

2. SOIL SURVEY, CENTRAL OTAGO.

(By H. T. FERRAR.)

Field-work in connection with the soil survey of irrigation areas in Central Otago was resumed on the 17th October, 1927, and ceased on the 10th April, 1928. During this period an area of 393 square miles was surveyed. This area includes and also extends beyond the boundaries of the following irrigation projects—namely, Arrowtown, Crown Terrace, Gibbston, Hawea Flat, Tarras, Ardour, Bendigo, Pisa Terraces, and Cromwell Flat. These are the areas that remained to be surveyed at the close of the 1926-27 field season, and their mapping completes the flying survey which was begun in January, 1926, at the request of the Hon. the Minister of Public Works. In all, an area of 1,177 square miles, or 753,280 acres, more or less, has been surveyed.

CLASSIFICATION OF SOILS.

The classification and mapping of soils is usually designed to serve some definite economic purpose, such as combating some disease in man or in animals, or ameliorating stretches of poor or unproductive land. The methods of classification of soils being followed in New Zealand are based on those adopted in other countries. In the United States of America the Bureau of Soils, which has had charge of this work since 1899, makes the *soil type* the unit of mapping. Soil types are differentiated according to some factor or character that may be recognized in the field. Soil types having some relationship or some feature in common are grouped together to form a *soil series*. Several soil series subject to some external influence form a *soil province*. Soils are classed as clays, loams, sands, &c., or combinations of these words, according to their texture as determined by mechanical analyses. By adhering to this form of classification no confusion need arise when a systematic soil survey of New Zealand comes to be carried out.

Central Otago, with its low rainfall and characteristic drought-resisting flora, forms a definite soil province. The soils are mainly derived from five different kinds of rock, and thus form five natural soil series. Since facilities for irrigation and drainage (irrespective of availability of water) determine the cultural and commercial values of the land, the situation factor was adopted as the best criterion for differentiating soil types. In many places, owing to the fact that similar soils were variously situated, there was a temptation to make use of some other differentiating factor; in other words, there was a temptation to be inconsistent. Had inconsistencies been allowed to creep in, the maps would have become too complicated, especially in view of the special purpose for which the survey was made. The following classification has therefore been adopted:—

Vincent Series (consisting of finely divided schist material), embracing the following soil types: Galloway clay; Younghill silty loam; Idaburn, Ranfurly, Lauder, Drybread, Clyde, Naseby, Kyeburn, Blackstone, and Dunstan stony loams.

Hawkdun Series (soils covering greywacke mountain-sides), with one soil type, called Hawkdun stony loam.

Becks Series (soils covering clays, sandstones, and gravels of Tertiary age), with two soil types, called Becks sandy loam and Totara gravel.

Waipata Series (derived from basic volcanic rocks) with one soil type, the Camphill stony loam, consisting of disintegrated basalt.

Cromwell Series (consisting of blown sand), with one soil type, called Cromwell sand.

Unproductive: Stony river-beds, sluiced and dredged ground, and tailings.

METHODS OF MAPPING.

The methods of mapping outlined in last year's annual report were followed as closely as possible. Naturally, slight changes in the manner of mapping have had to be made as the work was carried into new areas. The result of this has been that slight changes of symbolization appear on the field sheets, but these will be corrected when the whole series is assembled for reproduction.

To a large extent the maps are topographical, but not entirely so. Owing to the climatic conditions ruling in Central Otago, two base-levels of erosion had to be considered—namely, that of an intermittent creek and that of a perennial stream. This difficulty did not present itself until this field season, when the work was carried into Cromwell basin. Here alluvial fans or deltas at the mouths of steep mountain-creeks are spread out upon high-level river-terraces. Such deltas were mapped as if they were normal low-level alluviations. In other places sudden changes in soil-texture or in the natural vegetation attracted attention, but could not be mapped. Nevertheless, pedological differences of this kind were noted upon the field sheets, and can be utilized when the soils of the district are studied in more detail.

SOME CONSEQUENCES OF IRRIGATION.

In last year's report attention was drawn to some of the deleterious effects that follow irrigation. In the area surveyed this year it was noticed not only that salty and waterlogged patches of land were few and far between, but that a visible concentration of saline matter was advantageous, for sheep habitually resort to "licks" on the edges of irrigated fields where salty matter is visible, in order to supplement a deficiency of mineral matter in their pasture. It was also noticed that irrigation was practised wherever water was available, and that very little water was allowed to escape into deep watercourses.