(2) *Damage noted and Signs of the Prevalence of the Animals.*

This may be conveniently subdivided into the following categories, each having certain differences regarding the principal plants attacked :—

(*a*) River-flats.
(*b*) Bush slopes and banks.
(*c*) Sub-alpine scrub.
(*d*) Open tops.

Slips were in most places in the Kawhatau and Waikamara Valleys criss-crossed with tracks, while tracks seemed to lead up each tributary stream.

(*a*) *River-flats.*—After passing over the Waipawa Saddle deer-tracks became numerous, and when the main branch of the Waikamara was reached at a tussock-flat signs were evident. Large tussock-grasses amongst fallen timber in the bush had been entirely eaten, while some of the following undershrubs had been killed : *Nothopanax colensoi* and *Senecio eleagnifolius*, others being well trimmed back. A small-leaved Coprosma and Olearia arborescens had also suffered, the last-named having put out fresh shoots which again had been eaten off. *Polystichum vestitum*, a common fern of this range and the Tararuas, had, as usual, received attention.

The damage to the river-flats became progressively worse as we went upstream on the first day out, until on a flat opposite the outlet of a large tributary flowing in from the north-west of the Kawhatau Valley all leaf-mould had vanished from the forest-floor, the roots lying on bare sand and shingle. All the ferns were gone, the only trace being small stumps, no doubt of *Polystichum vestitum*. The only undershrubs remaining were a few divaricating small-leaved coprosmas, and an occasional broadleaf (*Griselinia littoralis*), Mountain wineberry (or perhaps hybrids between *Aristotelia racemosa* and *A. fruticosa*) and *Nothopanax sinclairii* were left alive, all other undershrubs were killed, many having been barked. There are possibly two reasons for concentrated damage in this spot. Being opposite the mouth of a tributary stream, deer driven down by snow in the winter into the tributary valley-floor would possibly move down into the main valley. As the tributary valley provides the only break in the high ridge of precipitous cliffs on that side, the flat, being opposite, would get far more sunshine in winter than most other flats for some distance up or down the Kawhatau.

Proceeding up the river, in several places it was noted that the bark of *Pittosporum rigidum* had been eaten. Another badly damaged river-flat was situated a mile or two upstream. Again it was opposite the junction of a north-west tributary. The damage was similar to the first.

A little farther on the flats became more open tussock country, where some of the clumps of danthonia had been eaten right down and killed. Large patches of mountain beech were still present, however. In one instance, it consisted of trees 12 ft. to 15 ft. high on a shingly river-flat ; there was no vestige of leaves or greenery left below 5 ft. In a number of cases the bark had been eaten somewhat. The definite line above which twigs with leaves on them remained was very striking.

Above where we camped for the night damage was present along the flats. Owing, however, to the amount of dead and dying trees and shrubs, from other causes mentioned below it was not easy to arrive at the proportion caused by deer. To replace the dead beech trees, there is in some cases a regeneration of beech seedlings 3 ft. to 4 ft. in height, some of these had been eaten back, while in one case the whole top of a young tree had been chewed off, all bark, leaves, and young growth having gone.

Similar damage, although no notes were taken, was observed proceeding down the Waikamara the following day. In one place, however, particular note was taken of the fact that a large patch of mountain-beech seedlings, 2 ft. to 3 ft. in height, had been eaten well back.

On the lower portion of the Waikamara on the last day the following notes were recorded : Flats badly knocked about in places. Putaputaweta seedlings well eaten back. Details of one such flat are as follows : Large trees, red beech, practically all under shrubs except tree fuchsia, *Coprosma rhamnoides*, and *Nothopanax anomalum* killed out ; mahoe and broadleaf torn to the ground ; *Nothopanax* (most likely *arboreum*—five finger—at this altitude) 8 in. to 1 ft. through, barked completely to 5 ft. to 6 ft. in height, and, of course, dead—a scene of desolation. A few minute herbs and the wood-grass (*Microloena avenacea*) remain on the forest-floor. When Rangiora began to appear as the altitude lessened it was well browsed back. Where we left the river to climb into the Mokai–Patea ridge similar damage was observed in the bush on a terrace. In addition, clumps of a large Astelia were either eaten well back or killed.

(*b*) *Bush Slopes and Banks.*—In addition to the damage recorded under the heading of river-flats, which, of course, also occurs in the above class of country, the destruction of the fern kio-kio is found. This fern, as described for the headwaters of the Hutt River, plays an important part in preventing movement of old fixed scree slopes, &c. As the portions of the creeping stem left after it is killed quickly disappear, it is difficult, unless the damage is found shortly after it is done, to think that the fern has ever been present. It is only by a comparative study of untouched, damaged, killed out portions of stem still left, and spots where all signs have vanished, that the right conclusions may be drawn. The following are notes taken of actual observations : Upper banks of the Waikamaka, kio-kio on bank of stream side eaten ; banks of Kawhatau proceeding upstream on second day out, kio-kio eaten, some areas untouched, others with fronds all eaten off, and some from which the fern has vanished ; Upper Kawhatau on third day, kio-kio has been almost wiped out on a lot of the banks ; on slopes amid sub-alpine scrub in this area, eaten out in many places ; in lower reaches of Waikamara kio-kio cleaned out in places.

On one place where recent slipping had occurred on previous fixed steep scree slopes the area immediately adjacent was found to still have traces of the fern left on it. It may be safely assumed in this case that deer had been responsible for the commencement of the slipping.

Here notes were taken of damage caused to the bush on the spur by which we climed onto the Mokai–Patea ridge : Deer have cleared out bush badly on the way up to saddle ; Nothopanax and certain other trees have been barked ; any bark remaining on the trees attacked is on the lower side of the trunk when it overhangs some inaccessible spot ; practically all ferns gone, a striking exception being huge beds of *Dicksonia lanata* growing like bracken fern—this species did not appear to be touched. As this spur leads into cleared farm country and is not fenced, some of the damage here may be due to sheep, cattle, and wild pigs, abundant signs of the latter being seen about the bush-edge, also rooting amongst the large areas covered by *Celmisia spectabalis* in the open country.

(*c*) *Sub-alpine Scrub.*—This type of vegetation (except where it is of too dense a growth to enable the animals to enter it) seems to suffer perhaps more than any other.

On the eastern side of the Waipawa Saddle the following plants had been browsed on : Tutu, mountain flax, koromiko (*Hebe salicifolia*), *Coprosma robusta*, *Senecio eleagnifolius*, *Astelia nervosa*, and a grass (Poa ?). When starting up the ridge between the Waikamara and the Kawhatau on the first day tracks amongst the scrub were numerous. The following damage was noted : The handsome Spaniard (*Aciphylla colensoi*) had had the centres containing the fresh leaves and the flower-spike eaten—it appeared as though many would die. *Nothopanax colensoi* was in many cases killed, while mountain wineberry, broadleaf, and *Senecio eleagnifolius* were badly knocked about. *Astelia nervosa* and *Bulbinella hookeri*, two herbaceous plants, had also been attacked. The tracks have started gullying in a small way, now being well down through the layer of leaf-mould and soil into the debris, where with every heavy fall of rain they will increase in size. While proceeding up the Kawhatau River two places on the mountain side were inspected. In both cases dead shrubs could be seen from the river-bed, but it was doubtful how this had been brought about. Looking closely, it was evident that deer were responsible for a great deal of the damage. *Polystuhum vestitum*, in the first area lower down the valley, had been eaten off, while the bark of the following trees had been eaten, causing death in many cases : *Nothopanax colensoi*, broadleaf, mountain wineberry, *Senecio eleagnifolius*, and *Hoheria populnea* and *Pittosporum rigidum*. Trees not killed were in most cases saved by the fact that one side of the trunk was not readily accessible, the bark left preventing ring-barking.