

coast area. They are generally poor in the natural state and are very deficient in phosphate. Deficiency in cobalt is a factor limiting farming operations in many areas, which will be delimited. Lime is shown by analysis to be absent or very low. The *recent alluvial soils* are found on river-flats and are usually very fertile. Plant foods are normally abundant, but phosphate may give responses on some of the older soils and lime on the wetter areas. The *organic soils* include peaty soils, and *saline soils* embrace those that are adversely influenced by high salt content.

#### PROGRESS OF WORK.

Of the 20,500 square miles in this region approximately 1,000 square miles of Southern Hawke's Bay and Northern Wairarapa had been mapped at 31st March, 1940. Of the 4,500 square miles of completed detailed soil work in Hawke's Bay an area of about 2,500 square miles in Mid- and Southern Hawke's Bay was reduced and put in general form. A further 300 square miles was made available by the soil survey of Matakaoa County described elsewhere in this report. About 14,700 square miles remain to be completed in the field.

### MANAWATU SOIL SURVEY: PROGRESS REPORT.

#### INTRODUCTION.

A general survey of Manawatu soils was commenced at the end of May, 1939, and progressed along with the survey of the market garden soils in that district. Up to the end of March, 1940, 1,110 square miles had been mapped, comprising all of the land between Waikanae and Palmerston North, from the sea to the foot of the hills, and most of the land north of Palmerston North to Kimbolton, from Coal Creek to the Rangitikei River. In addition to this some work was done on the mapping of the western slopes of the Tararua Range. During the survey of market-garden soils at Ohakune about 270 square miles of the broken mudstone and sandstone country lying to the west was mapped.

#### SOILS.

The soils of the Manawatu are grouped under the headings of Recent soils, meadow soils, and podsoils.

##### (a) *Recent Group.*

Recent alluvial soils are described in the account of market-garden soils. A strip about half to one mile wide of loose sand-dunes along the sea coast is classified under this heading. The top inch or two in places is coloured black by humus accumulation, and the underlying sands are grey. The chief cover is marram-grass and lupin; but many of the sandhills are shifting and carry little or no vegetation.

##### (b) *Meadow Group.*

Alluvial meadow soils occur in the Moutoa and Makarua swamps, the Kairanga district, and to a lesser extent elsewhere. The central parts of the swamps are peats or peaty loams, and the outer margins are recent alluvial sands and silts. Between the centre and margin lies a belt of meadow, heavy, silt loams, containing a varying amount of peaty material. Drainage is good on the recent alluvial soils, but on the meadow soils water lies for long periods at or near the surface. Big drainage channels run through these areas, and in the Makarua much of the land is now being farmed. As the land gradually subsides with drainage, buried stumps project above the surface and have to be removed; in some paddocks a second and third layer of stumps have appeared above the surface. When the land has been cleared and drained, good pastures can be established.

The very fertile young alluvial Kairanga soils are closely farmed, though in most parts considerable drainage is yet required.

##### (c) *Podsol Group.*

The podsol group is divided into young, immature, and semi-mature, according to the degree of podsolization.

The young podsoils are found on moderately steep to steep greywacke slopes, and on the inland fixed sandhills where the topsoil is black to a depth of 12 in. and the subsoil loose and grey. The sandhills farthest inland have a black topsoil 12 in. or more in depth resting on rusty-brown sands which in places are loosely cemented with iron and represent a further stage in podsolization. Where top-dressing is carried on the greywacke and sandhill soils support a good mixed pasture.

Immature podsoils occur on the terrace north of Levin, at Kimbolton, Te Horo, and along the Zig-zag Road, towards Apiti. The topsoils are dark brown to brownish black, and the subsoils are mainly yellowish-brown clay loams or heavy sandy loams, slightly compacted. The fertility varies from high on the Levin soils to low on the Zig-zag soils.

Semi-mature podsoils occur on the terraces at the foot of the mountains, at Milson Aerodrome, and on most of the flat to gently rolling country north of Bunnythorpe and Sanson. The soils have a dark-brown or black topsoil, depending upon whether the original cover was heavy forest or light forest and manuka. The subsoils are brownish-yellow heavy clay loams to clays; and in most places at 24 in. to 36 in. from the surface is a very compact hard layer of hard clay content. This compact layer prevents free drainage. Where drainage and top-dressing has been applied, a good mixed pasture can be maintained.