

Crown Pastoral Land Tenure Review

Lease name : KILLERMONT

Lease number : PO 207

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.

They are released under the Official information Act 1982.

June 04

DOC CONSERVATION RESOURCES REPORT ON TENURE REVIEW OF KILLERMONT PASTORAL LEASE

**PART 1
INTRODUCTION**

Killermont pastoral lease is located at the very south end of the Mackenzie Basin. It comprises two runs (201B and 674) totalling 4796 ha. Geographically it consists of two main areas - the north end of the Dunstan Range on the western side of the property, and a large portion of the Ahuriri River flats and outwash surface between the Ahuriri River and Berwen Road to the east.

The lease is largely surrounded by intensively developed valley floor and extensively grazed rangeland. Adjacent properties are: Dunstan Downs to the southwest, Birdwood and Ahuriri Downs north across the Ahuriri River and Twin Peaks to the south.

Killermont lies within two Ecological Districts, the Omarama Ecological District and the Ahuriri Ecological District. Both Ecological Districts have been surveyed as part of the Protected Natural Areas Programme (PNAP) in 1982/83 and one Recommended Area for Protection (RAP) was identified on the property; “Frosty Gully” (Ahuriri RAP 13). In addition, the Ahuriri River, which runs along the northern boundary of the property, was identified as a RAP (Omarama RAP 14) as well as a Site of Significant Wildlife Interest (SSWI).

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

2.1 Landforms & Geology

The property essentially comprises two broad types of landform and geology in about equal proportions - hard rock mountain ranges and basin floor plains made up of gravel outwash and alluvial flats.

These two broad landform types can be subdivided into four geomorphic units as follows:

Mountain Range

- (i) Killermont Hill/Frosty Gully
- (ii) Frosty Gully/Manuka Creek valley

Basin Floor Plains

- (iii) Outwash Surface
- (iv) Ahuriri River Terraces

Hard rock mountain ranges

(i) Killermont Hill/Frosty Gully

At the northern end of the Dunstan Range is a large steep hill rising steeply from the Basin floor to rolling unvegetated summits, up to 1464m asl. Composed of strongly indurated dark grey greywacke and black argillite of the Torlesse Group (Chlorite Sub-Zone I), the hill has three aspects. (a) The large northeast facing side of the hill overlooks the Ahuriri River. Two large stream valleys dissect its face, with upper level basins and secondary small gullies and spurs, slightly interlocking. (b) The much smaller southeast aspect has a broadly conical form and is dissected by several shallow gullies. (c) The third aspect faces south and forms the 3km long true left side of Frosty Gully. It too is well dissected by stream valleys.

Hill slopes are generally steep to very steep and planar to broadly rounded in form, rising to rolling summits. Their surface is generally smooth with relatively few rock outcrops breaking the surface. Fresh scree, more stable scree, and patches of exposed soil are common, as are surface exposures of bedrock. Overall however the hill is well covered with vegetation and lacks the extensive scree typical of many Canterbury ranges. There is a large rock bluff with associated talus at the base of the north-east aspect, next to SH8.

(ii) Frosty Gully/Manuka Creek valley

This unit is the generally southeast-facing aspect of the high, steep Dunstan Range, forming the true left of Manuka Creek and the south side of Frosty Gully. The summit reaches a maximum altitude of 1747m asl, with all the summit above 1400m. The area is mostly underlain by schist, more specifically: non-foliated quartzo-feldspathic semi-schist with phyllite and marble of the Haast Schist Group (Chlorite Sub-Zone II). The mid to lower slopes of Frosty Gully and the slopes forming the lower end of Manuka Creek valley are formed of Torlesse greywacke.

Slopes are long and steep, tending to be rectilinear to broadly rounded. They are dissected with numerous gullies and ridges. There is a distinct “shoulder” about mid-slope on the faces south of Frosty Gully, separating the steeper lower slopes from the gentler more rolling topography of the higher slopes. A similar shoulder exists in Manuka Creek valley, where gentler rolling summit and upper slopes suddenly drop away more steeply into the valley.

Like Killermont Hill, the summits are rolling but a cover of scree and shattered rock pavement dominates, reflecting past peri-glacial conditions. There has also been minor cirque glaciation at the head of the valley. Fresh and older scree is widespread over the upper slopes. Rock outcrop is common but generally the slopes appear smooth, mantled with scree and colluvium. A large steep alluvial fan exists towards the lower end of the valley, its base truncated in a low scarp by Manuka Creek.

Basin floor plains

(iii) Outwash Surface

This area consists of a large part of the extensive glacial outwash surface formed by the Ahuriri River in the last “Aviemore” glacial period. A very small portion of older outwash surface of the “Morven” period exists at the base of the Dunstan Range in the Frosty Gully area. To the northeast, north of SH8, the outwash merges with more recent alluvial plain of the Ahuriri River.

The plains evenly slope from west to east, from around 560m asl at the west end to just under 480m asl at the east boundary. The plain rises more steeply in Frosty Gully merging imperceptibly with the lower hill slopes and piedmont fans. Agricultural development has masked the landform pattern to some degree.

The surface topography is generally flat to undulating, and when viewed aerially, exhibits the mound and hollow surface pattern so typical of the Mackenzie outwash surfaces. This distinctive micro-topography pattern is oriented roughly with the prevailing winds of the time. It is due to wind erosion which causes soil to accumulate in sinuous mounds leaving hollows with shallow, stony soils (Molloy 1988) and is accentuated by vegetation distribution.

Closer to the Dunstan Range the steeper surfaces have been incised by several small steep-sided gullies. Manuka Creek too has cut into the surface, forming a curving scarp some 500m long extending from a small conical hill at the end of a long spur.

The Ahuriri River has formed an impressive long curving scarp marking the transition from outwash to more recent alluvial plain between the homestead and the fault-formed ridge. Another scarp cut earlier continues east of the fault, decreasing in height to eventually merge with the outwash surface.

A late Quaternary fault has disrupted the surface of the plains on its northern edge, forming a curious low ridge from 3-5km east of the homestead, marked by a cutting on SH8. It merges imperceptibly with the long scarp cut by the Ahuriri river and appears to be part of it at first glance.

(iv) Ahuriri River Terraces

A narrow band of recent (Holocene) gravel alluvial terraces of varying heights and sizes along the base of Killermont Hill and between the outwash surface and the Ahuriri river. At the west end these landforms are noticeably lower than the older outwash surface but they merge together towards the eastern boundary.

2.2 Landscape

2.2.1 Landscape context

Killermont is situated at the very south end of the Mackenzie Basin, one of the most extensive outstanding natural landscapes in the Canterbury Region and “one of the most investigated, painted, written about, visited, eulogised and argued over landscapes in New Zealand” (Boffa Miskell Partners and Lucas Associates 1993¹)

This 1993 study and a 1992 study by Boffa Miskell Partners² on landscape change in the Mackenzie Basin looked at its landscape values (primarily visual values) in some detail (BMP 1992) and identified a range of key attributes to support its outstanding status making particular note of the variety, the huge scale and clear expression of landforms as well as the basin’s visual character particularly its openness, vastness, and strong horizontal emphasis. Other distinctive characteristics were general absence of trees, overwhelming dominance of landform, high apparent naturalness, tussockland character, and overall unity, simplicity and coherence of the landscape. Other attributes described in the study include the way the Basin is so clearly recognisable as a large basin, due to the strongly defined enclosing ranges, and the ability to see right across the basin floor, particularly in clear light conditions.

¹ Boffa Miskell and Lucas Associates – Canterbury Regional Landscape study, vol. 1 & 2

² Boffa Miskell Partners Ltd – Landscape Change in the Mackenzie/Waitaki Basins

The absence of features across the plains gives the impression of vast open space and distance.

Additional features of the Mackenzie Basin is that most of it is seen as a highly “natural” landscape. From an ecological perspective, much of it is in fact considerably modified, with hieracium and exotic grasses widespread throughout the basin. However, the Basin retains very high “natural” qualities because of its overwhelming dominance of natural landform and extensive presence of short grassland which still retains a component of native species and continues to support a diversity of indigenous insects, lizards and birds. It is still regarded overall as one of the region’s, and arguably, the nation’s, largest outstanding natural landscapes. It is also a highly visible landscape. A major tourist highway (SH8) passes through the middle of the basin and much of it can be viewed from the highway.

The north end of the Dunstan Range and the Wether Range as a whole are a significant part of the high skyline ranges enclosing the Mackenzie Basin. The north end of the Dunstan Range, called Killermont Hill in this report, is particularly significant. It is the closest part of the ranges to the highway and increasingly dominates the view from SH8 travelling south, as the highway runs straight toward it and around its base.

A large part of the expansive Basin floor in the Omarama area is within *Killermont*, and bounds the highway to either side for over half the distance across the plains between Omarama and the Longslip Creek valley. Whilst spectacular for their scale and simplicity rather than for their appearance and vegetation, the wide open flat surface is vital to imparting a sense of a “basin”, a special characteristic that typifies the Mackenzie as a whole. They allow panoramic views for several kilometres in any direction to the surrounding mountain ranges, which on a fine day can be seen with great clarity from base to summit. The flats are also important in allowing excellent views of the Clay Cliffs from SH8, and also views of the large braided Ahuriri riverbed. The absence of tall vegetation (eg, shelter belts) is critical to the role the flats play in the experience of this part of the Mackenzie Basin.

The Basin floor and parts of the Ewe Range and eastwards are mapped as Outstanding Natural Landscape in the Canterbury Regional Landscape Study (BMP and LA 1993). However interpretation of the text indicates the ranges enclosing the Basin were all considered outstanding - “the only area [of the Semi-Arid Mountain Range Landscape Type] that meets ... “Outstanding” status is where the mountains border the Mackenzie Basin. Thus the Wether Range and north end of the Dunstan Range are considered to fall into the Outstanding area.

2.2.3 Property Level Landscape Description

For the purposes of describing the landscape the property has been divided into seven landscape units³ within three major groups:

- 1 Basin Floor Flats
 - (i) *Developed Flats*
 - (ii) *Undeveloped Flats*
 - (iii) *River Margin*
- 2 Piedmont Fans and Lower Hill Slopes
- 3 Dunstan/Wether Range
 - (i) *Killermont Hill*

³ Landscape units are distinct areas delineated by landform, vegetation patterns, and cultural patterns

- (ii) *Frosty Gully*
- (iii) *Manuka Creek*
- (iv) *Lower Hill Slopes*

1 Basin Floor Flats

- (i) *Developed Flats* - a large part of the basin floor outwash plains close to the homestead at the west end have been intensively developed into large green geometrically shaped paddocks with shelter belt planting.
- (ii) *Undeveloped Flats* - most of the basin floor flats remain undeveloped although the original short tussock vegetation is substantially modified. This area includes recent Ahuriri River alluvial plain and outwash surface. A widely arcing terrace scarp defines the alluvial plain, and this scarp merges with a late Quaternary fault-formed ridge. The outwash surface lies between the Ahuriri River and Berwen Road, and is comprised of gravels laid down in the last “Aviemore” glacial period by the Ahuriri River and Omarama Stream.

Vegetation cover is predominantly very low grassland and herb vegetation. Hieracium is dominant, often forming humps amongst patches of bare soil. Sweet briar is extensive over the plain to the north of the highway but is only scattered over the plains to the south. Porcupine shrub forms low, dark, stout mounds on the stony terrace scarp. The general absence of trees is notable, however a few wilding pines are present by the Berwen Road, and a clump of mature exotic trees occur to the north of SH8, marking some kind of former settlement.

As well as extensive grazing, cultural features include two water races winding across the plains towards the east end. These take water from the Ahuriri River to irrigate the flats of the neighbouring property. SH8 runs through the unit along the north side, and Short Cut Road bisects the area from west to east. Two grass airstrips have been formed - one in the southeast corner with associated buildings, and one opposite *Berwen* homestead. A grasslands research area forms a small rectangular enclosure on the Berwen Road. A large gravel pit has been excavated in the scarp adjacent to Short Cut Road, with another near *Berwen*. A power line crosses the plains from *Killermont* homestead to *Berwen* homestead.

- (iii) *River Margin* – a narrow strip of recent alluvial terraces and floodplain borders the Ahuriri River. The river is actively eroding in places, removing former terrace surfaces and cutting new scarps. The landscape is more varied here with terrace surfaces of varying widths and levels, and a mixed vegetation comprising short tussock, exotic grasses (often dense), areas of sparser hieracium and mat/cushion plants, *Carex-Schoenus* wetland, matagouri, grey shrubland on the scarps, sweet briar, willows and lupins.

This area is extensively grazed, including opportunistic grazing of the riverbed outside the lease (no fenced boundary). A power line runs parallel to the highway from *Dunstan Downs* to *Killermont* homestead, and a pylon line crosses the terraces just south of *Dunstan Downs*, marching eastwards across the Ahuriri River.

2 Piedmont Fans and Lower Hill Slopes –

A large area around the base of Killermont Hill and the Dunstan Range, comprising mainly developed and “improved” alluvial fan and lower hill slopes. It has been partly developed into large cultivated paddocks of irregular shape, dissected by small steep-sided gullies filled with scrub; and partly into small hill grazing blocks exhibiting the typical green hue and

vigorous matagouri-sweet briar growth in response to burning, AOSTD and more intensive grazing.

Short tussock is common on the hill slopes, set within a dense green turf of clover, exotic grasses and small herbs. The floodplain of Manuka Creek lies on the south boundary, with a dense grey shrubland, interspersed with sweet briar, *Carex-Schoenus* wetlands and dense exotic grassland.

3 Dunstan/Wether Range

- (i) *Killermont Hill* - a large, steep hill rising above the homestead to an altitude of 1464m asl, with a smooth, rolling, tussock-covered summit. Active erosion is not widely evident and the hill is generally well vegetated (albeit by depleted tussock grassland).

On the mid to lower slopes, the pre-dominant vegetation cover is modified short tussock with a significant shrub component due to repeated burning, grazing and AOSTD. Hieracium and native mat-cushion plants are common, forming a low grey green turf. Grey scrub is also extensively present either in dense clumps (e.g., in gullies) or forming an open scrub cover across the slopes. Tall tussock grassland pre-dominates over the upper slopes and summit, with occasional patches of scree, bedrock outcrop, and grey scrub in gullies. The tussock cover is generally depleted, forming an open cover of speckled appearance. Dense grey shrubland including bracken is associated with the bluff area near the highway, growing over the talus apron and amongst the rocks.

The area is grazed as one large block and two much smaller blocks - one situated on the lower slopes by the north boundary, and the other adjacent to Frosty Gully on the southeast side. Several very small deer-fenced paddocks have also been created along the base of the hill on the southeast side. A 4WD track is readily visible zigzagging up the southeast aspect and up a ridgeline to the top. A pylon line crosses the northernmost corner.

- (ii) *Frosty Gully* - this unit comprises a large valley formed on the east side of the Dunstan Range (Frosty Gully). The north side of Frosty Gully is a series of deep gullies and narrowly rounded spurs topped by rounded summits, and this is complemented by a mosaic of pale ochre patches of bare soil, light grey patches of fresh scree, darker patches of older scree, and vegetation. The central part of Frosty Gully is relatively rugged country with extensive bedrock outcrops forming steep bluffs. To the south, the slopes are smoother and more rolling, though still steep.

Tall tussock grassland is the dominant vegetation cover particularly over the eastern faces south of Frosty Gully. Grey shrubland is present in gullies at mid to lower altitudes. A special feature of the area is remnant totara-celery pine forest over the base of the slope on the true left of Frosty Gully. A much smaller remnant remains on old scree on the lower slopes to the south of Frosty Gully.

This landscape unit is extensively grazed in one large and one smaller block with the mid to lower east-facing slopes separated from Frosty Gully. A 4WD track runs up each of the peripheral ridges to the range summit.

- (iii) *Manuka Creek* – the property boundary runs along the true left side of Manuka Creek, a small east-flowing tributary of Omarama Stream. The head of the valley is the top east side of the Wether Range, where it joins the Dunstan Range. The very steep topography is dissected with a number of small gullies and a few larger valleys. Rock outcrops are common, but generally the slopes appear smooth, mantled with scree and colluvium.

Tall tussock is the pre-dominant vegetation cover. Dense colourful subalpine shrubland covers the lower slopes upstream of the cone. Cassinia and snow totara form extensive cover over some slopes, giving a rich ochre to olive green hue. Downstream, grey shrubland is dominant along the valley floor. Scattered totara exists over the mid to lower slopes on the west side of the fan and on the slope just above it. Upslope, prostrate dracophyllum forms extensive reddish brown patches. Mosses and lichens, snow totara, dracophyllum and other prostrate woody species and native herbs form a low colourful vegetative layer cloaking the scree beneath, dotted with tall tussock.

The range is very extensively grazed in one large and one smaller block. A subdivision fence runs up the west side of the alluvial fan and up the spur above the fan to about 1100m contour then it runs east to the spur that separates this unit from the Frosty Gully unit, and then down that spur to Manuka Creek. A 4WD track winds up Manuka Creek with an extension up the fan and east up on to the fenced spur. The valley track continues to climb in a very visible zigzag pattern (mainly on the neighbouring property) up a spur at the head of the valley to the summit of the Wether Range. It then goes along the summit of both the Wether and Dunstan Ranges up to where the fenced spur reaches the range summit.

- (iv) *Lower Range Slopes* - a small area of steep greywacke hill country just below the eastern range slopes to the south of Frosty Gully. Substantially modified and “greened” by burning, grazing and AOSTD. This area includes the small conical hill, 753 m *asl*.

2.2.4 Visual values

Visual values of a landscape can be considered in two ways; firstly by inherent visual values, and secondly by visibility from public places. The former relates to what the landscape actually looks like, regardless as to whether it is publicly visible or not. The latter assumes that landscapes seen from public areas will have more values for more people, and be significant in forming the widely held view of the landscape.

2.2.4.1 Inherent Visual Values

Mid to high altitude areas

The higher parts of the Dunstan Range are highly natural looking areas with high coherence, intactness and legibility. The uniform tussock cover allows every detail of the underlying landform to be seen with clarity and allows interplay of light and shadow highlighting even small details. The natural patterns created by the combination of different elements of pale fresh scree, darker stable scree, and plant communities impart a high visual quality. In addition, some of the landforms have a distinctive appearance, e.g., the shelving topography south of Frosty Gully. The resultant visual contrasts between elements (e.g., rugged, deeply shadowed rock contrasting with fine textured soft tussock) form strong images.

The summit area has simple sweeping landforms, impressive expanses of shattered rock; patterned ground created by peri-glacial processes and richly coloured vegetation found hidden amongst the rocks in this seemingly barren landscape. Excellent panoramic views are also gained from the summit: north-west up the Ahuriri valley, east across the Mackenzie Basin, south along the Wether and St Bathans Ranges, southwest along the Dunstan Range and Dunstan Creek valley, and west across the ranges between Longslip Creek valley and Lake Hawea.

Low altitude areas

Within the more modified landscape of the lower country, the totara forest remnants are significant natural features, especially where associated with scree and talus forming strong visual images.

The rock bluff adjacent to SH8 with its associated dense, mixed native shrubland and talus deposits is another notable natural feature.

The outwash plains are impressive in a broad sense for their scale, simplicity and homogeneity. The long, curving scarp marking transition from outwash to more recent river terrace is an impressive landform, and the fault-formed ridge is a clearly visible and intriguing feature. The absence of trees is notable and essential for the special landscape quality of the plains. However the vegetative cover of low mat and cushion plants (especially hieracium), exotic grasses and sweet briar lacks the inherent visual quality imparted by the uniform short tussock grassland cover found on other outwash surfaces in the Mackenzie.

2.1.4.2 Visibility from Public Places

Much of *Killermont* is visible from public places. The most significant views are from SH8, which passes through the property, and these are described below. Similar views can be gained from the Clay Cliffs conservation area (on the opposite side of the Ahuriri River near the east end of the property) and from two minor local roads (Berwen Road and Short Cut Road).

Views from SH8

- SH8 passes through the northernmost edge of the property. The outwash surfaces, whilst of little visual interest in themselves, are the fore and mid ground for the impressive panoramic views across the Basin to the enclosing ranges. They are critical in imparting the sense of being in a “basin” (in a physical sense), a key attribute of the wider Mackenzie basin. This sense of space is greatest east of the fault trace where views are not inhibited by a highway scarp. Excellent views of the Clay Cliffs badlands feature are also possible from SH8 due to an open foreground. An ever-changing perspective of this feature can be gained for virtually the whole time while crossing the plains of *Killermont*.
- Killermont Hill is highly significant in views from the highway travelling south. North of Omarama, it appears as an integral part of the St Bathans/Wether Range which is clearly perceived as a major enclosing range for the basin, and seemingly a barrier to passage further south. The range can be seen from as far north as the Pukaki Dam on SH8 and also from SH80 near its junction with SH8. It is the backdrop to some impressive views across the basin, and is also the backdrop to the township of Omarama on the north approach. South of Omarama, suddenly much closer and more direct views are gained once past the first stretch of highway bordered by trees. As the highway progresses south, Killermont Hill increasingly dominates the view and forms the skyline. The road passes right underneath Killermont Hill, where there are close and detailed views of the lower hill slopes and the rock bluff feature. Due to the landform arrangement, attention is also focused on the head of Manuka Creek valley.

2.3 Climate

The Upper Waitaki Basin has a continental like climate with hot summers and cold winters and annual, diurnal and extreme ranges in temperature. According to climate records from the NZ Met Service, rainfall is normally evenly spread throughout the year, but there is a wide seasonal and annual variability from year to year. The flats on Killermont fall within a moist

sub humid climate, with annual rainfall somewhere between 530 mm (at Tara Hills) and 750 mm (Ribbonwood Station to the north). With increasing altitude, rainfall increases to more than 900mm on the Dunstan Range. On average, snow falls on 6-12 days each year, the months May through to September having more than one day of snow per month. However, snow may fall during any month (NZ Met. Service. 1983).

The basin enjoys high sunshine hours, averaging 2000-2300 per year (cf. Christchurch which averages 1950). There is no season that can be called frost free, and the months of April to November have, on average, more than 10 days with frost.

2.4 Vegetation

Most of the flat and rolling hill country at the northeast end of Killermont has been developed for farming. Shrubland hangs on some steeper hill slopes, in shallow gullies and along streams. The shrublands increase in size and diversity higher up Manuka Creek, up Frosty Gully and other east draining streams. Shrubland is also found along the north facing slopes and stream gullies above SH 8. Small pockets of Halls totara are found in Frosty Gully, on faces above Manuka Creek, and in a side stream where burning and clearing has reduced its size. Tussock covers the higher slopes, with rockfields and cushion plant communities along the tops.

The backcountry at the head of Manuka Creek is in good condition for this type of country, i.e., steep, rocky, often with thin to skeletal soils and with a dry climate. Typically, aspect is important with the cooler south and easterly faces being more diverse and with a better plant cover than the drier, sunny northerly faces.

2.4.1 Halls totara forest

The Halls totara is an important forest type in this area. McGlone (1998)⁴ states that the scattered pockets of conifer scrub found throughout the southern South Island are relicts of a once more widespread scrub-low forest community. There are few examples of these forests or shrublands left, so all remnants are important. Four areas of Halls totara occur on *Killermont* (see landscape section, map 2) and these are described below.

The largest area of Halls totara (*Podocarpus hallii*) is on stony to bouldery ground and foot slopes near the mouth of Frosty Gully at about 700 m and stretching uphill along several narrow shingle slides. A deer fence passes through the western edge of this forest. The forest is open with large spreading Halls totara up to about 5 to 6 m tall and associated with carpets of snow totara (*Podocarpus nivalis*), matagouri (*Discaria toumatou*), mountain wineberry (*Aristotelia fruticosa*), mountain toatoa (*Phyllocladus alpinus*), porcupine shrub (*Melicactus alpinus*), *Coprosma propinqua*, native broom (*Carmichaelia petriei*) and sweet brier (*Rosa rubiginosa*). Several climbers grow in association with the shrubs. They are *Clematis marata*, *Rubus schmidelioides*, *Muehlenbeckia australis* and *M. complexa*. There is good Halls totara regeneration.

A small patch of Halls totara grows near the head of a stony gully a kilometre south of Frosty Gully and on a bouldery side slope in the next gully south. This latter overlooks a further patch in the next major stream south where the Halls totara is riparian downstream, although appears to have previously grown out onto adjacent slopes where a few trees still grow. A fence runs down the north side of this patch although numerous trees grow to the north of the fence higher up the gully.

⁴ McGlone, M.S.; Moar, N.T. (1998). Dryland Holocene vegetation history, Central Otago and the McKenzie Basin, South Island, New Zealand. *New Zealand Journal of Botany* 36: 91-112.

2.4.2 Shrublands

The diverse shrublands found in Frosty Gully, Manuka Creek, and adjacent hill slopes have important natural values, both as indigenous plant communities, and for the invertebrate, lizard and bird life that they support.

The best shrubland lies up Manuka Creek on the alluvial river terrace and extending uphill and on to adjacent faces and tributary streams. It is diverse shrubland, dominated by matagouri but with many other species, including: *Hebe salicifolia*, *Hebe rakaiensis*, *Olearia odorata*, *Olearia bullata*, *Olearia cymbifolia*, *Coprosma propinqua*, cottonwood (*Ozothamnus fulvida*), native broom, mountain wineberry, porcupine shrub, with some Halls totara and snow totara. Creepers present are: *Clematis marata*, *Muehlenbeckia australis*, *M. complexa*, tutu (*Coriaria sarmentosa*) and *Rubus schmidelioides*. The ferns *Polystichum vestitum* and *Hypolepis millefolium* are prominent in places. Introduced species include: monkey musk (*Mimulus guttatus*) growing in the stream in places, elder (*Sambucus nigra*), occasional sweet brier, and common pasture grasses.

A less diverse, low, matagouri shrubland grows patchily on most of the lower hill slopes and appears to be recovering from past burning activity.

Snow totara shrubland is prominent on all slopes above the upper Manuka Creek, both as scattered round patches and as extensive areas, often with matagouri patches, cottonwood, *Coprosma cheesemanii*, *Leucopogon suaveolens*, golden speargrass (*Aciphylla aurea*), and narrow-leaved snow tussock (*Chionochloa rigida*).

On some of the cold, rocky east to southeast faces at higher altitudes, small areas of *Dracophyllum pronum* dominate or co-dominate with snow tussock and/or mountain fescue.

2.4.3 Grasslands

Below about 900 m where the grasslands have been oversown and top-dressed but not ploughed, native species dominate. Hard tussock (*Festuca novae-zelandiae*) or mountain fescue (*Festuca mathewsii*) generally dominates with the introduced grasses; sweet vernal (*Anthoxanthum odoratum*), and the less common browntop (*Agrostis capillaris*). Mouse ear hawkweed (*Hieracium pilosella*) and white clover (*Trifolium repens*) are common with numerous native herbs, grasses and small shrubs such as: patotara (*Leucopogon fraserii*), *Coprosma petriei*, *Pimelea traversii*, *Pimelea oreophila*, *Raoulia subsericea*, *Anisotome flexuosa*, *Brachyscome sinclairii*, *Wahlenbergia albomarginata*, *Viola cunninghamii*, *Bulbinella angustifolia*, *Geranium sessiliflorum*, *Celmisia gracilentia*, *Scleranthus uniflora*, *Luzula rufa*, *Poa colensoi*, *Rytidosperma pumilum*, *Blechnum penna marina* and mosses. Coral broom (*Carmichaelia crassicaule*) is locally common and *Coprosma cheesemanii* and *Leucopogon suaveolens* sporadic. In places, scattered narrow-leaved snow tussock appears. In the more open, stony places native chickweed (*Stellaria gracilentia*), *Anaphalioides bellidioides*, *Colobanthus strictus* and *Koelaria cheesemanii* are found.

2.4.4 Upper tussockland

In general, snow tussock dominates above about 900 m. On a northeast facing slope at about 1100m, the narrow-leaved snow tussock has a cover of 20-25% and on average is 600 mm tall. The ground here is very stony (up to 50% of ground cover). Other important plants are mountain fescue, golden speargrass, mouse ear hawkweed, blue tussock (*Poa colensoi*), *Raoulia subsericea*, *Pimelea oreophila*, *Scleranthus uniflora*, and king devil hawkweed (*Hieracium praealtum*). *Dracophyllum pronum* occurs in places.

On the ridge top at 1538 m the vegetation is similar, although there is less open area (stones 20-25%) and a greater plant cover. Blue tussock is more important here, and a few additional species such as *Leptinella pectinata*, *Celmisia gracilentata* and *Luzula rufa*. There is a noticeable difference between sunny north or northeast faces and the cooler south to southeast faces. A northeast face at 1500 m was very open with rock and litter comprising about 70% cover, and narrow-leaved snow tussock about 20% cover. Inter-tussock species included *Pentachondra pumila*. By contrast, the east face at the same altitude had a cover of 80% vegetation and only about 15% rock. The snow tussock was slim-leaved (*Chionocholea macra*) (c.20% cover), mountain fescue (c.10% cover), blue tussock (c.5%), *Dracophyllum pronum* (c.25%) and a range of about 25 species present including the relatively rare speargrass *Aciphylla montana* var. *gracilis*, *Hebe buechananii*, *Celmisia viscosa*, *Celmisia lyallii*, *Carmichaelia vexillata*, *Luzula traversii* and *Lycopodium fastigiatum*. In places towards the head of the valley, large coarse scree slides contain only sparse vegetation with snow totara occurring in patches along the edges. At 1400 m hawkweeds become more noticeable and in places the snow tussock is widely spaced with a greater occurrence of mountain fescue.

2.4.5 Cushion vegetation

Along the highest parts of the ridge, generally above about 1600 m but occasionally lower, there are large areas of rockfields, as well as areas of cushion vegetation. Among the angular stones and rocks are found *Dracophyllum muscoides*, *Raoulia hectorii*, *Luzula pumila*, *Poa colensoi*, *Dracophyllum pronum*, *Phyllachne colensoi*, *Hebe buechananii*, *Anisotome flexuosus* and several lichen species. In places where the soil is deeper (e.g., small hollows) slim-leaved snow tussock forms patches, and mats of *Celmisia viscosa* grow. Other plants found on the stony or rocky ground are *Schizeilema hydrocotyloides*, *Colobanthus buechananii*, *Agrostis muelleriana*, *Celmisia laricifolia*, and *Raoulia grandiflora*.

2.5 Fauna

2.5.1 Birds

A total of 33 bird species have been recorded on Killermont Pastoral Lease. This comprises of 6 endemic species, 12 native species and 15 introduced species.

Endemic species: Bellbird, Grey warbler, Paradise duck, NZ Falcon, Pipit, Black fronted tern.

Native species: Australasian harrier, Black shag, White faced heron, Spur winged plover, Grey duck, Welcome swallow, Silvereye, Pied fantail, Pied oystercatcher, Banded dotterel, Pied stilt, Black backed gull.

Introduced species: House sparrow, Hedge sparrow, Starling, Blackbird, Songthrush, Chaffinch, Goldfinch, Greenfinch, Redpoll, Yellowhammer, Skylark, White backed magpie, Mallard duck, Chukor, Rock pigeon.

Important habitats on the Killermont Pastoral Leasehold property include totara forest and shrubland remnants, terraces adjoining the Ahuriri River and the high tops of the Dunstan Range

Terraces adjoining the Ahuriri River

Terraces adjoining the Ahuriri River form the natural boundary of the river as well as providing feeding sites for black fronted tern and banded dotterel, both threatened species. Parts of the property extend into the Ahuriri riverbed, an outstanding Site of Special Wildlife Interest (SSWI). In recognition of the outstanding conservation values a National Water Conservation Order was placed on the Ahuriri River in 1990. The parts of the property that extend into the riverbed provide habitat for a wide range of wetland bird species (list ...).

Birds that utilize the Ahuriri River include the threatened species black stilt (Category A) and wrybill (Category B), black-fronted terns (Category B) and feeding and breeding sites for banded dotterel (Category C species).

2.5.2 Fish

Sites in Manuka Creek were sampled for freshwater fish using an electric fishing machine. Only Brown trout were found in this creek.

Manuka Creek is a permanent water body with a rock and gravel substrate, an average width of 3 meters and an average depth of around 500mm. The stream is in excellent condition with very good water quality and a range of invertebrates suggestive of a stream of high quality.

2.5.2 Invertebrates

2.5.1 Results

Twenty three insect species were recorded from Killermont station and two species of spiders (Appendix 3) or six insect species/hour spent on the property. Comments below are almost entirely restricted to the endemic New Zealand species.

Halls totara shrubland

An introduced aphid (*Aphis*) species was beaten off Halls totara and a solitary crab spider *Diaea* species. In addition to the totara, the forest remnant contained *Hebe salicifolia*, which is uncommon in the district, and plenty of *Muehlenbeckia* creeper so copper butterflies were quite apparent.

One common characteristic insect noted in short tussock grassland by the Halls' totara bush was the small black crickets *Bobilla* species in the brown-top dominated grassland. The metallic green *Parentia* (probably *P. malitiosa*) was present in the grassland by the stream and a smaller muscid (housefly) in the small side creeklet.

Grey shrubland with Cassinia

The shrubland in the upper catchment of Manuka Creek was checked for insects. This site had among the best plant species diversity and shrub plants in the best condition in the four stations visited in the district. The site included more *Hebe salicifolia*, the most extensive *Cassinia* in the district, and bush lawyer *Rubus*, but limited native clematis *Clematis marata*. *Cassinia* supports its own distinctive insect species including seed feeding flies of Tephritidae and gall midges (Cecidomyiidae) and the small cicada like Psyllidae too. Two native bee species were collected off its flowers and immature wolf spiders were beaten from the foliage. However, of more interest was the presence of flat green galls on the tip of the native broom *Carmichaelia petriei*. This is a new host record for gall midges (Dale & Madison 1982, Smith 1961). This broom also had bobbly grey galls (which was probably of a mite).

Freshwater insects

The quality of the creek sampled by the Halls totara forest was high, because even a rapid sampling revealed two stonefly species, which require high quality water as well as two less demanding species of mayfly (Collier & Winterbourn 2000). The Manuka Creek catchment has not been surveyed for caddisflies (Trichoptera) and mayflies (Ephemeroptera) before, but it is likely to have most if not all of 9 caddisfly genera recorded by Environment Canterbury and the 13 species recorded this summer from Omarama/Little Omarama Streams on Berwen and Dunstan Peaks would be present here too.

2.6 Historic

Killermont was once part of the large Omarama run, which was first established, in part, during 1858. The run changed hands in 1866, with an acreage estimated at 181,440 acres. The splitting of the old station commenced in 1915 into Dunstan Downs, Dunstan Peaks, Berwen, Twinburn and Killermont. There are no known historic sites on the property.

2.7 Public Recreation

2.7.1 Physical Characteristics

According to **FMC** guidelines Killermont would be mainly within an “open space” recreational experience zoning. For open space the descriptors are semi-natural grasslands under extensive grazing, accessible by roads, off-road vehicles and foot tracks.

According to **DOC’s** recreation opportunity descriptors Killermont has the primary characteristics of a back-country environment – primarily “4 x 4 drive in”. This means that the property is a modified environment but one that is generally dominated by natural vegetation or landscapes and is natural looking. It is accessible to all terrain vehicles and is traversed mainly by ungravelled roads, or 4 x 4 access. Obvious elements of modification include roads and areas of farming or forestry.

Within the property, three main physical settings can be found – flats, low-to-mid altitude mountain slopes, high altitude slopes and summits. The latter from a recreational view point are the areas of recreational interest.

2.7.2 Legal Access

Legal access is available to Killermont from the Omarama-Lindis Pass Road (State Highway 8), the Berwen Road and Short Cut Road, all of which run through the front of the property. There is no legal access to the back of the property.

2.7.3 Activities

Little is known about current recreation activities on Killermont. Public Access New Zealand made comment in the NGO meeting that access on to the tops through Killermont would make for an excellent day walk from the State Highway, enjoying views out over the Ahuriri, Mackenzie Basin and south into Dunstan Creek and the St Bathans Range. It also provides short access on to the tops of the Dunstan Range and Wether Ranges, for ski-touring sometimes and can be utilised for tramping and day-trips.

PART 3

OTHER RELEVANT MATTERS & PLANS

3.1 Consultation

Meetings were held on 25 September 2001 in Christchurch and 26 September in Timaru with representatives from Federated Mountain Clubs, New Zealand Deer Stalkers Association, Peninsula Tramping Club, Canterbury Conservation Board, New Zealand Mountain Bike Association, Forest and Bird Society, Canterbury University Tramping Club, Opus Consultants, Mount Cheeseman Ski Club, Environment Canterbury, Friends of Lewis Pass, QEII, Pegasus Pig Hunting Club, as well as Public Access New Zealand, Fish and Game Council, QV Valuations, Knight Frank Ltd, Geraldine Tramping Club, 4 WD Club, Temuka Tramping Club, and Environment Canterbury in Timaru to discuss Killermont along with several other properties.

The main issues brought up in the meeting were:

The Wether Range is seen as an important area to be managed by DOC, particularly the tops. Another comment was that it would be great to have walking access from somewhere near the boundary so you can travel along the range and go to Dunstan Downs along the crest from Dunstan Downs. This would be an outstanding day's tramping for a day trip with wonderful viewpoints.

Deer Stalkers Association would like vehicle access on to the property.

3.2 District Plans

Killermont is in the Waitaki District. The proposed Waitaki District Plan was publicly notified in December 1996. Following public submissions and hearings on the proposed plan, the District Plan as amended by Council decisions was released in September 1999. Killermont lies within the Rural S (Rural Scenic) Zone. The Rural Scenic Zone contains areas of the District which have significant scenic values – the high country, rangelands and inland basin areas. The majority of this zone lies above the 400 m contour (a.s.l.).

The Plan establishes what sort of activities are Permitted, Controlled, Discretionary or Non-complying. The Plan also establishes Site Development Standards and Critical Zone Standards for these activities. A permitted or controlled activity that does not comply with any one or more of the Site Development Standards becomes a restricted discretionary activity. However, the Plan has undergone a number of changes in the Rural Scenic Zone following Council's decisions on submissions. The Plan is still under discussion with agencies, individuals and interested parties.

3.3 Conservation Management Strategies & Plans

Killermont pastoral lease lies in the CMS unit known as Waitaki. The key objectives for this unit relevant to tenure review are:

- to seek to protect, maintain and enhance the natural landscapes and natural landscape values of the Waitaki – through appropriate methods such as tenure review and district plans

- to identify the significant indigenous vegetation and threatened species of the unit and to use a range of effective methods to protect the indigenous biodiversity as well as protecting and enhancing the viability of priority threatened species populations and their habitats in the unit.
- For recreation and access the Conservancy’s objectives are to provide new recreational facilities and opportunities by the Department, other organisations and concessionaires where natural and historic resources and cultural values are not compromised, and to liaise with adjacent landholders to resolve conflicts over access for recreation to land managed by the Department.
- To reduce and maintain rabbit and thar densities to levels that ensure their adverse effects on natural values are minimised

Other priorities identified in the CMS that are Conservancy wide and relevant to tenure review on these properties are – to undertake necessary actions to secure the conservation of Category A and B species, including predator control, fencing and habitat protection. The species listed as priority include New Zealand falcon, wrybill, black-fronted tern and banded dotterel.

PART 4
MAPS ETC.

4.1 Additional information

Appendix 1: Invertebrates Recorded From Killermont Station

DIPTERA flies

Cecidomyiidae Gall midges	Herbivores or predators can be rather host specific
Undescribed species	Gall in native broom tip <i>Carmichaelia petriei</i>
Dolichopodidae	
<i>Parentia ? malitiosa</i>	Totara bush site
Muscidae	
<i>Spilogona</i> sp undetermined	Totara bush site
Stratiomyidae Soldier flies	Mainly feed on decomposing vegetation, adults
pollinators	
<i>Odontomyia chloris</i>	<i>Cassinia fulvida</i> flowers
Syrphidae (Hover flies) Aphid predators, decomposers or herbivores, adults pollinators	
<i>Melangyna zealandica</i>	Large hover fly Aphid predator
Tachinidae	Mainly caterpillar parasites
Undetermined species	<i>Cassinia fulvida</i> flowers

EPHEMEROPTERA Mayflies

Leptophlebiidae	
<i>Delatidium autumnale</i>	Totara bush creek tributary of Manuka creek
<i>Delatidium cornutum</i>	Totara bush creek tributary of Manuka creek

HEMIPTERA bugs, aphids, scales, etc.

Aphididae (Aphids)	Herbivores that may transmit plant viruses
<i>Aphis</i> sp. (A)	Halls totara
Aphrophoridae Spittle bugs	Mainly generalised shrub-herb feeders
<i>Philaenus spumarius</i> (A)	Meadow spittlebug Polyphagous includes spaniard, shrubs
Cicadellidae Leafhoppers	Often rather host specific herbivores
<i>Zygina zealandica</i> (A)	
Psyllidae	Hosts often one or a few plants
<i>Trioza discariae</i>	Grey shrubland, from matagouri
Lygaeidae	Can be flower and seed feeders
<i>Nysius huttoni</i>	Grass seed and grass airport, halls totara area

HYMENOPTERA Wasps, bees, ants, sawflies

Apidae (Social bees) - Major pollinators of introduced and some native plants

Apis mellifera (A)

Hives present on flats

B. terrestris (A)

Workers active on vipers buglass plants

Colletidae

Native solitary bees

Leioproctus monticola

Cassinia fulvida flowers

Formicidae

Ants

Omnivores-predators

Monomorium antarcticus Southern ant

In short grassland, totara bush area

Halictidae

Native ground nesting subsocial bees

Lasioglossum sordidum

Cassinia (Ozothamnus) fulvida - cottonwood flowers

LEPIDOPTERA moths, butterflies

Lycaenidae

Lycaena boldarium

Copper butterfly

ORTHOPTERA

Grasshoppers, wetas, crickets, katydids

Acrididae

Grasshoppers

Phaulacridium marginale

tussock grassland

Gryllidae

Crickets

Bobilla sp.

Grass by totara bush

PLECOPTERA Stoneflies

Gripoterygidae

Zelandoperla furcillata

Totara bush N tributary of Manuka creek

Zelandoperla tillyardi

Totara bush N tributary of Manuka creek

ARACHNIDA Spiders

Lycosidae

Immatures

On *Cassinia (Ozothamnus) fulvida* – cottonwood mid Manuka creek

Thomisidae

Crab spiders

Diaea sp. (green) immatures

Beaten from Halls totara foliage/fruit

4.2 Illustrative Maps

4.2.1 Topo/Cadastral

4.2.2 Values