

Crown Pastoral Land Tenure Review

Lease name :Lochaber

Lease number :PT 061

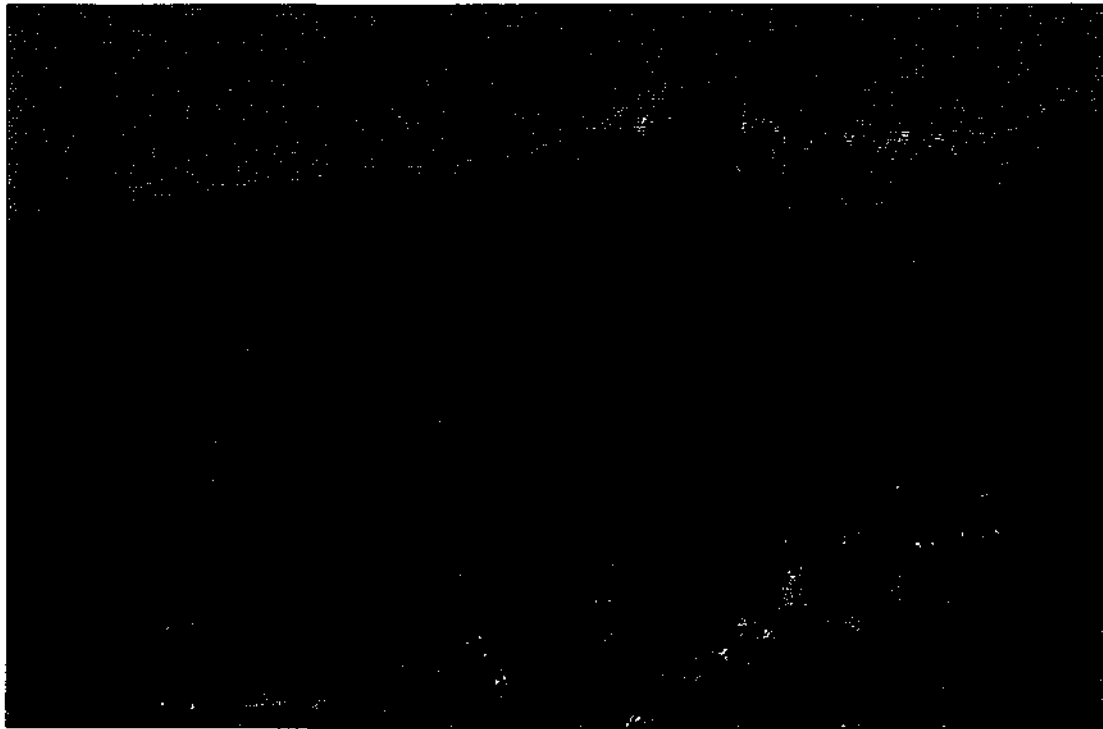
Conservation resources report

As part of the process of tenure review, advice on significant inherent values within the pastoral lease is provided by Department of Conservation officials in the form of a conservation resources report. This report is the result of outdoor survey and inspection. It is a key piece of information for the development of a preliminary consultation document.

The report attached is released under the Official Information Act 1982.

Copied October 2002

**LOCHABER
PASTORAL LEASE**



CONSERVATION RESOURCES REPORT

Released under the
Official Information Act

PART 1 INTRODUCTION

This report describes the significant inherent values present on Lochaber Pastoral Lease. Lochaber Pastoral Lease covers an area of 9937 ha in the catchment of the Orari River, South Canterbury and lies between the Orari River and the Tara Haoa (Mt Peel) Range. The northwest boundary follows the Hewson River and Quartz Creek; the northeast boundary follows the crest of the Tara Haoa Range; the southwest boundary follows the Orari River; and, the southeast boundary traverses the mid-slopes below Little Mt Peel (see Topographical/Cadastral map attached).

Lochaber Pastoral Lease largely comprises steep dissected hill country lying between approximately 400 and 1750m altitude. The southern part of the property covers small steep streams flowing from the Mt Peel Range into the lower Orari Gorge (Rocky, Pickaxe and Coopers Streams) and the upper Scotsburn. The central part of the property covers the catchment of Mount Peel Creek. The northern part of the property covers slightly gentler country draining to the Hewson River and Quartz Creek.

The property adjoins Mt Peel, Waikari Hills and Stew Point Pastoral Leases along the Tara Haoa Range to the northeast; Rata Peaks Pastoral Lease to the north; Dry Creek Pastoral Lease to the west; Blue Mountain Pastoral Lease to the southwest; and The Gorge Pastoral Lease to the south. Lochaber also shares a boundary with Peel Forest Park Scenic Reserve along the south ridge of Little Mount Peel (between the Scotsburn and Emily Stream), and Scotsburn Conservation Area in the Scotsburn Creek catchment.

Lochaber lies in the Orari Ecological District, within Pareora Ecological Region, and within the local government area of the Mackenzie District Council. There has not been a Protected Natural Areas survey of the Orari Ecological District.

PART 2 INHERENT VALUES, DESCRIPTION OF CONSERVATION RESOURCES AND ASSESSMENT OF SIGNIFICANCE

2.1 LANDSCAPE

Lochaber Pastoral Lease forms part of the rangelands that in a wider context form the backdrop to South Canterbury. The property is within the Orari Ecological District, a district typified by complex geology, broken topography and a diversity of vegetation types. It is strategically located adjacent to existing protected natural areas, and parts of the property complement and enhance those protected areas.

On the property the areas that make a significant contribution to the natural character of the high country landscape are the higher-altitude slopes and deep valleys south of Blacksmith Spur. Areas north of Blacksmith Spur are of secondary importance for landscape protection as areas that help to maintain and reinforce the natural character of the high country landscape. Lower-altitude areas in the Orari Valley have transitional importance for landscape protection as areas where productive and protective uses should be integrated.

For this assessment of significant inherent landscape values, Lochaber Pastoral Lease is divided into six landscape units. These landscape units are mapped in the Landscape Assessment report, and are described below.

Landscape Unit 1 : Hewson River

This unit comprises the block of land at the northern end of the property. It ranges from 600m altitude at the Hewson River to 1184m at the dome-shaped summit in the centre of the unit.

The western boundary is defined by the Hewson River; the northern and eastern boundary is the incised Quartz Creek; and, the southern boundary is defined by the ridge north of Camp Gully and upper Mount Peel Creek. The landform is dominated by a sequence of high rolling hills with a deep mantle of colluvium. The side slopes of these hills are indented by concave gullies that penetrate to the crest of the hills. Separating the rounded hills are well-defined watercourses that drain directly into the Hewson River and Quartz Creek. The overall impression of the landform is that it is uniform with occasional outcropping of rock: the most prominent being on the base of slopes within the Quartz Creek catchment. There are bare wind-eroded patches on the drier northeast slopes. A notable feature is the soil striping, which generally lies at right angles to the prevailing wind on the leeward side of the rolling hills.

The vegetative cover is determined by aspect, altitude and farm management: much of this unit appears to be recovering from earlier high grazing pressure. Induced low-stature tall and fescue tussock are co-dominant; cotton daisy and golden spaniard are common. The density and stature of the tall tussock improves on the darker faces, especially within the Quartz Creek gully where the tall tussock, matagouri, golden spaniard and native shrubs form a continuous canopy along the water course. Much of the property below 1000m altitude has been regularly over-sown and top-dressed. The concentration of browntop produces a red haze on the sunnier faces, and opportunist species such as sheep's sorrel, mouse-ear hawkweed and bidibid are common on disturbed ground.

The unit has been subdivided into three large blocks that are grazed primarily by wethers. Farm development proposals for this area include the construction of deer fences.

Landscape Values

This unit has moderate landscape values, principally due to the overall impression of uniformity created by the simplicity of the induced grasslands on the subdued topography. This overall appearance of uniformity is accentuated by the lack of shrubland communities.

In aesthetic terms the ground-cover has an almost monochromatic tonal range and fine textural qualities that make it difficult to conceal impacts such as tracking and bulldozed fence-lines. These factors reduce the overall sense of visual coherence. Subtle variations in both landform and ground-cover contrast markedly with the more diverse landscape character on the remainder of the property.

Visual Values

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This unit has moderately high resource values due to the strong sense of openness and indefinable boundaries. The uncluttered nature of the terrain provides distant views of the prominent Ben McLeod and Hewson ranges.

Potential Vulnerability to Change

This unit could be adversely affected by activities that include:

- Fragmentation of existing landforms and vegetative cover by the erection of fences, including deer-fences on prominent ridges.
- Possible decline in tall tussock cover by concentrated grazing.
- Changes in land use such as the establishment of plantation forestry.
- Possible degradation of water courses by intensification of deer farming.

Landscape Unit 2a: Coal Hill

This unit incorporates the part of Mount Peel Creek catchment north of Blacksmith Spur. The northern, western and eastern boundaries of the unit are defined by ridgelines, the most prominent being that along the eastern property boundary where the sharp-crested ridgeline ascends to the distinctive summit of Coal Hill (1617m). The southern boundary of the unit is defined by Blacksmith Spur, and the southeast boundary by the valley of Mount Peel Creek.

The dominant feature within the unit is the elongated V-shaped valley surrounded by a sequence of steep spurs leading off surrounding ridgelines. This enclosed valley could be described as an upland basin. The floor of the valley is concave with a major tributary of Mount Peel Creek meandering across the valley floor. In places where the tributary nicks the base of the spurs small slips are created.

The vegetation pattern is determined by aspect and previous management with the darker face directly below Coal Creek supporting a good sward of tall tussock, cotton daisy and golden spaniard, while the corresponding sunnier faces support a mixture of tall and fescue tussock with browntop and other pasture grasses. On the drier slopes a feature is the flush zones that frequently have localized communities of *Coprosma*, mountain flax and cabbage trees. Across the valley-floor thickets of matagouri line the creek channel and areas of recent alluvium. River terraces support grasses, mouse-ear hawkweed and tufts of short tussock. The tributary that drains off Blacksmith Spur is lined with a more diverse mixture of shrubs including mountain ribbonwood, mountain flax, toetoe, tutu and native broom.

The land use is primarily extensive grazing and the unit is divided into two large summer blocks. Farm development proposals include the erection of deer fences on at least part of this block. At the confluence of the two main tributaries of Mount Peel Creek there are two musterers' huts. Although built during different eras, their style and materials are matching, and the earlier hut has been lined with undressed beech panels.

Landscape Values

This unit has moderately high landscape values attributable to the fact that large tracts of this unit convey a high degree of naturalness because of the extensive presence of native vegetation. Furthermore the unit transmits an overall impression of spaciousness and remoteness, which are both key ingredients when describing the South Island high country. Human intervention

is not apparent with hard edges inconspicuous on the valley slopes. In this context the twin huts are looked upon as part of the high country scene.

Visual Values

This unit has moderate visual resource values with views being generally channelled towards either end of Mount Peel Creek. To the south, outside the unit, Mt Peel is a distinctive landmark that can be observed from many parts of the district.

Potential Vulnerability to Change

This unit could be adversely affected by activities that include:

- Concentration of grazing that could limit the expansion of native shrubland.
- Erection of deer fences on prominent ridgelines.
- Possible loss of riparian vegetation and damage to stream-sides by deer browsing and trampling.

Landscape Unit 2b: Saddle Hut Stream

This unit comprises the entire Saddle Hut Stream catchment and the neighbouring southern tributary that drains the western flanks of Mt Peel. The boundaries for the unit are well defined by the ridgelines that separate these catchments.

The landforms that characterize these low mountain lands include the series of dissected spurs that lead off the main ridgelines. These spurs are separated by asymmetrical gullies, many of which contain water courses that wind around the base of the spurs. Saddle Hut Stream drains the majority of the unit, flowing into Mount Peel Creek mid way through the gorge. Below Mt Peel large rocky outcrops jut out from the spur crests and this tributary of Mt Peel Creek features large expanses of exposed bedrock.

This unit also includes the Mount Peel Creek gorge, which follows a torturous route between the upper valley (Unit 2a) and the Orari River valley. The down-cutting of the creek is evident, with the water following a constricted passage around rocky buttresses and a deeply-incised passage through the valley-floor gravel deposits. Approaching the Orari Valley the valley opens out to a series of terraces.

The vegetative cover is strongly dictated by aspect, altitude and depth of soil, with the darker faces in the Saddle Hut Stream catchment clad in healthy tall tussock, while the drier slopes are covered in mixed tall and fescue tussock with patches of scrub spreading up from the base of the slopes. At rocky sites kanuka scrub extends to about 900m altitude.

Landscape Values

This unit has complementary values to Unit 2a, the main difference being that it contains Mt Peel. The landscape value of both the peak and its flanks are intertwined which makes it important that both of these physical components are seen as one entity.

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Additionally the Mount Peel Creek gorge has high landscape values attributable to the strong sense of containment, views focused on specific elements and the high indigenous component. The creek itself has high in-stream aesthetic values, including plunge pools, white water and boulder reaches.

Visual Values

This unit has a high visual resource value with all views being directly focused towards Mt Peel. This prominent peak is not only significant locally but dominates the skyline from many parts of South Canterbury.

Potential Vulnerability to Change

The activities and land uses that could adversely affect this unit include:

- Insensitive earth disturbances associated with the formation of tracks or bulldozed fence lines.
- Intensification of land use.
- Construction of utilities along prominent skylines.
- Erection of deer fences close to the margin of the Mount Peel Creek.
- Modification of the margin of the creek through deer trampling and wallowing.

Landscape Unit 3: Western Block

This unit incorporates all of the dissected high hill country overlooking the Hewson River and the upper Orari River on the western side of the property. It also includes the floodplain and low terraces that border these rivers.

The primary landforms are the short steep spurs that extend from the floodplain to the main ridgeline. The southern boundary of the unit is well defined by the Lochaber Stream catchment, while Camp Gully defines the northern boundary. Narrow crests that are deeply indented and frequently contain patches of wind erosion typify the short spurs. Camp Gully contains interesting diagonal rock strata.

The floodplain is irregular in width with the multi-channelled river meandering across the wide gravel bed. Extending out from the floodplain are flights of terraces, most of which have been developed for intensive farming.

The vegetation is influenced predominantly by aspect, with the side slopes having an alternating cover of relatively good tall tussock on the darker faces, especially in Camp Gully, while the sunny faces have a more depleted tussock cover with a strong presence of introduced grasses. Similar to Landscape Unit 1, the induced characteristics of the vegetation are evident by the wide distribution of cotton daisy and golden spaniard. The floodplain supports a mixture of exposed gravel (stonefield), matagouri scrub and pasture. The river terraces convey a strong human settlement pattern, being cultivated and subdivided into smaller paddocks, which are now utilized for silage and break grazing.

Landscape Values

This unit has moderate landscape values forming the inter-face between the more intensively farmed land along the river valley and the unimproved high country to the east. In places the intensity in land use is quite hard-edged while in other places the change in use is more transitional. Owing to the long

uncluttered views of the Hewson and upper Orari rivers this floodplain has more significance in a visual context.

Visual Values

This unit has moderately high visual resource values, as it conveys a strong sense of place with the confluence of the Hewson and Orari rivers forming a natural focal point within a back-country setting. As it is surrounded by high ridgelines this unit is only visible in a localized area, which helps to reinforce the sense of arrival at a specific destination. This unit has distinctive end-of-the-road characteristics that terminate at the bridge that leads to Lochaber.

Potential Vulnerability to Change

Land uses and activities that could adversely affect this unit include:

- Further mono-cultural flood protection planting.
- Insensitive construction of stop-banks.
- Fragmentation of shrublands by further track construction.
- Erection of structures on the highly visible floodplain.

Landscape Unit 4: Middle Mt Peel

This unit encompasses the high dissected hills that project out from the Tara Haoa Range along the eastern boundary of the property. It includes the southern flanks of Mt Peel and Middle Mt Peel. Although these peaks are dominant landmarks, equally impressive are the sequence of elongated valleys separated by narrow-crested spurs. The profile changes with altitude: the upper sections are typically wide basins with angulated outcrops of rock and slopes that descend to the valley floor; the mid-sections of each valley become more enclosed with the watercourses tending to wind around the intersecting side spurs; and, the entrance to each valley is a broad terrace extending out to the Orari River. This describes all of the side valleys except Pickaxe Stream, which is encased by Pickets Spur that completely obscures the lower valley from the river terrace.

The combination of the disjointed nature of the terrain and the cold southern aspect has influenced the vegetation. Much of the upper valleys support hardy inaka scrub with areas of mountain ribbonwood, broadleaf and *Olearia*. The mid sections of the valleys contain remnants of beech forest with a few single outliers that have been protected from fire by natural rock barriers. On the corresponding sunnier faces the upper slopes are covered in tall tussock with scattered shrubland, while the lower slopes and valley floor support short tussock, matagouri and pasture.

Landscape Values

This unit conveys high landscape values, attributable to the "crumpled" landform and diverse vegetation. These combine to create a landscape of complexity. In aesthetic terms this wide variation is translated into impressions of:

- Coarse visual textures due to the diversity in vegetation.
- Wide range of colours associated with the variation in vegetation patterns.
- Overall appearance of discord through the fractured nature of rock.

Additionally, the valleys that penetrate the southern flanks of the Tara Haa Range are memorable due to their scale and sense of enclosure. Perhaps the most outstanding valley is the one that contains Pickaxe Stream, due to its overall naturalness and sense of discovery. This unit is a natural adjunct to Unit 2b, which combines to form a quintessential landscape owing to the high component of naturalness and lack of human intervention.

Visual Values

This unit has moderate visual resource values, with the series of valleys generally hidden by the folds in the topography, which in turn emphasize the sense of discovery when viewing each of the valleys.

Potential Vulnerability to Change

It is considered that this unit is inherently resilient to major changes in land use, however activities that could have an adverse effect include:

- The spoiling of natural features by bulldozed lines for tracks and fences.
- Further modification of shrublands on the valley floors.
- Erection of structures on skylines.

Landscape Unit 5: Scotsburn Creek

This unit comprises all of the headwaters of Scotsburn Creek, at the southern corner of the property. Being a single catchment, the physical boundaries of the unit are well defined by the surrounding ridges that stem out from Little Mt Peel at the eastern end of the Tara Haa Range. The primary landform is the V-shaped Scotsburn Valley and its incised side-gullies.

This corner of Lochaber has been protected from farm development because of its isolation, difficult access, and the nature of the terrain. The vegetation comprises a rich diversity of mixed hardwood forest, beech forest and inaka scrub.

On the contiguous block of freehold land that forms the immediate backdrop to the Blandswood settlement the vegetation becomes increasingly more modified with tall and fescue tussock and cotton daisy on the darker faces, while the more sunny slopes are covered in introduced grasses and large patches of gorse. The main ridgeline and upper side slopes have been planted in Douglas fir.

Landscape Values

This unit has high landscape values, forming a natural adjunct to Unit 4. Characteristics that make it significant include the diversity of native vegetation, interesting topographical features, strong sense of enclosure and the general impression of remoteness due to the lack of structures and other man-made impacts.

Strategically this unit is important owing to its close proximity to Blandswood and Evans Flat, with the even-graded ridge system being used as an access route to Little Mt Peel. From this vantage point visitors look down on a valley that has high indigenous character.

It should be noted that the high degree of naturalness within this valley could be compromised by the spread of plantation species from the adjoining freehold

property, as there is a potential for Douglas fir seedlings to invade the native cover. In aesthetic terms this could result in the landscape becoming increasingly disjointed in character.

Visual Values

Values in this unit are an extension of those found within Unit 4.

Potential Vulnerability to Change

Activities and changes in land use that could adversely affect this unit include:

- Further depletion and decline of the native woody vegetation through grazing and/or burning.
- Encroachment of weed species such as gorse and Himalayan honeysuckle.
- The spread of Douglas fir and other exotic trees.
- The erection of structures on prominent skylines.

2.2 LANDFORMS AND GEOLOGY

The Orari Ecological District, within which the property lies, is an area of non-glaciated low mountains with an altitudinal range of 600 to 1500m (McEwen, 1987). It lies between the glaciated foothills of the main divide and the Canterbury Plains. Lochaber Pastoral Lease lies in the centre of the Orari Ecological District.

The property is dominated by two main rock types. Most parts, including all areas south of Quartz Creek, comprise moderately-indurated greywacke and argillite of the Torlesse Group (Chlorite Subzone I). A small portion of the northern part of the property, in Quartz Creek, comprises rhyolite and andesite of the Mt Somers Volcanics. Areas of recent alluvium are present on the boundary of the property in the Orari Valley (Gair, 1967).

Topography of the property is dominated by the Tara Haoa Range, from Coal Hill (1617m) in the north and Little Mt Peel (1311m) in the south and including the prominent summits of Big Mt Peel (1743m) and Middle Mt Peel (1583m). The property occupies the southwest flank of the range, and is drained by the Orari River and its tributaries. Topography is gentler in the northern corner of the property, including the area comprising igneous rock of the Mt Somers Volcanics.

Moderately-steep to steep montane slopes with prominent spurs and incised streams dominate the landforms in the south; rounded summits and slopes dominate in the north. All the property is dissected by small streams draining south into the Orari River or west into its major tributary the Hewson River. The centre of the property is formed by another major tributary of the Orari River: Mount Peel Creek.

2.3 CLIMATE

Lochaber Pastoral Lease has a sub-humid hill country climate with cool to cold winters and mild dry summers. Annual rainfall in the area is between 800 and 1200mm with snow lying at higher altitudes for several months in winter. Predominant winds are from the northwest, though strong cold southerlies also

affect southern parts of the property. Steep slopes on the property are vulnerable to erosion during infrequent storm events, especially along the southern slopes of the Tara Haa Range and upper tributaries of Mt Peel Creek.

2.4 VEGETATION

2.4.1 Original Vegetation

McEwen (1987) described the former (pre-European) vegetation of the Orari Ecological District as podocarp forest, podocarp-hardwood forest and areas of beech forest, with subalpine tussockland and scrub. It is likely that originally (prior to the arrival of humans) most montane parts of Lochaber Pastoral Lease supported mountain beech forest. Podocarp and podocarp-hardwood forest (including southern rata) would have been present at lower altitudes in the south. Areas above the natural timberline (c.1200m) are likely to have supported tall tussockland, inaka scrub and, at exposed sites, herbfield and stonefield. Areas of *Coprosma/matagouri* scrub and mixed riparian scrub were probably present at localised montane sites. Short tussock grassland and areas of wetland may have been present on lower-altitude river flats and terraces.

2.4.2 Indigenous Plant Communities

The most extensive indigenous plant community on Lochaber Pastoral Lease is tall tussock grassland. This community is present throughout the montane zone in all but the southern part of the property (Scotsburn area), and ranges from relatively intact tussockland to highly-modified tussockland-herbfield. Scrub, shrubland and fernland communities are relatively widespread, though more common in the south of the property. Small areas of forest are present in the southern valleys, representing a transition between the podocarp-hardwood forests of the upper plains and foothills and the mountain beech forests of the inland hills.

Other plant communities cover a relatively small part of the property: alpine herbfield and stonefield is confined to the Tara Haa Range, mostly in the vicinity of Big Mt Peel; rockland communities are confined to stream-sides and bluffs; and, gravelfield to small areas of stream bed. Scree is present on steep slopes south of Middle Mt Peel. No large areas of wetland or short tussockland are present. Lower altitude parts of the property, especially in the Orari Valley, are developed and dominated by introduced pasture species. The main indigenous plant communities are described below.

A1 Mountain Beech Forest:

Mountain beech (*Nothofagus solandri* var. *cliffortioides*) forest is confined to scattered locations in the south of the property. It is present as small remnants in the steep upper reaches of Coopers Stream and the Scotsburn. A more extensive remnant is present in Pickaxe Creek, with scattered patches and an individual tree present in the lower valley. A small remnant of beech forest is also present in upper Rocky Stream (Paul Harrison, *pers.comm.*); there was insufficient time to inspect this remnant, though it was viewed through binoculars from the summit of Big Mt Peel.

These areas of mountain beech forest are clearly remnants of a formerly more extensive area of forest. They are confined to steep terrain in areas that are

protected from fire by natural barriers such as ridges and bluffs. A small patch of beech forest across the Hewson River on Dry Creek Station, and more extensive areas of beech forest further inland on Ben McLeod and Mesopotamia stations, indicate that beech forest was formerly much more widespread in the area.

It is likely that most areas of beech forest would have been removed by fires that coincided with the arrival of Polynesian people in the South Island approximately 800 years ago (McSaveney and Whitehouse, 1989). Further burning, and loss of forest cover, is likely to have occurred during the early years of pastoral farming in the late 1800s.

The forest canopy is dominated by mountain beech with the occasional presence of broadleaf, mountain ribbonwood, *Coprosma linariifolia* and, at lower altitudes, kohuhu. Beech forest mistletoes were not observed but may be present. Species present in the forest understorey include korokio, *Olearia avicenniaefolia*, *Hebe traversii*, *Coprosma rhamnoides*, *Coprosma rigida*, three-finger and mountain wineberry. Ground cover species present include prickly shield fern, necklace fern, maidenhair spleenwort, *Asplenium appendiculatum*¹ and occasionally hanging spleenwort. Additional species observed in beech forest in the Scotsburn include *Coprosma microcarpa*, hound's tongue fern and *Lycopodium varium*.

This forest community is generally in good condition, except where traversed by animal (deer and thar) tracks. There is strong forest regeneration at the margins of all beech forest remnants sampled, including around isolated trees. No significant weed species were observed within the forest.

Mountain beech forest is representative of the vegetation that formerly covered a large part of the ecological district and a significant proportion of the property. The most extensive remaining stands on the property are in Pickaxe and Coopers Streams, though remnants in Rocky Stream and the Scotsburn are also sizeable. Areas of forest (beech and associated hardwood) in Pickaxe and Coopers streams were ranked as Sites of Significant Wildlife Interest (SSWI) of moderate value by the NZ Wildlife Service in 1982. These two areas and the area of forest in the Scotsburn are listed as Sites of Natural Significance in the Proposed Mackenzie District Plan.

A2 Montane Hardwood Forest:

Montane hardwood forest is present at scattered locations in the north of the property, and as more extensive stands in the south. The composition of this plant community is variable, ranging from dense low-stature stands on lower slopes to a scattered mountain ribbonwood treeland in higher-altitude gullies. The most extensive areas of this forest community are in Rocky, Pickaxe and Coopers Streams, and in the Scotsburn, often associated with remnants of mountain beech forest.

Dense stands of montane hardwood forest are usually dominated by one or more of the following species: broadleaf, mountain ribbonwood, *Olearia avicenniaefolia*, three-finger and kohuhu. In the Scotsburn kowhai, lancewood, wineberry, fuchsia, southern rata and mountain totara are also present. Scattered stands are usually dominated by mountain ribbonwood and occasionally, at lower altitudes, ti tree.

¹ formerly known as *Asplenium terrestre*

Understorey species include *Coprosma parviflora*, *Coprosma propinqua*, *Coprosma rugosa*, *Coprosma linariifolia*, korokio, mountain wineberry, tutu, mountain kiokio, prickly shield fern and *Asplenium richardii*. Additional species present in lower-altitude areas include koromiko, kiokio, *Pseudopanax simplex*, *Melicope simplex*, hound's tongue fern, mapou and *Astelia* sp.

In northern (generally higher-altitude) parts of the property this plant community is representative of the forest that is likely to have been present in gullies and perhaps on stable talus. The degree of past vegetation disturbance makes it difficult to predict the original extent of this forest type relative to the extent of beech forest (or perhaps mountain totara forest) on the property. It appears to be colonising colder damper slopes presently occupied by tall tussock grassland or mountain kiokio fernland.

In the Scotsburn this plant community is a seral community, colonising areas of tall tussock or inaka scrub on slopes that formerly supported podocarp-hardwood or beech forest. In some areas this regenerating forest is well established, lacking only the podocarp species (matai, totara and kahikatea) that were emergent over the hardwood forest canopy. Again, the original extent of this forest type relative to beech forest is unclear, as forests on this part of the property appear to be transitional between the lowland podocarp-hardwood forests of the upper plains and foothills and the mountain beech forests of the inland hill country.

Montane hardwood forest, and associated areas of beech forest, provide important forest bird habitat. These forest areas, especially those in the Scotsburn, complement the larger area of forest protected within Peel Forest Park Scenic Reserve. All areas of indigenous forest on the property have significant inherent value as representative plant communities and/or as wildlife habitat.

B1 Mixed Scrub/Shrubland:

Mixed scrub or shrubland is present as dense 1 to 2 m-high scrub in some areas and as scattered shrubland in other areas. It is more common on southern parts of the property where it is frequently associated with the forest communities described above, or with tall tussock grassland on lower slopes.

Scrub or shrubland is usually dominated by matagouri or *Coprosma propinqua*, though occasionally by manuka or kanuka. Mountain ribbonwood and ti tree are occasionally emergent.

Other species commonly present include mountain wineberry, *Hebe traversii*, korokio, porcupine scrub, golden spaniard, tutu, bush lawyer, scrub pohuehue and *Clematis marata*.

Occasionally present are *Olearia bullata*², *Olearia odorata*, *Myrsine nummularia*, tauhinu, native broom (*Carmichaelia australis*) and *Coprosma intertexta*.

Ground cover species include bracken, prickly shield fern, necklace fern, *Blechnum penna-marina*, mountain kiokio, bladder fern, thousand-leaved fern, bidibid (*Acaena* sp.), *Oreomyrrhis ramulosa*, *Viola cunninghamii*, harebell and *Pimelea pseudolyallii*.

Occasionally present are *Bulbinella* sp., mountain flax, male fern, broom, sweet brier and cleavers.

² Also known as *Olearia virgata* var *rugosa*.

Scrub along streams is frequently dominated by *Olearia avicenniaefolia* with many of the species listed above, and the following additional species: inaka, koromiko, kohuhu, *Coprosma rugosa*, *Gaultheria crassa*, Canterbury pink broom, kiokio, toetoe, *Chionochloa conspicua* and mountain flax.

Grey willow is also present a number of stream-side locations throughout the property, and Himalayan honeysuckle is present along the banks of the Scotsburn.

On drier rocky slopes in the centre of the property (notably the lower Mt Peel Creek catchment) kanuka scrub is present. It frequently grades to depleted tussockland, and has similar associated species. Areas of manuka scrub are present in the south, especially in the Scotsburn where they are associated with inaka scrub.

These scrub and shrubland plant communities are representative of vegetation that would have formerly covered recently deposited alluvial or colluvial deposits on valley floors or lower slopes. It is possible that scrub and shrubland presently occupies a more extensive area than before human-induced vegetation disturbance. If left undisturbed, many areas would gradually regenerate to forest communities.

Most areas of scrub or shrubland are intact, though affected by sheep grazing at accessible sites and tahr browse in steeper southern valleys. The best examples are in the centre of the property in Mt Peel Creek and Saddle Hut Stream, and in the south in Rocky, Pickaxe and Coopers streams. Small, but healthy, areas of stream-side scrub are present along Quartz Creek in the north of the property.

Most areas of indigenous scrub or shrubland on the property have significant inherent value as representative plant communities and wildlife habitat, or as areas with good potential for the establishment of indigenous forest. However, some are compromised by the presence of broom, especially stream-side scrub in Saddle Hut Stream, and others by the occasional presence of grey willow.

B2 Inaka Scrub/Shrubland:

Inaka (*Dracophyllum*) scrub/shrubland is present at higher altitude sites in the central part of the property, and on south-facing slopes in the south. It is often present as dense scrub, though occasionally as scattered shrubland in tall tussockland or fernland. This plant community is most extensive on the southern slopes of the Mt Peel Range, and at higher altitudes in the Mt Peel Creek catchment.

It is dominated by inaka (*Dracophyllum uniflorum*) at all sites except the Scotsburn where *Dracophyllum longifolium* and manuka are co-dominant at lower altitudes.

Associated species include narrow-leaved snow-tussock, mountain flax, golden spaniard and *Gaultheria crassa*.

Important ground cover species include mountain kiokio, cotton daisy, *Anisotome aromatica*, *Helichrysum filicaule*, *Brachyglottis bellidioides*, *Lycopodium scariosum*, *Pimelea pseudolyallii* and *Viola cunninghamii*.

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In the Scotsburn, broadleaved species are also commonly present, including three-finger, broadleaf, *Pseudopanax simplex*, *Coprosma serrulata*, *Hebe odora*, *Hebe lycopodioides* and *Brachyglottis buechananii*³.

Additional ground-cover species present include *Myrsine nummularia*, *Gentiana* sp., *Gonocarpus aggregatus*, *Astelia nervosa*, *Astelia petriei*, *Pentachondra pumila*, *Celmisia lyallii*, *Celmisia angustifolia*, *Coprosma cheesemanii* and *Coprosma perpusilla*.

This plant community is probably representative of subalpine scrub/shrublands originally present in the ecological district. On the property it is present over a much larger area than it is likely to have formerly occupied, as it has successfully colonised montane sites that probably once supported forest. In some areas, such as the upper Scotsburn, it is the most extensive plant community present.

Inaka scrub at higher-altitude sites has significant inherent value as a representative plant community. Elsewhere it has value as an indigenous plant community that provides wildlife habitat and good potential for forest regeneration.

C Tall Tussock Grassland:

Two major tall tussock grassland communities are present on the property: narrow-leaved snow-tussock (*Chionochloa rigida*) and slim snow-tussock (*Chionochloa macra*). The former occupies montane slopes below an altitude of approximately 1400m; the latter is present above 1400m.

Tall tussock grassland is probably the most extensive indigenous plant community on the property. It occupies colluvial slopes, ridges, summits and some valley floors. It is most widespread in the northern part of the property, where it forms an unbroken though in places highly-modified cover. On damper south-facing slopes tall tussockland is frequently replaced by mixed scrub at lower altitudes and inaka scrub at higher altitudes. On drier slopes it is replaced by mixed scrub (and occasionally kanuka scrub) or mouse-ear hawkweed-dominated herbfield at low altitudes, and cotton daisy-dominated herbfield at higher altitudes.

Below approximately 1000m throughout the property, this plant community has been modified by pasture development (over-sowing and top-dressing) and on some areas of gentler ground it has been completely replaced by pasture species.

Narrow-leaved snow-tussock (*Chionochloa rigida*) dominates tall tussock grasslands below 1400m altitude, forming a canopy cover of between 15% and 70% depending on the extent to which the grassland has been modified. Other important species in these grasslands (present at varying densities at different sites) are cotton daisy, golden spaniard, matagouri, fescue tussock, blue tussock, *Leucopogon suaveolens*, patotara, red woodrush, mouse-ear hawkweed, creeping pohuehue, *Blechnum penna-marina*, *Polytrichum juniperinum*, *Raoulia subsericea*, *Lycopodium fastigiatum*, snowberry, harebell, *Pimelea oreophila*, *Pimelea pseudolyallii*, *Carmichaelia monroi*, *Anisotome aromatica*, sheep's sorrel, browntop and sweet vernal. Numerous other species are present as a minor component of these grasslands.

³ Previously known as *Senecio benettii*.

At lower altitudes, narrow-leaved snow-tussock cover is sparser and a greater proportion of pasture grasses and clovers are present, presumably as a result of over-sowing and top-dressing. At depleted sites cotton daisy and mouse-ear hawkweed are more dominant.

Slim snow-tussock (*Chionochloa macra*) dominates grasslands above 1400m altitude, forming a canopy cover of between 25% and 60%. Other important species in these grasslands are *Celmisia lyallii*, blue tussock, cotton daisy, *Dracophyllum prunum*, *Lycopodium fastigiatum*, *Polytrichum juniperinum*, *Anisotome flexuosa*, *Kelleria dieffenbachii* and *Raoulia grandiflora*. Occasionally present are mouse-ear hawkweed, sheep's sorrel, *Celmisia viscosa*, *Celmisia haastii*, *Viola cunninghamii* and *Polystichum cystostegia*.

The extent to which tall tussock grasslands are representative of the original vegetation of the area depends on the former extent of forest cover. The natural timberline in the area appears to be at approximately 1200m altitude, though this would have varied according to aspect. Colluvial slopes below approximately 1200m altitude in the north and centre of the property probably supported areas of mountain beech forest and perhaps mountain totara forest before the increased frequency of fire associated with human settlement between 800 and 600 years ago.

If this interpretation of the former vegetation is correct, a large proportion of the existing montane tall tussock grassland on the property is probably not representative of the original vegetation. Rather, it is a plant community that spread to occupy sites formerly covered by forest or scrub, and has been maintained at those sites by grazing and the increased frequency of fire. The tall tussock grasslands at montane sites on the northern part of the property have inherent natural value, but probably do not have significant value as a representative plant community.

Conversely, tall tussock grasslands at higher altitudes (slim-snow-tussock) probably are representative of the original vegetation. These grasslands do have significant inherent value in all but the most modified sites. The best examples of slim snow-tussock grassland appear to be around the head of the Mt Peel Creek and Saddle Hut Stream catchments below the ridge between Big Mt Peel and Coal Hill, though only parts of this area were sampled during the field survey.

D Fernland:

Fernland is present on the southern part of the property on damper south or east-facing slopes. It is relatively extensive on steep montane slopes in the small valleys draining Mt Peel Range (Rocky, Pickaxe and Coopers streams and the Scotsburn). Fernland is dominated almost entirely by mountain kiokio (*Blechnum montanum*). At lower altitudes other species are occasionally present, including tutu, inaka, narrow-leaved snow-tussock, *Gaultheria crassa*, mountain flax and *Astelia nervosa*.

Fernland appears to be a seral community that is occupying sites formerly covered by forest or scrub. It is likely that scrub and forest will eventually recolonise these sites, though in places fernland is affected by wild animals: large patches of trampled and browsed fernland were observed in Rocky Stream (presumably by tahr and/or pigs). Fernlands have inherent natural value as indigenous plant communities, and for their potential to assist the regeneration of indigenous scrub and forest communities.

E Montane Rockland, Gravelfield and Scree:

Rockland: Montane rockland is present as areas of exposed bedrock throughout the property along stream gorges and on steeper slopes. It is nowhere extensive, but is a substrate that supports a distinctive array of indigenous species.

Important species present include *Helichrysum intermedium*, *Hebe amplexicaulis*, creeping pohuehue, tutu, *Gaultheria crassa*, maidenhair spleenwort, mountain kiokio, *Scleranthus uniflorus* and blue tussock.

Occasionally present are *Asplenium richardii*, *Brachyglottis lagopus*, *Hebe cheesemanii*, bladder fern, *Exocarpus bidwillii* and in the southeast a more compact form of *Hebe amplexicaulis* (aff. *Hebe pinguifolia*). At higher altitudes vegetable sheep (*Raoulia eximia*) is occasionally present.

A number of species, including Canterbury pink broom, are associated with stream-side bluffs though do not grow directly on them. These are listed in the description of stream-side scrub (see B1).

Montane rocklands are representative of the original vegetation on exposed bedrock. They are generally in good condition, though affected by browsing in places.

Gravelfield: Montane gravelfields are confined on the property to the active beds of streams. There are no extensive areas of montane gravelfield, and the small areas that are present are generally modified.

Typical species present include tutu, haresfoot trefoil, *Epilobium melanocaulon*, creeping pohuehue, white clover, mouse-ear hawkweed, Yorkshire fog, viper's bugloss and Californian thistle. Matagouri and fescue tussock are present on more stable stream beds, and *Helichrysum depressum* was observed in upper Mt Peel Creek.

Montane gravelfields support species that are representative of the original vegetation on recent stream gravel, but are mostly quite modified. They are not extensive or significant plant communities on the property, though probably play a valuable role in the protection of the habitat for freshwater fauna.

Scree: Montane screes are confined on the property to the steep upper reaches of Pickaxe Stream on the southern slopes of Middle Mt Peel. These screes were not sampled during the field survey, though appear from a distance to be relatively stable. They are likely to support species typical of the relatively extensive screes present elsewhere in the eastern Canterbury mountains. They are likely to have significant inherent value.

F Alpine Herbfield and Stonefield

The extent of alpine plant communities on the property is limited by the small area of high-altitude country. They are confined to the upper slopes of the Tara Haa Range, near the summits of Big Mt Peel and Middle Mt Peel. They range from a sparsely-vegetated stonefield at exposed sites to a prostrate plant community dominated by *Dracophyllum pronum*.

Important species present include *Dracophyllum pronum*, *Raoulia grandiflora*, *Chionohebe pulvinaris*, blue tussock, *Luzula pumila*, *Anisotome flexuosa*, *Phyllachne colensoi*, *Kelleria dieffenbachii* and *Celmisia sessiliflora*.

Other species occasionally present include *Celmisia angustifolia*, *Celmisia lyallii*, *Celmisia laricifolia*, *Celmisia haastii*, slim snow-tussock, red woodrush, *Montia australasica*, *Brachyglottis bellidioides* and mouse-ear hawkweed.

Alpine plant communities on the property are representative of the original plant communities, though are in places modified by animal trampling and browsing. They have significant inherent value.

2.4.3 Flora

No threatened species, as proposed by de Lange *et al* (1999), were observed on the property. However several species of interest were recorded.

Canterbury pink broom (*Carmichaelia torulosa*), a species listed as 'declining' by de Lange *et al* (1999), was observed at a number of locations on the property. This species is relatively common, though scattered, throughout the property. However, it does appear to be confined to sites that are relatively inaccessible to stock. The healthiest and largest population of this species observed on the property is along the lower reaches of Quartz Creek. Good populations were also observed in Rocky and Pickaxe streams and in upper Mt Peel Creek.

Coprosma intertexta, a species listed as 'sparse' by de Lange *et al* (1999), was observed in Mt Peel Creek, Rocky Stream, and in shrublands in the Hewson and Orari valleys.

Hebe amplexicaulis, a species listed as 'range restricted' by de Lange *et al* (1999), was observed throughout the property on rocky stream-sides and bluffs. This species is confined to inland South Canterbury (Wilson and Galloway, 1993). It is allied to *Hebe pinguifolia*.

The Mt Peel edelweiss (*Leucogenes tarahaoa*) is present on the Tara Haa Range. This species is listed as 'range restricted' by de Lange *et al* (1999). It was not observed during the field survey but is apparently present on higher altitude parts of Lochaber Pastoral Lease.

2.4.4 Problem Plants

Introduced plants that have a potentially significant effect on indigenous plant communities on the property, and that can be controlled or contained, are listed and discussed below. Other ubiquitous naturalised species for which containment or control are probably impractical, such as mouse-ear hawkweed and naturalised grasses, are not discussed here but are listed in the vegetation descriptions.

Broom (*Cytisus scoparius*)

Broom was observed at several locations on the property. The largest infestations observed were in upper Saddle Hut Stream and upper Rocky Stream, both of which have been previously controlled (Paul Harrison, *pers. comm.*). The main Saddle Hut Stream infestation was not inspected during the field survey, though scattered broom was observed in lower Saddle Hut Stream below the infestation. A significant proportion of the Rocky Stream infestation is dead, though scattered broom is present downstream. Other smaller infestations of broom (mostly single plants) were observed in Mt Peel Creek

(below Top Mt Peel Huts), Saddle Hut Stream, Rocky Stream, in the Orari Valley, on Pickets Spur (lower Pickaxe Stream) and in the lower Scotsburn.

Control of these infestations of broom is essential to protect conservation (and farming) values. Although there are relatively large infestations in Saddle Hut and Rocky streams, with scattered plants downstream, it is considered that control and eventual eradication of broom from these areas is possible (Paul Harrison, *pers.comm.*). Continued monitoring and control of isolated infestations on other parts of the property would be an achievable, though long-term, management action.

Sweet brier (*Rosa rubiginosa*)

Sweet brier was observed at scattered locations throughout the property. No large infestations were observed, and it does not appear to be particularly aggressive on the property. However, control of isolated plants would be a worthwhile management objective.

Gorse (*Ulex europaeus*)

Gorse was observed on the lower south ridge of Little Mt Peel (between the Scotsburn and Emily Stream) on the property boundary. Infestations are not extensive, and are surrounded by dense tussockland or scrub. These infestations appear to have been controlled, as many dead plants are present. Continued control of gorse in this area would be useful to help prevent the establishment of further infestations. However, eventually the surrounding vegetation, if undisturbed, will overwhelm and contain the gorse.

Grey willow (*Salix cinerea*)

Grey willow was observed at a number of locations on the property, scattered along most streams. It is widely distributed on the property, but nowhere common. Grey willow poses a potentially serious threat to stream margin vegetation on the property. It may also affect kowhiowhio (blue duck) habitat.

Removal of existing infestations of grey willow would be relatively easy. However, continued monitoring and control of new infestations would be required. A further species of willow was observed in Pickaxe Stream. It appears very similar to grey willow, and is presumably a grey willow hybrid.

Wilding Conifers

Self-sown pines and larch were observed at several locations on the property. Isolated large old trees were also observed at scattered locations. Wilding conifers are not common on the property, but have the potential to become much more common, especially in areas where grazing is removed.

Ideally the large old trees, and any wilding spread, should be removed. If not controlled, wilding trees could have a significant impact on indigenous plant communities and landscape values. Ongoing monitoring will be required in the Scotsburn, to enable the early detection of any spread of Douglas fir from nearby plantations.

Alder (*Alnus glutinosa*)

Alder has been planted along the banks of the Orari River, on the boundary of the property. It appears as if there has been substantial spread from the original plantings as alder forms dense stands along a large section of the river. Occasional trees are also present in scrub some distance from the river in the Orari Valley. Most of these plantings/infestations lie outside the property

boundary. However, some control may be required to prevent alder becoming established on the property.

Himalayan honeysuckle (*Leycesteria formosa*)

Himalayan honeysuckle is present and relatively common in the Scotsburn. It occurs as a minor component of the low forest and scrub, and as dense thickets along parts of the stream near the property boundary. The effect of these infestations is unclear. It is unlikely to displace indigenous species in scrub and forest, but it certainly displaces low-stature species along streams and perhaps alters the stability of the stream bed. Further investigation of the effect of these infestations is recommended.

Nodding thistle (*Carduus nutans*)

Dense infestations of nodding thistle were observed at some low-altitude sites on the property, mostly on cultivated land near the homestead. This species was not observed in established (intact) indigenous vegetation, and is probably unlikely to pose a significant threat beyond cultivated or heavily-grazed land.

Elder (*Sambucus nigra*)

One medium-sized elder tree was observed near where the farm track crosses Rocky Stream. As a precaution against unwanted spread this tree, and any others on the property, should be removed.

Hawthorn (*Crataegus monogyna*)

A single hawthorn tree was observed in the Orari Valley. This species poses a significant potential threat to plant communities. As a precaution against unwanted spread it should be removed.

2.5 FAUNA

2.5.1 Birds

A typical range of forest, scrub and open-country birds were observed on the property. Notable species observed include karearea (NZ falcon), kereru (NZ pigeon) and kowhiowhio (blue duck).

Karearea (*Falco novaeseelandiae*) were observed at a number of locations, all in or near the Mt Peel Creek catchment, in the centre of the property. Pairs of karearea were observed at two locations. This species appears to be common on this part of the property: more common than I have observed at many other high country sites. Karearea are listed as a Category B species for conservation action by Molloy *et al* (1994).

Kereru (*Hemiphaga novaeseelandiae*) were observed near the southeast boundary of the property in the Scotsburn. Kereru in the Scotsburn are likely to be part of a larger population centred on Peel Forest Park Scenic Reserve and other lowland forest remnants in the area. Kereru are listed as a Category B species for conservation action by Molloy *et al* (1994).

Two kowhiowhio (*Hymenolaimus malacorhynchos*), a male and female, were observed in Mt Peel Creek, near the Top Mt Peel Huts, and a single male kowhiowhio observed in Saddle Hut Stream. Kowhiowhio faecal sign was also observed in Rocky Stream, Pickaxe Stream and the Scotsburn. Abundant fresh sign was observed in lower Pickaxe Stream, suggesting the probable presence of a pair of birds. Sign in Rocky Stream and the Scotsburn was older and less

abundant, though only small sections of these stream-beds were traversed during the field survey. Kowhiowhio are listed as a Category B species for conservation action by Molloy *et al* (1994), and regarded as 'endangered' under the International Union for the Conservation of Nature (IUCN) criteria (Department of Conservation, *unpublished data*).

The most significant bird population observed during the field survey is the kowhiowhio population. These birds are part of a scattered population that is present in the South Canterbury foothills, between the Rangitata and Orari rivers (Cunningham, 1991). This population does not appear to have been surveyed systematically, though there have been occasional sightings of kowhiowhio from throughout the area, and especially in the Orari River, over recent years. The threatened status of this species has recently been upgraded from 'vulnerable' to 'endangered'.

2.5.2 Reptiles

Common skinks (*Oligosoma nigriplantare polychroma*) were observed at several locations on the property. There is one confirmed record of the scree skink (*Leiolopisma waimatense*), a Category B species, in the Hewson River area.

2.5.3 Freshwater Fish

Mt Peel Creek has been surveyed for freshwater fish and species present included upland bully (*Gobiomorphus breviceps*), Canterbury galaxias (*Galaxias vulgaris*) and Koaro (*Galaxias brevipinnis*). Alpine and Canterbury galaxias have been found in the Hewson and Orari Rivers. Longfin eel, torrent fish, upland bully, common bully and koura have also been found in the Orari. No introduced species were observed on the lease although brown trout do inhabit the Orari River.

2.5.4 Invertebrates

There are numerous invertebrate habitats present on Lochaber Pastoral Lease, including stream, tussockland, shrubland, sub-alpine and alpine habitats. Invertebrates observed in each of the main habitats are described below.

Alpine and Sub-alpine zones:

The sub-alpine zones of the property are partly modified, and only common sub-alpine invertebrate species were observed in this area.

The alpine region of Mount Peel contains a diverse alpine fauna. The carabid (ground beetle) *Megadromus temukensis* was collected at 1300m altitude on Little Mount Peel. This ground beetle is endemic to Mid Canterbury, South Canterbury and Mackenzie region. Two large weevils were also collected from Little Mount Peel, and several alpine cicada species were seen throughout the alpine region.

Four species of alpine grasshopper/kawhitiwhiti have been collected in the alpine zone: *Sigauss campestris*, *Paprides nitidus*, *Sigauss australis* complex and *Brachaspis* 'hunter'. *Sigauss campestris* has been recorded from only 60 scattered sites in the lower two-thirds of the South Island. *Paprides nitidus* is a common species that is found from The Hunter Hills in the south to the top of the South Island. The *Sigauss australis* complex includes common alpine

grasshoppers found between Alexandra in the south and Arthur's Pass in the north. *Brachaspis* 'hunter' is an unnamed species recorded from only 17 sites between the St Mary Range in the south and the Two Thumb Range in the north. This species is listed in the Department of Conservation's Short-horned Grasshoppers Recovery Plan (Walker, *in prep.*).

The most significant values of the alpine zone are the diverse alpine grasshopper fauna and the presence of *Brachaspis* 'hunter'.

Shrubland:

Two species of *Odonata* were noted around the shrubland in Quartz Creek: the mountain giant dragonfly/kapowai and the common red damselfly/kihitarā. Ground beetles, parasitic wasps and cicadas were also observed in or around open rocky areas in Quartz Creek. Numerous diurnal moths were observed over the shrublands, but only a few species recorded probably because diurnal moths are most active between October and December.

Other areas in Quartz Creek were not sampled but the shrublands are likely to support a diverse invertebrate fauna, including species of Lepidoptera, Hymenoptera and Coleoptera (beetles and weevils). Several species of tiger beetle were noted around the edge of the shrubland. *Dracophyllum* shrublands on the property are likely to support a diverse fauna of nocturnal moths, Diptera (flies) and Hymenoptera (ants, wasps and bees).

Grassland:

All areas of grasslands sampled on the property were heavily modified, and appear to support only common species of invertebrates. Several species of robber fly and butterfly were observed in the grassland communities. Butterflies recorded include the common tussock ringlet butterfly, the bolder copper, the common copper, and New Zealand's smallest butterfly: the southern blue butterfly. The common grasshopper/kawhitiwhiti *Phaulacridium marginale* was observed throughout grassland communities on the property.

Forest Remnants:

The ground-cover within forest remnants on the property is in good condition, providing deep leaf litter and suitable habitat for ground-dwelling invertebrates. Species of ground beetle, darkling beetle, cave weta and weevil were observed. Numerous wood-boring invertebrates (larvae only) were noted, indicating a very rich native wood-boring invertebrate community.

Many other invertebrates (springtails, spiders, slaters, isopods, woodlice, centipedes, millipedes and slug eggs) were also observed, indicating a good functional community dominated by native invertebrates. The red admiral butterfly/kahukura (*Bassaris gonerilla gonerilla*) was observed flying around the forest margins.

Forest remnants on the property provide significant habitat for a diverse invertebrate fauna.

2.5.5 Problem Animals

Introduced animals that have a potentially significant effect on indigenous plant communities on the property, and that can be controlled or contained, are listed and discussed below. Other ubiquitous naturalised species for which containment or control are probably impractical are not listed.

Himalayan thar (*Hemitragas jemlahicus*)

Thar were observed in Rocky Stream, and thar sign was observed in most of the small southern valleys on the property. Localised destruction of fernland and scrub was observed in Rocky Stream and the Scotsburn, presumably caused by thar and/or feral pigs.

The property lies within Management Unit 3 of the Himalayan Thar Control Plan (Department of Conservation, 1993). The plan proposes, as a conservation objective, a maximum population density of 2 thar per km². Control, and ideally eradication, of thar from this area should be undertaken to protect tall tussock grasslands and alpine plant communities.

Feral pig (*Sus scrofa*)

Feral pig tracks, droppings and rooting sign were observed in Coopers Stream and the Scotsburn. Other tracks observed in Rocky and Pickaxe streams may also be used by pigs. In the Scotsburn animal tracks formed by pigs, and possibly other wild animals, traverse spurs from the valley floor to near the summit of Little Mt Peel. It appears that feral pigs are causing significant damage in the southern part of the property. Control of this species should be undertaken to protect fernland, scrub and forest communities.

2.6 HISTORIC RESOURCES

Lochaber Pastoral Lease was originally part of Mt Peel Station. The country between the Rangitata and Orari Rivers was first selected for grazing by John Acland and Charles Tripp who acquired a number of separate leases between 1856 and 1861. Runs 341, 342 and 343, comprising 15,000 acres between the Mt Peel Range and the Orari River, were acquired on 1st May 1860 (Andersen, 1916).

The area presently within Lochaber Pastoral Lease was, prior to its separation, run as part of Mt Peel Station. It appears that stock and pack horses crossed the Tara Haoa Range between Mt Peel Station and the present Lochaber Station via Mule Spur. It seems likely that the route between Mule Spur and Mount Peel Creek was along the relatively gentle ridge between Big Mt Peel and Coal Hill and then via Blacksmith Spur. An old stone well is apparently still present on this ridge.

Boundary huts and mustering huts are likely to have been present on the property, however the existing huts observed appear to be of more recent origin. The Top Mt Peel Huts (or 'Twin Huts') in upper Mount Peel Creek appear to date from the early to mid 1900s. The huts are of similar size and construction though one is older than the other and is lined with undressed timber panels. A partly-derelict hut at the confluence of Hewson River and Quartz Creek is clad with boards and battens, but also appears to be relatively recent (c.1940s).

Old fences traverse prominent ridges on the property, probably representing the original run or block boundaries. Old fences observed on the property were in disrepair. An old fence along the ridge west of Coal Hill has been replaced by a deer fence.

2.7 PUBLIC RECREATION

2.7.1 Physical Characteristics

Lochaber Pastoral Lease lies within the 'pastoral' recreation opportunity class in the Recreation Strategy for Canterbury Conservancy (Department of Conservation, 1994). Within the property, three main recreation settings can be described.

Mt Peel (Tara Haa) Range:

The Mt Peel Range recreation setting comprises the main ridge of the Tara Haa Range between Little Mt Peel at the southeast corner of the property and Big Mt Peel. It supports sub-alpine scrub and alpine stonefield and herbfield, with areas of outcropping rock. The ridge crest is relatively gentle and easily accessible on foot, providing a popular route for trampers ascending Big Mt Peel from the east. Practical foot access is also possible from the ridge crest into tributaries of the Orari River to the south and into Lynn Stream to the north. This recreation setting provides spectacular views of South Canterbury and dominates the skyline from the southern Canterbury Plains.

Orari Valley:

The Orari Valley recreation setting includes the Orari River, on the southwest boundary of the property, and the small tributaries of the Orari River in the southeast corner of the property (Rocky, Pickaxe and Coopers streams). The Orari River is confined within a rocky gorge, cut into the broader valley floor. Scrub, low forest and thickets of alder alternate with exposed rocky banks along the river, and shrubland and pasture are present on the adjoining terrace. Scrub, tall tussock and forest remnants are present in the tributary streams. Practical access to this recreation setting is via the Orari Valley, either from Lochaber Road at the inland end, or from the Orari River Road at the downstream end. A well-formed four-wheel-drive-vehicle track links these two roads through Blue Mountain Station on the southern side of the Orari River.

Mount Peel Creek-Quartz Creek:

The Mount Peel Creek-Quartz Creek recreation setting comprises the main central valleys on the property. It is characterised by extensive areas of induced tall tussockland and smaller areas of scrub and shrubland. The main Mount Peel Creek Valley is easily accessible on foot and by four-wheel-drive vehicle. A four-wheel-drive-vehicle track crosses the ridge between Mount Peel and Quartz creeks. Two small station huts are present, side-by-side, in the upper valley. The area provides a relatively remote recreation setting, enclosed by high ridges and the narrow gorge of lower Mount Peel Creek. Big Mt Peel dominates the southern skyline of the area, and can be easily ascended from Mount Peel Creek.

2.7.2 Legal Access

The metalled Lochaber Road provides access to Lochaber Pastoral Lease where it crosses the Hewson River near the homestead. Portions of legal road exist in the Orari Valley and there is a legal road up the Hewson Valley which link with a Crown Land strip that runs over from the Rangitata Gorge Road

through Stew Point Pastoral Lease. There is, however, a locked deer fence gate at the boundary of Lochaber and Stew Point Pastoral Lease.

Marginal strips are present along both Orari and Hewson Rivers. Legal foot access is also available to the southeast corner of the property at Little Mt Peel from Peel Forest Park Scenic Reserve.

2.7.3 Activities

The most important recreational use of the property, in terms of visitor numbers, is probably scenery appreciation. The southern side of the Mt Peel Range, between Big Mt Peel and Little Mt Peel, is clearly visible from a large part of South Canterbury. It dominates the northwest skyline when viewed from Geraldine and other towns in the area, and is prominent as a distant view from Timaru, Temuka and Winchester. It also forms the immediate backdrop for recreation activities in the Orari Valley.

Tramping, winter climbing, and to a lesser extent hunting, are also popular recreational activities on this part of the property, especially along the Mt Peel Range between Little Mt Peel and Big Mt Peel. The ascent of Little Mt Peel is a very popular local day-tramp, and a significant number of people continue along the ridge (along the property boundary) to Big Mt Peel. A number of people also climb Big Mt Peel through the property from the west, with consent from the lessee.

Four-wheel-drive-vehicle tracks on the property provide good opportunities for mountain-biking. An annual mountain-bike race traverses parts of the Hewson Valley on the western boundary of the property, and endurance events (such as the Southern Traverse) have included mountain-biking stages along ridge-crest tracks at the northeast boundary of the property. Farm tracks from the Orari Valley to the Hewson Valley via Mount Peel and Quartz Creeks, and down the Orari Valley are also well suited to mountain-biking.

Fishing, canoeing, rafting and swimming are popular in the Orari River on the property boundary. Streams within the property appear too small to provide significant opportunities for water-based recreation, but these and adjoining areas have potential to provide opportunities for walking, picnicking and nature study. There does not appear to be extensive use of the property for hunting, though there are localised concentrations of wild animals (thar, feral pig, deer) on the property, especially in the southern valleys.

PART 3 OTHER RELEVANT MATTERS AND PLANS

3.1 CONSULTATION

At meetings held with non-government organisations in Christchurch on 25 September 2001 and in Timaru on 26 September 2001 the following comments and recommendations were made:

- Important plants, particularly an Eidelweiss, grow around Mt Peel.
- Good to have access across Mt Peel from Lochaber.

- Mountain biking popular in the Orari and Hewson Valleys. Also good mountain biking via Camp Gully to Coal Hill.
- Interesting volcanic material near Coal Hill may have some special plants.
- Good forest including mountain beech in the gullies below Mt Peel.
- Side streams used by blue duck.
- All land between Big Mt Peel and southern end should be retired.
- Access track/firebreak through to the Rangitata Gorge Road financed by taxpayer and should be opened up for general use.

Written submissions were also received from the NZ Deerstarkers Association (South Canterbury Branch), the Peninsula Tramping Club, the NZ Alpine Club (South Canterbury Section) and the combined South Canterbury Tramping Club and Temuka Tramping Club. As well as points raised above the submissions called for access up the 4wd track beside Lochaber Stream and for access on the marginal strips of the Orari River, Hewson River, Quartz Creek, Mt Peel Creek and Lochaber Stream.

3.2 DISTRICT PLANS

Lochaber is in the Mackenzie District. The Mackenzie District Plan was notified in 1999 and was subject to appeal. There are still some unresolved issues but it is hoped that the Plan will become operative soon. Lochaber is all zoned Rural and there are three Sites of Natural Significance on the lease:

- SNS 75 covers forest remnants in the Scotsburn Valley, though it is unclear how much of this site lies on the property. It is described as podocarp-hardwood forest, supporting forest birds including kereru, and stream habitat supporting blue duck/kowhiowhio.
- SNS 76 covers forest remnants in Coopers Stream. It is described as 'black beech forest' and stream habitat with records of blue duck presence. This area is the same as that described as Coopers Stream Bush SSWI by the NZ Wildlife Service in 1982.
- SNS 77 covers forest remnants in Pickaxe Stream. It is described as 'black beech forest' and 'blue duck habitat'. This area is the same as that described as Pickaxe Bush SSWI by the NZ Wildlife Service in 1982.

In the Sites of natural Significance and, also, within the Rural Zone above the 900m contour, there are controls limiting volume, area and slope of earthworks, tree planting, vegetation clearance, building and pastoral intensification. There are also general controls within the remainder of the Rural Zone on the lease.

3.3 CONSERVATION MANAGEMENT STRATEGIES AND PLANS

Lochaber Pastoral Lease is within the Pareora Unit of the Canterbury Conservation Management Strategy. Relevant objectives for this unit are listed as:

- To identify the significant native vegetation and threatened species of the Pareora Unit.
- To use effective and efficient means to protect a representative range of indigenous biodiversity of the Pareora Unit.
- To protect and enhance the viability of priority threatened species populations and their habitat(s) in the Pareora Unit.

PART 4 ATTACHMENTS

4.1 ADDITIONAL INFORMATION

4.1.1 Scientific Names of Plant Species Cited in the Text

Common Name Scientific Name

(* = naturalised species)

alder*	<i>Alnus glutinosa</i>
bidibid	<i>Acaena</i> sp.
bladder fern	<i>Cystopteris tasmanica</i>
blue tussock	<i>Poa colensoi</i>
bracken	<i>Pteridium esculentum</i>
broadleaf	<i>Griselinia littoralis</i>
broom*	<i>Cytisus scoparius</i>
browntop*	<i>Agrostis tenuis</i>
bush lawyer	<i>Rubus cissoides</i>
	<i>Rubus schmidelioides</i>
Californian thistle*	<i>Cirsium arvense</i>
Canterbury pink broom	<i>Carmichaelia torulosa</i>
cleavers*	<i>Galium aparine</i>
cotton daisy	<i>Celmisia spectabilis</i>
creeping pohuehue	<i>Muehlenbeckia axillaris</i>
elder*	<i>Sambucus nigra</i>
hanging spleenwort	<i>Asplenium flaccidum</i>
fescue tussock	<i>Festuca</i> sp.
fuchsia	<i>Fuchsia excorticata</i>
grey willow*	<i>Salix cinerea</i>
golden spaniard	<i>Aciphylla aurea</i>
gorse*	<i>Ulex europaeus</i>
harebell	<i>Wahlenbergia albomarginata</i>
haresfoot trefoil*	<i>Trifolium arvense</i>
hawthorn*	<i>Crataegus monogyna</i>
Himalayan honeysuckle*	<i>Leycesteria formosa</i>
hound's tongue fern	<i>Microsorium pustulatum</i>
inaka	<i>Dracophyllum uniflorum</i>
kanuka	<i>Kunzea ericoides</i>
kiokio	<i>Blechnum novae-zelandiae</i>
kohuhu	<i>Pittosporum tenuifolium</i>
korokio	<i>Corokia cotoneaster</i>
koromiko	<i>Hebe salicifolia</i>
kowhai	<i>Sophora microphylla</i>
lancewood	<i>Pseudopanax crassifolius</i>
maidenhair spleenwort	<i>Asplenium trichomanes</i>
male fern*	<i>Dryopteris filix-mas</i>
manuka	<i>Leptospermum scoparium</i>
mapou	<i>Myrsine australis</i>
matagouri	<i>Discaria toumatou</i>
mountain beech	<i>Nothofagus solandri</i> var. <i>cliffortioides</i>

mountain flax	<i>Phormium cookianum</i>
mountain kiokio.....	<i>Blechnum montanum</i>
mountain ribbonwood	<i>Hoheria lyallii</i>
mountain totara.....	<i>Podocarpus hallii</i>
mountain wineberry	<i>Aristotelia fruticosa</i>
mouse-ear hawkweed*	<i>Hieracium pilosella</i>
native broom.....	<i>Carmichaelia australis</i>
necklace fern	<i>Asplenium flabellifolium</i>
narrow-leaved snow-tussock	<i>Chionochloa rigida</i>
nodding thistle*	<i>Carduus nutans</i>
patotara	<i>Leucopogon fraseri</i>
porcupine scrub	<i>Melicytus alpinus</i>
prickly shield fern.....	<i>Polystichum vestitum</i>
red woodrush.....	<i>Luzula rufa</i>
scrub pohuehue.....	<i>Muehlenbeckia complexa</i>
sheep's sorrel*	<i>Rumex acetosella</i>
slim snow-tussock.....	<i>Chionochloa macra</i>
snowberry	<i>Gaultheria depressa</i> var. <i>novae-zelandiae</i>
southern rata	<i>Metrosideros umbellata</i>
sweet brier*.....	<i>Rosa rubiginosa</i>
sweet vernal*	<i>Anthoxanthum odoratum</i>
tauhinu.....	<i>Ozothamnus leptophylla</i>
thousand-leaved fern	<i>Hypolepis millefolium</i>
three-finger	<i>Pseudopanax colensoi</i>
ti tree	<i>Cordyline australis</i>
toetoe	<i>Cortaderia richardii</i>
tutu	<i>Coriaria sarmentosa</i>
white clover*	<i>Trifolium repens</i>
wineberry.....	<i>Aristotelia serrata</i>
Yorkshire fog*	<i>Holcus lanatus</i>

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4.2 MAPS

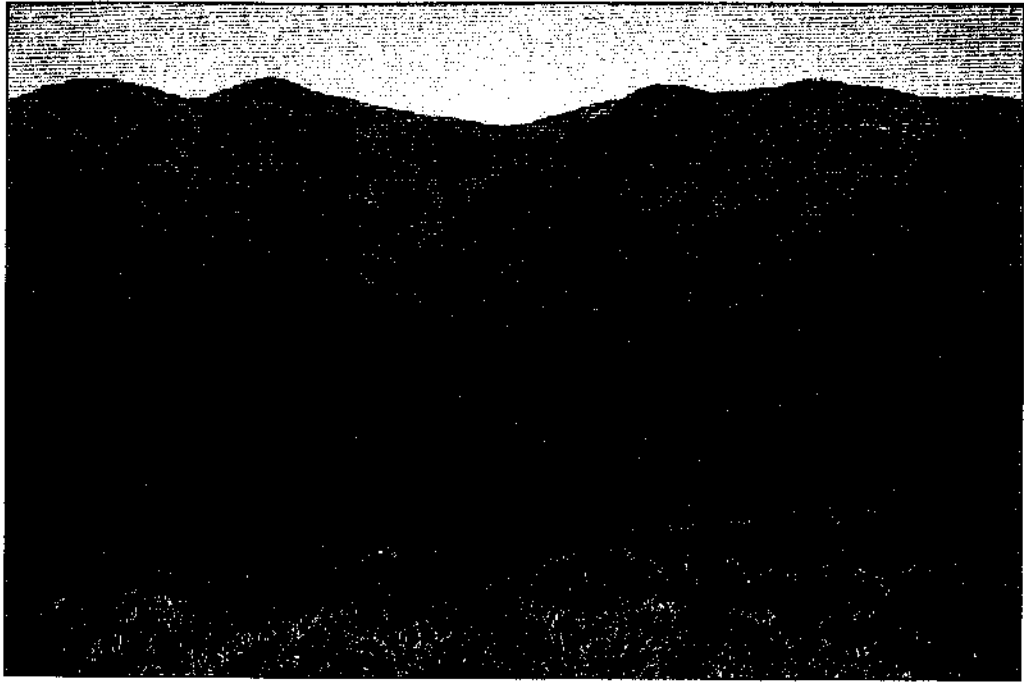
4.2.1 Landscape Units (attached)

4.2.2 Topographic/Cadastral Map (attached)

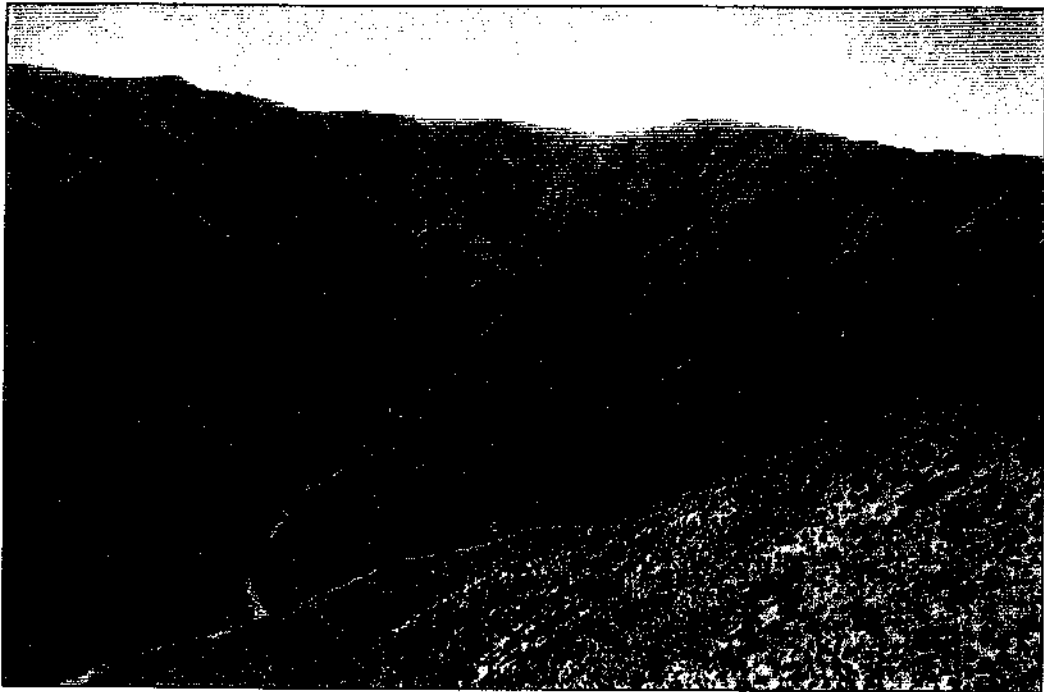
4.2.3 Values (attached)

4.3 ACKNOWLEDGEMENTS

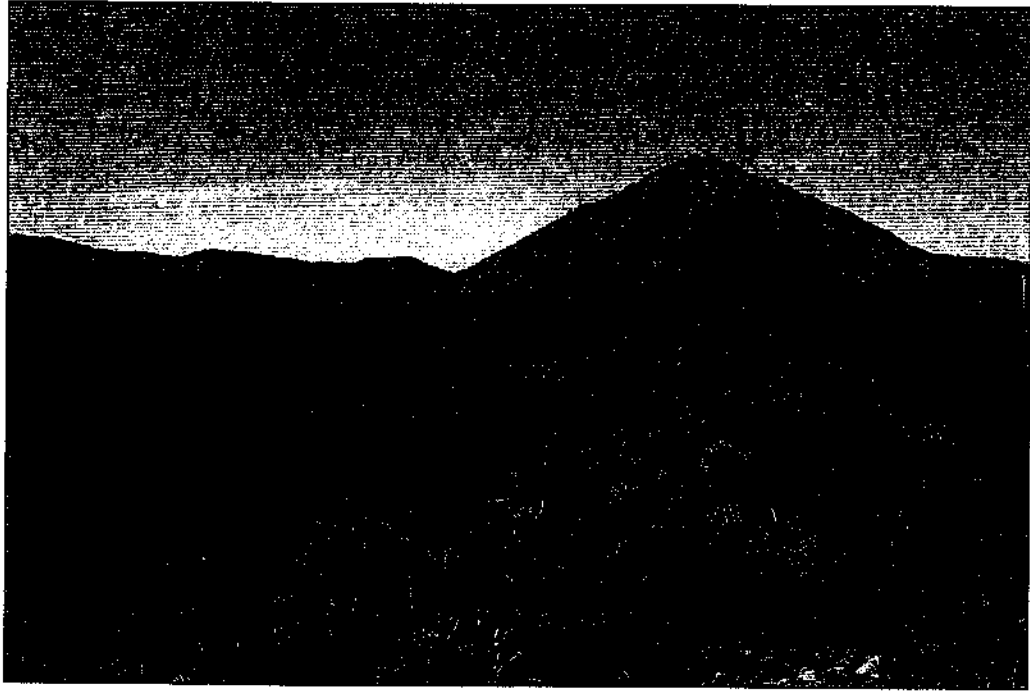
The Department of Conservation would like to thank the lessees, Paul and Jennifer Harrison, for their assistance with the survey. We would also like to thank members of the survey team – Mike Harding, Alan Petrie, Simon Morris, Kennedy Lange and Steve Harraway.



Headwaters of Mt Peel Creek



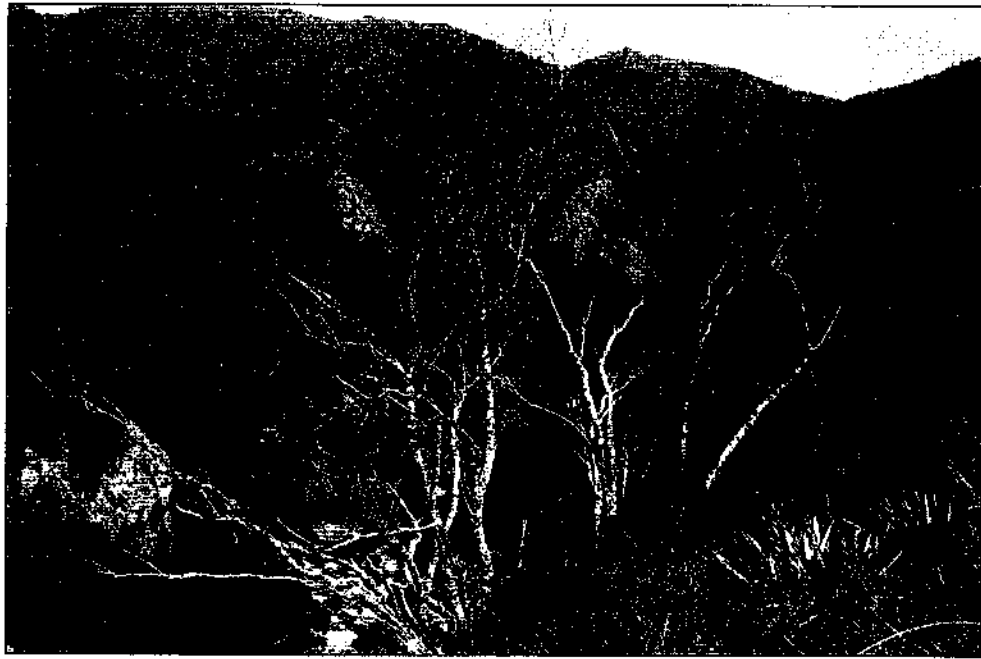
Saddle Hut Stream



*Narrow-leaved snow-tussock grassland on western edge of Mt Peel Creek catchment.
Saddle Hut Stream at centre-distance, Big Mt Peel at right.*



*Mountain kiokio fernland and inaka scrub on steep slopes in Rocky Stream.
(Note animal tracks and areas of depleted fernland)*



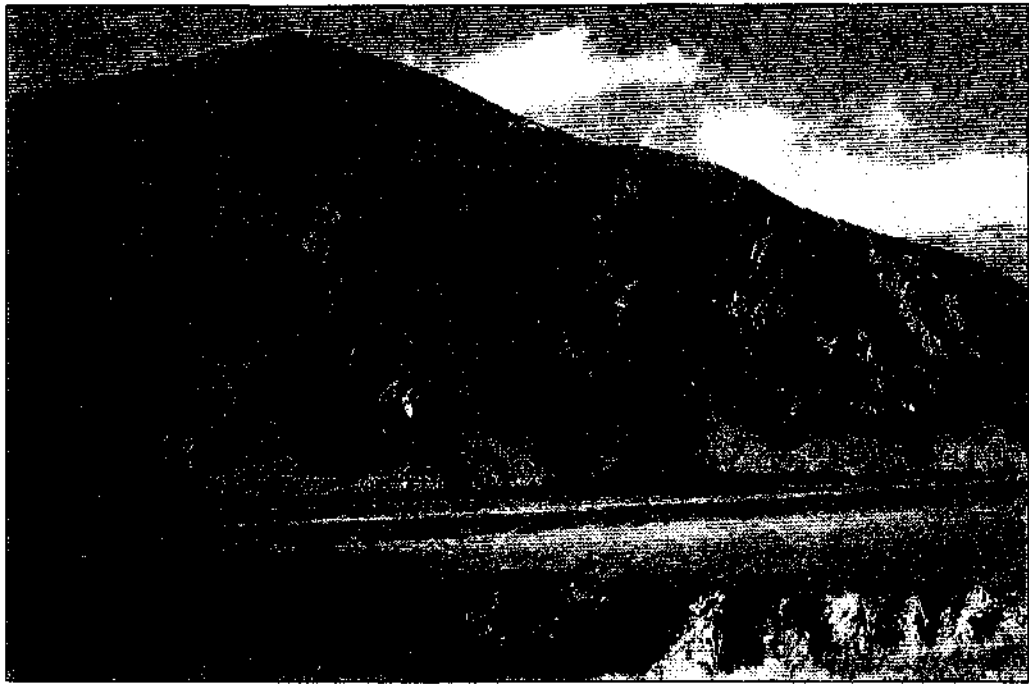
Canterbury pink broom (Carmichaelia torulosa) in Pickaxe Stream.



Stonefield and Dracophyllum pronum herbfield on the summit of Big Mt Peel.



Mixed hardwood forest, with small patches of beech forest in gullies, upper Scotsburn (below Little Mt Peel). Inaka scrub on upper slopes.



Mixed Coprosma/matagouri scrub, with emergent mountain ribbonwood, in the Orari Valley west (up-valley) of lower Pickaxe Stream.