Survey staff, made the ascent of Ruapehu Mountain last Easter, a description of which accompanies the report of the Assistant Surveyor General. He ascertained that the crater-lake on top of the mountain is now apparently quite cold, though showing signs of ebullition and considerable volcanic activity about the time of the Tarawera eruption in June, 1886. The most important exploration of the year, however, has been that made by Messrs. Mackenzie, Pillans, and Earnshaw in the country south-west of Lake Manipouri, during which they discovered a practicable route from that lake to the head of Dusky Sound, a route which, in the not far distant future, will play an important part in the tourists' line of travel. Visitors arriving from Australia might first visit Milford Sound, then taking the numerous other sounds on their way South could be landed at the head of Dusky Sound, and travel thence by the new route, coming out at Lake Manipouri, from which place they have all the other lakes before them. The new route does not seem to present any serious difficulties to the construction of a road for wheeled vehicles, in which it is superior to all other passes as yet explored for some hundreds of miles northwards. Mr. Mackenzie has been kind enough to furnish a description of the route and country through which it passes, which will be found in the appendix.

SETTLEMENT SURVEYS.

From year to year the fact has to be chronicled that the difficulties of subdividing the country into farms increases; this is due to the broken nature of the country the surveyors generally now have to contend with, necessitating the utmost care in the location of the road-lines. To insure workable grades the roads have to be contoured very carefully, and to obtain length to effect the necessary ascent or descents, it is frequently necessary to double the distance between any given points, thereby increasing the first cost of construction and subsequent maintenance very greatly. This may be illustrated by a statement in the report of the Commissioner of Crown Lands for the Wellington District, where, to provide the necessary road access to 209,000 acres, over 400 miles of road had to be laid out.

The total area sectionised last year was 556,555 acres, in 2,482 sections, the average-sized section being 224 acres; as, however, small grazing-run surveys are included in these figures, the average-sized farm will be much less than these figures. Great care is exercised by the surveyors in the laying-out of the roads, the arrangement of boundaries, so that they may be as easily fenced as the country will admit of, and in permanently marking the boundaries, in which process iron gas-pipes are frequently used here and there to form points of reference. The degree of accuracy with which this class of survey is executed is very creditable to the surveyors. With ordinary precautions in the preservation of the boundary-marks, little or no trouble should arise hereafter as to boundaries. Settlers, with few exceptions, however, appear to be careless of these boundary-marks, placed with so much trouble and expense, and often remove them in fencing, a most unwise proceeding which may often entail on them a law-suit in the future. The department endeavours to keep the importance of preserving the survey-marks constantly before the public by printing on every advertisement of land for sale or disposal a notice of the penalty incurred in the removal of such marks.

The surveyors have to thank the several improvements in the measuring apparatus now used for the accuracy of their work, which could not be accomplished with the old surveyor's chain, which is now obsolete, and likely in a few years to become a mere curiosity. The invention of the steel band and the steel wire has marked an epoch in the history of surveying.

The department had on hand at the 31st March an area of 1,178,000 acres of land either under survey or which was awaiting survey for settlement and other purposes.

The permanent staff of surveyors, which numbers forty-eight officers, was augmented during the past year by the employment of sixty-two authorised surveyors, nearly all of whom were engaged on section surveys, or operations directly connected therewith.

NATIVE LAND COURT SURVEYS.

The total area surveyed under this heading amounts to 291,707 acres, in 176 blocks, at a cost of 3.6d. per acre. The greater portion is within the Auckland District, and the work has been done generally by the authorised surveyors at contract or schedule rates. The above figures represent the area of land where the Government advanced the cost of survey, generally with the view of facilitating the purchase of the lands by the Crown. In addition to this area, 366 blocks or divisions, containing 414,803 acres, have been surveyed by the authorised surveyors at the cost of the Maoris, and the plans deposited in the Survey Department for record and check. Thus a total of 706,510 acres has been surveyed during the year to facilitate the operations of the Native Land