

(2) *Western Foothills South of Ngaruroro River.*

Flanking the ranges on the east is a narrow belt of moderately steep and rolling country crossed by gorges and extending in narrow arms towards the middle of the district, where it intermingles with the western plains. Sandstones, conglomerates, and mudstones are the main rock formations. The rainfall is high, and heavy forest once flourished on much of this belt. The rolling hills are ploughable and the soils are light and friable. The regions formerly in forest have an initial high fertility, but this is susceptible to severe and rapid depletion, and phosphatic top-dressings are required to maintain productivity. The soils of the formerly scrub-covered areas are low in natural fertility, deteriorate very slowly, and are deficient in phosphate and apparently in lime.

(3) *Coastal Hill Country.*

This is the typical Hawke's Bay hill country and occupies the eastern half of the province. The belt comprises steep, moderately steep, and rolling hills, and is fairly narrow in the north, but widens greatly west of Napier and again in the extreme south. The underlying rocks are muddy sandstones, mudstones, sandstones, limestones, argillites, and stony conglomerates.

Light forest once flourished in a few areas, particularly in the south, but much of the area was in tall fern when Europeans first arrived. The rainfall is normally fairly low (30 in. to 40 in.), but is somewhat higher in the west and north, and again in a few south-eastern areas. As a rule natural fertility is high, although a few soils are distinctly poor. Phosphate is almost universally deficient, but the content of lime is rarely seriously low, even on gentler slopes. Most of the soils are loamy and easily worked. On the steeper country slipping is a serious problem, but otherwise erosion is not severe.

(4) *North-western Pumice Country.*

Volcanic ash showers blanket the north-western quarter of the province. On the east of the ranges there is an extensive belt of gently rolling and moderately steep hill country, crossed by many deep gorges which is covered with volcanic ash. The underlying rocks have little influence on the soil, except where the ash shower is thin. The most important showers are known as the Taupo pumice and Gisborne pumice. The former covers about half the area and gives rise to poor soils usually deficient in cobalt as well as in phosphate. Lime is very low or absent, according to chemical analyses. The Gisborne pumice covers the south-western half of the belt. The soils are slightly more fertile and generally have a sufficient supply of cobalt. The Napier-Wairoa Railway has given access to a good deal of gently sloping country of the Gisborne pumice type, which is largely covered with fern.

(5) *Plains.*

(a) *Western Plains.* A few miles east of the ranges broad terraces extend intermittently from Woodville and Dannevirke towards Norsewood, Takapau, and the Ngaruroro River. They are generally many feet above stream-level, and their soils are derived from gravels, sands, and silts worn from the nearby mountains. These soils are light and friable and resemble those of the western foothills as regards plant-food content. They developed under high rainfall and heavy forest on the west, but under scrub and fern farther east.

(b) *Eastern Plains.*—Strongly contrasted with soils of the western plains are those of the plains in the coastal districts. Silts and sands from neighbouring mudstones, limestones, and sandstones form the parent materials of these latter soils, and their high fertility is noteworthy. The Heretaunga Plains surrounding Hastings, which are typical, have been described in a separate bulletin,* and other extensive plains of the same character occur north-west of Waipukurau. Similar soils occur on river-flats throughout the coastal hill country. The original vegetation was bracken fern or light forest, and the rainfall is not high (30 in. to 35 in.). Phosphate is on the low side on some of the older soils, but lime is deficient only on the wetter areas.

EAST COAST AND CENTRAL NORTH ISLAND: GENERAL SOIL SURVEY.

In February, 1940, the Hawke's Bay Soil Survey party was transferred to the North Island General Soil Survey. The region to be surveyed by this party includes the east coast districts of Wairarapa, Hawke's Bay, and Gisborne, together with the greater part of the Ruapehu-Taupo-Rotorua-Whakatane area. It is expected that the project will be completed late in 1940, concurrently with surveys of the remainder of the North Island.

SOIL GROUPS.

The *Rendzina or Limestone Soil Group* is not very extensive, but occurs in widely scattered small areas. It is very fertile. The *new group soils* (which are possibly equivalent to the grey-brown podsollic soils of America) are found in the coastal half of the east coast districts. They are loamy and fertile as a rule, and respond well to superphosphate. Lime and sometimes potash may be beneficial on gentler slopes, but are rarely limiting factors in the development of the soils. The *brown-yellow loam soils* (which are probably equivalent to the brown podsollic soils of America) have developed under a higher rainfall than the new group soils and often under heavy forest. They are found on the ranges and adjacent foothills and plains. The soils are friable and may be very fertile when first broken in, but such initial natural fertility is susceptible to rapid depletion. On these soils phosphate is deficient and, according to chemical analyses, so also is lime, but lime deficiency does not limit their use as a rule. The *pumice soils* occupy most of the Central North Island and extend eastwards into the east

* "Land Utilization of Heretaunga Plains." *Department of Scientific and Industrial Research, Bulletin No. 70, 1939.*