



Crown Pastoral Land Tenure Review

Lease name: Braemar

Lease number: Pt 121

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 2003

DOC CONSERVATION RESOURCES REPORT ON TENURE REVIEW OF BRAEMAR PASTORAL LEASE

PART 1 INTRODUCTION

Braemar is a property of 15,216 hectares situated on the north central perimeter of the Mackenzie Basin. Broadly it comprises the mountain ranges between the Jollie River and Fork Stream (the Gammack Range) and the apron of high moraine down land and terrace to the south of the mountain range. The property ranges in altitude from about 750m to 1500m, with most of it above 900m (i.e. in subalpine or higher zones).

Mt Cook Station (some of which is now retired) adjoins to the northwest. Braemar freehold land adjoins on the western margin. The Tekapo Military Training Area (TMTA) lies to the south. Glenmore Pastoral Lease adjoins to the east. The land above 1500m on the Gammack Range is retired pastoral lease, to be gazetted as Conservation Area.

Braemar lies partly in the Godley Ecological District (Tasman Ecological Region) and partly in the Tekapo Ecological District (Mackenzie Ecological Region). The Mackenzie Ecological Region was surveyed as part of the Protected Natural Areas Programme in 1982/83. Two "Priority Natural Areas" were identified on the property: Landslip Creek (Tekapo 2) and head of Irishman Creek (Tekapo 17). ✓

The Godley Ecological District has not been surveyed so there have been no RAPs identified in this District. ✓

There are currently no protected areas on the property. ✓

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

2.1 Landscape Context

Braemar is situated on the perimeter of one of the most extensive outstanding natural landscapes in the Canterbury Region - the Mackenzie Basin (BMP and LA 1993¹). Some of the ranges enclosing the Basin, including the Gammack Range, have not been included in the outstanding area. They are, however, classified as regionally significant. They are an integral part of the whole Basin landscape and contribute significantly to the landscape qualities of the Basin, providing enclosure and a backdrop. ✓

This 1993 study and a 1992 study by Boffa Miskell Partners² on landscape change in the Mackenzie Basin assessed the basin's landscape values (primarily visual values) and identified a range of key attributes to support its outstanding status.

- numerous geological and biological sites of importance
- it contains some of New Zealand's key features such as Aoraki/Mt Cook
- the presence of glacial lakes
- the clearly expressed landforms, the variety of landforms, their huge scale
- the visual character - the impression of vast openness, strong horizontal emphasis, notable absence of trees, the overwhelming dominance of landform, overall unity, simplicity and coherence of the landscape and high apparent naturalness. The extensive and continuous cover of tussock grassland associations is critical for this visual character (fine texture, soft ✓

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

brown /grey/ochre/straw colours, uniformity, simplicity and low form accentuating landform and allowing rich interplay of light and shadow)

- the area's cultural history ✓

The Basin is perceived as a highly natural landscape. Ecologically, the Basin is in fact considerably modified, with hieracium, exotic grasses and sweet brier widespread. However, the Basin retains very high "natural" qualities because of its overwhelming dominance of natural landform and extensive presence of tussock grassland and shrublands which still retains a component of native species and continues to support a diversity of indigenous insects, lizards and birds. It is also New Zealand's most spectacular illustration of glacial morphology on a grand scale (Molloy 1988). ✓

The Mackenzie Basin landscape is a highly visible one. Much of it can be viewed from state highways in the Basin and from the Canal roads (both important tourist routes). The south end of the Gammack Range forms a large part of the mountainous backdrop enclosing the Basin between the Tekapo and Pukaki valleys. A large part of the high rolling moraine terrain between Fork Stream and the Tasman valley also lies within Braemar. ✓

These areas are highly visible from viewpoints along SH8 (Tekapo to Twizel), SH80 (Mt Cook Road) and the Canal roads. They frame important views of Aoraki. The Braemar road offers an excellent "back country" experience. The Jollie and Fork valleys are largely self-contained landscapes not visible from within the Basin although they drain into the Tasman and Tekapo Rivers. ✓

The Braemar landscape as a whole contains the visual qualities that underlie the outstanding status of the wider Basin landscape. The whole Braemar area is one of the more natural and remote parts of the Mackenzie Basin. There are high to exceptional ecological values over much of the area. About half the property is composed of glacial landforms, which form a large part of the glacial landscape for which the Basin is renowned. A number of significant natural features are present within the property as will be described in the following sections. ✓

2.1.1 Landscape description

2.1.1.1 Regional and district landscapes

At the broadest level, Braemar lies within a band of mountain ranges, valleys and basins running the length of and parallel to the Southern Alps – referred to as an "Intermontane Ranges and Basins Landscape Type" (BMP and LA 1993). The Mackenzie Basin is the largest of these intermontane basins.

At a slightly lower level the Mackenzie basin landscape has been divided into "landscape compartments"³ for study of the landscape. Although the 1992 study and classification system did not cover the ranges north of the Basin floor, it has been extended for this survey to include the whole Braemar area.

Braemar falls into 3 landscape compartments:

1. The Jollie, Fraser and Fork valleys are part of the **Jollie-Fork-Cass Landscape Compartment** - a series of remote, rugged, glaciated mountain valleys of highly natural character rising to well over 2000m. Tussock grassland and subalpine shrublands dominate, as well as alpine, rock and scree communities. ✓
2. The "front" range and high moraine country forms the north end of the **Tekapo Downs Landscape Compartment**. It comprises mainly rolling to hummocky moraines generally ✓

³ A landscape compartment is a visually discrete area. They differ from land systems or other classifications (such as landscape units) in that their emphasis is on the perceived broader landscape. Landscape characteristics within each compartment are generally similar (BMP 1992)

aligned north-south. Tussock grasslands dominate, giving a fine-textured homogenous appearance and sense of large-scale space. Tarns and wetlands are a feature. There is a marked absence of development in much of this compartment. Military training is a distinctive use of the area.

3. The narrow west-sloping moraine area facing into the Tasman valley is a very small part of the Pukaki Landscape Compartment, overwhelmingly dominated by the lake and presided over by Aoraki. Wilding tree spread is a characteristic of this compartment.

2.1.1.2 Property landscape description

Braemar largely comprises an extensive area of high montane/subalpine moraine and kame terrace of rolling, hummocky and flat terrain with numerous wetlands and tarns. This "front country" forms an "apron" around the south end of the Gammack Range. The lower slopes and valley floors of the true left Jollie valley and true right Fork Stream form the "back country". They are large, steep-sided glaciated valleys with much rock and scree.

Tussock communities form the dominant cover. Wetlands are a feature of the moraine along with tarns. Subalpine shrublands dominated by dracophyllum are typical on higher altitude land and cooler aspects. Wilding conifers are prolific over the western part of the property and are gradually spreading southeast.

Obvious cultural modification is limited to a few inconspicuous fences and 4WD tracks. Presence of exotic grasses and depleted, Hieracium-dominated short tussock along with extensive low matagouri is evident only along the lower altitude western margin of the property, closest to the homestead area of developed and improved farmland.

For the purposes of this report the property has been subdivided into nine landscape units.

The units are as follows:

Jollie-Fork-Cass Landscape Compartment

1. Jollie Valley – large, straight, southwest flowing glaciated valley. Very steep and often sheer side slopes comprise a mix of short and tall tussock; grey⁴ and subalpine shrublands; extensive scree; and rock outcrop. Large steep scree cones line the lower slopes. Remnant totara forest is a feature of the valley. A musters hut is the only cultural element.
2. Upper Fork Stream – large, open, glaciated valleys of Fraser and Fork Stream. Very steep side-walls, often sheer to ridge crests. There is more tussock than shrubland compared with the preceding unit. Scree cones line the lower slopes and in places spread out across the valley floor. The wide valley floor is composed of low alluvial terraces and flood plains, patterned by braided stream channels. Moss and cushion/mat plants; short tussock; matagouri; and – in moister places – red tussock, sedges, and browntop cover the stable surfaces. A few faintly marked sections of 4WD track are the only cultural elements.
3. Mt Stevenson Basins – a pair of steep-sided V-shaped tributary valleys descending from cirque basins on the southeast side of Mt Stevenson. Large, low angle fans spread out across the Fork valley floor. Vegetation is similar to preceding unit. No cultural elements are present.

-- could probably have been included in unit 2

4 'Grey Scrub' refers to a mix of small-leaved divaricating shrub species dominated by matagouri, olearia and coprosma, having a bushy, fine-textured grey appearance.

Tekapo Downs Landscape Compartment

4. Braemar Moraine – the large area of high moraine downland between First Creek, Mary Burn and Fork Stream. Tall tussock grassland and extensive wetlands characterise this unit. An inconspicuous stock fence and a faint 4WD track are the only cultural elements.

The unit can be subdivided into six subunits:

- (i) Balmoral Moraine – the area of massive moraine ridges forming corrugated terrain orientated northwest-southeast. Characterised by tall tussock grassland and extensive wetlands. Bisected by Landslip Creek.
- (ii) Mary Burn Trough Wall – ice scoured, moraine-veneered western margin with erratics. Tussock grassland contains scattered wilding pines.
- (iii) Landslip Creek – valley of Landslip Creek cutting southwest across the "grain" of the moraine. Lower section terraced, upper section enclosed by a spectacular pair of free-standing lateral moraines. Matagouri is typical of the lower part of the valley.
- (iv) Irishman Creek Outwash – broad concave outwash surface with extensive wetlands towards eastern margin of moraine.
- (v) Fork Stream Moraine – the eastern margin of the moraine, comprising rolling moraine ridges with more recent latero-terminal moraine from the Fork Stream glacier superimposed over it. Short tussock is more prevalent here.
- (vi) Lower Fork Stream Valley – lower section of the valley, characterised by an impressive curving valley wall formed of glacially smoothed rock and – lower down – latero-terminal moraine. Depleted short tussock grassland is also prevalent in this subunit. Red tussock present on moraine on floor of valley.

5. Braemar Dome – broad, dome-shaped mountain with generally smooth rolling terrain shaped by minor cirque glaciation and peri-glacial processes. Steep side slopes merge with Braemar moraine. Tall tussock, subalpine shrubland and talus form the surface cover. Dissected by the head-waters of Irishman Creek. *- Is this in the reserve land?*

6. Pukaki Kame Terrace – large wide plateau surface lying west of and below Braemar moraine. Characterised by ridges of hummocky moraine separated by flat fluvio-glacial surfaces. Short and tall tussock grasslands cover the area including extensive areas of dense red tussock wetland. Wilding conifers are scattered across the northern half (having been cleared from the southern half), and matagouri and exotic grasses are widely present along the western margin. Tams and "dumps" of large angular boulders are common throughout the moraine areas.

The unit is subdivided into three grazing blocks with fences running east west. Generally inconspicuous 4WD tracks pass through the area. A musterers hut is present on the Mary Burn.

The unit can be subdivided into four subunits:

- (i) Landslip Creek Plateau – the wider higher northern part with the most extensive flat areas and more indigenous cover including large patches of *Celmisia*.
- (ii) Landslip Creek – on the western margin, the creek has incised a large, steep-sided angular gully. Native shrublands are present in the gully.

- (iii) Boltons Gully Plateau – the southern part of the plateau with a consistently hummocky terrain and greater presence of depleted short tussock grassland.
 - (iv) Camp Stream Margin and Mt Cox – the western margin of the plateau, characterised by depleted short tussock grassland, widespread matagouri, and exotic species.
7. Rotten Tommy Hill – large geometrically shaped hill lying between and isolated by First and Second Creeks. Has been scoured by glacier ice and veneered with moraine, the latter deposited in a series of benches across the top surface. Vegetation comprises short and tall tussock, grey and subalpine shrublands, and a spreading population of thick wilding conifers. The deep, angular creek gullies each feature a large rock bluff (e.g. Tomnahurich Rock in First Creek). A stock fence running down into First Creek is the only cultural element.
 8. First, Second and Landslip Creek Valleys – the three southwest-trending high altitude valleys situated between the Jollie Valley and Braemar Dome. Narrow ridges separate the valleys. Surface cover is a mix of tall tussock, subalpine shrublands, wetlands, scree and rock.

Pukaki Landscape Compartment

9. Pukaki Trough – the western margin of the property, comprising the true left mouth of the Jollie valley and the crest of the long glacially scoured and moraine-veneered trough wall forming the immediate Tasman valley. Rolling west-sloping terrain supports a mixed cover of tall tussock, wilding conifers, matagouri, spaniards, and exotic grass – the latter three more widespread around Landslip Creek. Wilding conifers form a dense cover over the Jollie face. A stock fence divides off the Jollie face as a small grazing block.

2.1.2 Visibility

The front country of Braemar is highly visible from a number of viewpoints along SH8 and the Canal roads; from most of SH80; and from parts of the Braemar, Braemar-Mt Cook Station and Godley Peaks roads.

The Gammack Range, Braemar Dome and the high moraine form an impressive backdrop viewed from various perspectives. The distinctive shapes of individual landforms and the way they are arranged forms a vivid and memorable image. The Landslip Creek moraines are a particularly striking element of this composition. Braemar Dome and the Landslip Creek moraines are the subject of the dramatic vista framed by the Irishman Creek Gorge, viewed from SH8 where it intersects the Canal.

The front country is a large and important part of one of the nation's best-known views – that of Aoraki presiding over Lake Pukaki viewed from SH8 and SH80. The Gammack Range and the high moraine along with the Burnett Mountains form the right side of this view, framing Aoraki.

Impressive panoramic views of the high moraine and Braemar Dome are gained from the Braemar Road. The visual simplicity, unity and cohesiveness of this highly natural tussock-clad landscape is striking and there is a strong sense of remoteness.

The Fork and Jollie valleys are largely hidden from public view. The lower Jollie River valley, mainly comprising Rotten Tommy Hill, is clearly visible from SH80.

V

2.1.3 Landscape evaluation

Braemar is remarkable for the consistently high degrees of naturalness and intactness over virtually the whole property. Obvious human modification is very limited. Natural elements, patterns and processes overwhelmingly dominate. Individual landforms, and broader patterns of landform and vegetation remain intact. The area is one of the more natural parts of the Basin floor, enhanced by the fact it is physically and visually integral with the retired areas above it. The absence of fragmenting human modifications means both the "front" country and the valley landscapes are perceived as "whole" natural landscapes, enjoying a strong sense of remoteness.

Much of the Braemar landscape has a high degree of coherence. This is primarily due to the absence of intrusive modifications.

Legibility is also very high over most of the property. This is due to the ubiquitous tussock cover and the freshness of many of the landforms. There are a number of particularly well-defined landforms such as the Landslip Creek moraines, and the large alluvial fans and scree cones in the valleys. The virtual absence of obvious cultural modifications also means the inter-relationships between landforms remain intact and clear to see.

The Braemar landscape is a visually impressive and highly memorable landscape, due to the above qualities. The "front" country has a special landscape character, which makes it particularly memorable. The scale of the area is vast, with a strong sense of remoteness and wide open spaces. The visual unity and simplicity due to the extensive tussock cover over large simple landforms is striking. Tall tussock grassland on a large scale has its own special visual qualities due to its fine soft linear texture, muted colour range, and the way it moves in the slightest breeze. The area possesses a number of distinctive elements – the corrugated ridges of moraine; the extensive wetland strings; the spectacular lateral moraines of Landslip Creek; the Pukaki kame terrace. At a more detailed level there are "visual highlights" – anastomosing wetlands, tarns, rock "dumps", and erratics.

The Fork and Jollie valleys are typical of Canterbury high country valleys but are impressive nevertheless. They are large with obvious glacial moulding and spectacularly steep sides. The visual mosaics of rock outcrop, scree and the various vegetation communities form rich visual images. The valleys also possess striking features – large symmetrical alluvial fans and scree cones; braided stream channels; remnant totara forest.

The only part of Braemar that lacks the high landscape values described above is the western margin. Wilding conifers, induced short tussock and hieracium, exotic grasses, and extensive low matagouri encouraged by fertiliser are more typical of this area. The west-sloping terrain is also visually connected to the more modified landscape of Braemar freehold.

Much of Braemar is highly visible from public viewpoints within the Mackenzie Basin, forming an impressive backdrop. It is the subject of – or an important part of – several major views. The Fork and Jollie valleys are largely hidden from public view. ✓

2.1.4 Vulnerability and threats to landscape values

The most serious and immediate threat is the spread of wilding conifers and/or the establishment of plantation forestry. The environment is demonstrably well suited to growing trees. The establishment of large areas of coniferous forest would have very serious adverse effects on existing landscape (and ecological) values.

Continued sheep grazing is likely to support the existing trend of an increase in the extent of short tussock/hieracium/exotic grasses/matagouri at the expense of tall tussock grasslands and wetlands. Remaining indigenous tussocklands may also tend to become more open with a decrease in inter-tussock diversity. The other problem with allowing on-going stock grazing is the absence of an upper boundary fence. At present stock can graze the whole of the Gammack

Range including fragile alpine grasslands and wetlands, favoured by sheep. Cattle grazing in areas containing tarns or wetlands causes considerable physical damage.

Fire is a threat to natural successional processes, especially in the presence of grazing. The application of fertilizer is a debatable issue. It may encourage existing exotic species to vigorously out-do native species, or it may allow native species to compete more strongly.

2.2 Landforms and Geology

Braemar is on the northern extremity of the Mackenzie Basin, a large structural depression, enclosed by steep greywacke/argillite and semi-schist mountain ranges. The basin floor has been partially filled with gravels, both piedmont deposits coming off the surrounding slopes and extensive moraine and outwash gravels deposited in Pleistocene glacial advances. Both these major groups of landform are represented on Braemar - mountain ranges surrounding the basin, and the basin floor itself.

For descriptive purposes these broad landform types have been subdivided into ten geomorphic units on Braemar.

photos of a plan showing low features would have helped but this is all relevant for purposes

↓

Balmoral Moraine – a large compact area of moraine deposited during the fourth last "Balmoral" glacial advance, lying between 1000 and 1300m. The area is bisected by Landslip Creek, which cuts southwest across the "grain" of the topography. Occasional patches of talus and erratics are present. "Cass" soils have formed over this area. These are weakly weathered silt/sandy loams of low fertility formed over loess and glacial till under cool, wet conditions. They are highly susceptible to frost heave and wind and sheet erosion if exposed.

The area comprises four subunits:

- (i) massive, broadly rolling sub parallel ridges of moraine orientated northwest-southeast forming coarsely corrugated terrain. Surface topography is well weathered and smooth. Many areas are poorly drained.
- (ii) a broad, shallow concave surface to the east representing the position where the Tasman and Godley glaciers met and shared an outwash surface. This area carries the branching main stem of Irishman Creek, incised in small angular gullies.
- (iii) on the eastern margin, an area of broadly rolling smooth ridges oriented to the south with a more youthful southeast oriented moraine ridge superimposed on it by the Fork valley glacier. Minor retreats and advances have formed a series of washboard moraines to detail the younger surface.
- (iv) a steep, planar to broadly convex slope forming the western margin, dropping 140-160m to an adjacent terrace surface. This is an ice-scoured and moraine-veneered trough wall. Several "stair-cased" parallel drainage channels dissect it. They initially drain southeast consistent with the landform pattern, but then turn abruptly southwest across the "grain" of the topography. This is thought to relate to falling ice levels. Erratics are most common on this area.

2. **Pukaki Kame Terrace** – a large plateau surface 2-2.5km wide, narrowing southwards and sloping evenly from 1100m altitude by First Creek to 800m at its south end by Mt Cox. It also falls away to the southwest to the lowest part of the property at about 750m altitude.

This is a large kame terrace formed during the "Mt John" (third last) glacial advance. The plateau surface is a mix of linear ridges of hummocky moraine separated by flat fluvio-glacial surfaces, often poorly drained. Flat surfaces are most extensive over the northern half, moraine hummocks characterise the southern half. Tarns and "dumps" of large angular

boulders are typical of the hummocky moraine. Landalip Creek crosses the surface in a large flat alluvial fan. Towards the western margin, the creek cuts into the plateau forming a large, steep-sided angular gully. "Cass" soils also cover this unit.

3. Pukaki Trough Wall – the glacially scoured and moraine-veneered trough wall formed during the second to last "Tekapo" glacial advance of the Tasman glacier, extending from the Jollie valley to Camp Stream. Elevation ranges from 1000m at First Creek to around 750m at Camp Stream, and descends to 600m on the floor at the Jollie valley. "Cass" hill and "Mesopotamia" soils have formed here. These are fine silt/sand/stony loams developed on loess, gravels and till. Loess is still accumulating. Natural fertility is low, and these soils are also highly susceptible to erosion if exposed.
4. Rotten Tommy Hill – a large geometrically shaped hill isolated by the large angular gullies of First and Second Creek. Altitude ranges from 600m on the Jollie valley floor to 1200m. The "top" surface comprises benched moraines. Rock bluffs are a feature of both First and Second Creek. "Puketeraki" Hill soils characterise the flatter areas - a loamy upland soil formed on greywacke rock and debris, low in natural fertility, and highly susceptible to erosion if exposed. "Kaikoura" steepland soils typify the steep slopes. These develop on greywacke rock and scree and have a weakly weathered, strongly leached nature and a fine loose structure. They erode rapidly if exposed. Minor scree and talus is present.
5. Fork and Fraser Stream Valleys – long, large glaciated valleys with steep side-slopes with extensive scree and bedrock outcrop. Some slopes are sheer to the ridge crest, others break in a rocky mid-slope shoulder to level out in upper-level basins. Large scree cones line the lower slopes and spread out across the valley floor. Some lumpy parts appear to be remnants of large alluvial fans or slides that spread right across the valley floor from the Glenmore (east) side.
Wide terraces, floodplains and low-angle alluvial fans form the valley floor, which is up to 750m wide. Streams follow a braided pattern, visible both as a pattern of dry channels on older stable surfaces, and in modern streams. Valley floor altitude starts at 1050m. "Kaikoura" and alpine steepland soils have formed on this unit on the valley sides. "Tasman" soils have formed on the valley floor on recent alluvium. These are shallow and stony silt/sandy loams, of low to medium natural fertility.
6. Mt Stevenson Basins – two large cirque basins and associated V-shaped valleys on the southeast face of Mt Stevenson, draining southeast into Fork Stream. They are steep-sided with extensive scree and bedrock on their north sides. The dividing ridge ends in a steep planar face, smoothed by glacier ice and a mantle of colluvium. Large, low-angle fans spread out across the valley floor from the valley mouths. "Kaikoura" and alpine steepland soils cover this unit.
7. Lower Fork Stream – a simple, wide, open valley of less rugged form. The valley wall is steep, planar and curves broadly to the southeast, smoothed by glacier ice and colluvium mantle. The lower end is a large latero-terminal moraine. There is minor dissection of the wall at its upper end where gullies have been incised, one with a large low-angle symmetrical fan issuing from it. Rock outcrop also breaks the smooth surface in places. The wide valley floor comprises alluvial floodplain and low terraces, and at the mouth of the valley, subdued moraine. Valley floor altitude begins at 960m. "Kaikoura" steepland and "Tasman" soils typify this unit.
8. Braemar Dome – ^{is it in the TR area?} a large, high, dome-shaped mountain rising to 1910m altitude forms the main part of this unit. Two smaller areas of similar terrain lie to the northwest, separated by Landalip and First Creek valleys, which cut through the terrain. Minor cirque glaciation and periglacial processes have formed broadly rolling topography of steep to moderately steep slope. A deep colluvial mantle smoothes the surface, and rock pavement and talus is common. Rolling ridges are generally oriented northwest-southeast, merging with the Balmoral moraine (Unit 1). "Puketeraki" hill soils have formed over this mountain.

9. Landslip, First and Second Creek Valleys – three long, narrow, south to southwest flowing glaciated valleys. Scree and bedrock outcrop is common. Separating ridges are narrow. Steep scree cones are a common element along the base of the side-slopes. The lower part of Landslip Creek is formed by a pair of spectacular free-standing lateral moraines formed by a valley glacier of the most recent "Birch Hill" glacial advance. "Kaikoura" and alpine steepland soils have formed on the steep slopes, with "Puketeraki" hill soils on the flat sloping floor of First Creek.
10. Jollie Valley – a large, long (25km) and deep glaciated valley with very steep side-slopes with extensive scree and bedrock outcrops. Large scree cones mantle the lower slopes. Towards the upper end, a series of short "stair-cased" benches of moraine veneered across the valley side-slope mark varying glacier levels. "Kaikoura" steepland soils have formed on the lower slopes, with alpine steepland soils above about 1500m. Valley floor altitude is 640m at the lower end.

2.2.1 Significant landform values

The moraine and kame terrace areas are a large and integral part of the extensive array of Pleistocene glacial landforms of the Mackenzie Basin. There are landforms present from four of the five known advances of the Pleistocene glaciers. The large scale, a high degree of naturalness and intactness both of individual landforms and broader patterns; and high legibility of the landforms confers high value to the area. The high moraines have been previously identified as a significant area (Mansergh 1978), because of their unique formation in a colder, wetter environment (within the basin). The moraine area is the largest and highest continuous moraine landscape in the South Island. Similarly this is also the largest area of "Cass" soils, which are not common in the Basin.

The free-standing lateral moraines of Landslip Creek are exceptional examples of their type (Kenny et al 1993). The latero-terminal moraine wall of lower Fork Stream is an impressive feature, and many of the alluvial fans and scree cones are also impressive for their size and symmetry.

Braemar Dome is an unusual landform within the basin (one of only two periglacial dome mountains). Braemar Dome and the moraine area are also the headwaters and main catchment area for Mary Burn and Irishman Creek

2.3 Climate

The Mackenzie Basin has a semi-continental climate, characterised by hot summers and cold winters and in large daily ranges in temperature. Rainfall is normally spread evenly through the year, but there is a wide seasonal and annual variability from year to year. There is also a marked variation in annual average rainfall across the Basin, ranging from over 1800mm per annum in the northwest to as little as 400mm per annum in the southeast. Braemar lies in the wetter northwest part of the Basin, enjoying an annual average rainfall of 1000mm or more. The property lies within the Humid Zone, typified by cool (in the mountains) to mild (higher moraine) to warm (lower country) summers and cold winters. Snow may be on higher ground for many weeks. Dessicating northwest winds are predominant, often at gale force. On average, snow falls on six to twelve 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 (New Zealand Met Service 1983).

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

2.4 Vegetation

Several different plant communities are recognised on Braemar. These are based broadly on landform, altitude, moisture and the influences of farming.

Tall tussock covers most of Braemar, especially the slim leaved snow tussock (*Chionochloa macra*) which forms extensive cover between 1300 and 1600m. Red tussock (*Chionochloa rubra*) dominates the moist gully floors from around 1400m down to the southwest boundary. It also forms more extensive cover below 1200m across the gentle hill-slopes of Braemar Dome and the adjacent plateau of moraine. Dense red tussock is also found on seepages and wet valley floors.

Narrow leaved snow tussock (*Chionochloa rigida*) occurs in a limited zone around 1200m. Hybrids between *C. macra*, *C. rigida* and *C. rubra* occur throughout making species identification and demarcation between tall tussock communities difficult. Tall tussock density is less at lower altitudes, on sunny aspects and in the eastern areas of Braemar. With increasing altitude, tall tussock communities become more natural until higher altitude scree dominates.

Short tussock (*Festuca novae-zealandiae*) tends to be prolific on dry river terraces and as an induced community on dry, lower slopes and moraine below 1200m. On the latter two areas, the short tussock is often associated with a higher percentage of exotic weed species, such as hawkweeds (*Hieracium species*) and grasses.

Throughout Braemar is an outstanding variety of wetlands, including tarns, kettleholes, bogs, swamps and streams. Shrublands are also present, as are scree and fell field communities and several nationally threatened and uncommon plant species are found on Braemar.

Descriptions of plant communities are as follows:

Tussock Communities

Slim Leaved Snow Tussock (*Chionochloa macra*) — 1200m

Slim leaved snow tussock (*Chionochloa macra*) is the major plant community on Braemar and forms extensive cover between 1200m to 1600m. Variation in plant composition and condition result from differences in aspect, climate and the influence of grazing, especially between the steep headwater slopes of the Fork and Jollie Rivers compared to the drier eastern slopes. Nevertheless a number of generalisations can be made.

Typically the best areas are on the southern slopes where *C. macra* forms up to 70% of the cover. On more exposed sites, such as sunny faces and ridge crests, *C. macra* cover is lighter at typically 30% to 40%. In the wetter headwater slopes, shrubland (described later in the text) and scree communities are more common. The broad-leaved snow tussock (*Chionochloa flavescens*) is also present in these areas. Species found through-out include blue tussock (*Poa colensoi*), the daisies (*Celmisia lyallii*, *C. angustifolia*, *C. spectabilis*, *C. gracilentia*, *Brachyglottis bellidiflora*, *B. haastii*), *Dracophyllum pronum*, snow berry (*Gaultheria novae-zealandiae*), *Kelleria dieffenbachii*, dwarf heath (*Leucopogon fraseri*), *Leucopogon suaveolens*, woodrush (*Luzula rufa*), *Gentiana corymbifera*, *Pimella oreophila*, *Raoulia subsericea*, *Scleranthus uniflorus*, mat Coprosma (*C. petriei*, *C. brunnea*), *Anisotome aromatica*, grasses (*Deyeuxia avenoides* and *Rytidosperma sp.*), and club moss (*Lycopodium fasciculata*). Litter and bare ground is common, the latter becoming more pronounced at higher altitude and on sunny slopes.

Narrow Leaved Snow Tussock (*Chionochloa rigida*) — 1000 - 1200m

C. rigida occurs in a narrow zone between the *C. macra* (above 1200m) and *C. rubra* (below 1000m). It is compositionally very similar to the *C. macra* community described above although it tends to be patchier and has a slightly higher abundance of hawkweed and sorrel. The ridge tops, especially the western Braemar Dome slopes, are often dominated by *Celmisia lyallii*. This effect

also extends into the *C. macra* zone at higher altitudes. Patches of fescue tussock (*Festuca novae-zealandiae*) are also common on ridges and on the sunny aspects, although induced vegetation forms a minority of the total cover. Hybrids between *C. macra*, *C. rigida* and *C. rubra* exist throughout this zone.

Red Tussock (*Chionochloa rubra*)

Red tussock lower down.

Red tussock is the dominant community on the lower slopes of Braemar Dome below 1200m and extends across the moraine in the west of the property. The vegetation pattern within this community is similar to that found in *C. rigida*, with the southern slopes having a greater percentage of tall tussock and less bare ground. Greater variation of red tussock cover occurs on the exposed areas and drier slopes, from typically 30-40% to 15-20%. The reduction in red tussock corresponds to an increase in unpalatable vegetation, mat plants and bare ground. The condition of the red tussock community deteriorates with decreasing altitude, eventually resulting in a change from red tussock to an induced short tussock community (with the exception of the wet gullies), although the latter mostly occurs below the southern boundary fence.

The red tussock community that occupies the lateral moraine tends to be drier and more open, with abundant patches of short tussock which become dominant toward the drier southeastern margin. There is a high diversity of native species associated with this area. Common species include woolly moss (*Racomitrium prunosum*), *Raoulia australis*, *R. subsericea*, *Scleranthus uniflorus*, *Poa colensoi*, *Leucopogon fraserii*, *Meuhlenbeckia axillaris*, *Brachyglottis bellidioides*, *B. haastii*, *Celmisia gracilentia*, *C. sessiliflora*, *Craspedia lanata*, *C. uniflora*, the orchids, *Thelymitra longifolia*, *Prasophyllum colensoi*, *Kelleria dieffenbachii*, *Pimelia oreophila*, *Blechnum penna-marina*, *Brachyscome radicata*, *Carmichaelia uniflora*, *Carex breviculmis*, *Luzula rufa*, *Coprosma petriei*, *Pernettya nana* and *Wahlenbergia albomarginata*. Common woody plants include matagouri, *Cassinia leptophylla*, *Dracophyllum uniflorum*, *D. prunum*, *D. kirkii*, and an abundance of the nationally threatened coral broom (*Carmichaelia crassicaule*), especially in the drier and lower south eastern end. The uncommon fern *Botrychium australe* is also present. The exotic species hawkweed (*Hieracium pilosella*, *H. praetum*), brown top (*Agrostis capillaris*), sweet vernal (*Anthoxanthum odoratum*), silvery hair grass (*Aira caryophylla*) are present and become abundant in places especially in drier areas. Chewings fescue (*Festuca rubra*), briar and pines are also abundant, especially along the slopes of the western boundary, but they do occur on the moraine top as well.

Short Tussock Grasslands - alluvial terraces

Short tussock (*Festuca novae-zealandiae*) communities are predominately found on young alluvial terraces of the Fork and Jollie rivers, but are also common on some lower altitude hill slopes and moraine country. The latter two are induced communities, presumably the result of burning and grazing.

Excellent representative examples of short tussock communities on alluvial terraces occur in both the Fork and Jollie River valleys. This community is typified by fescue tussock at less than 15% with an extensive covering of the woolly moss (*Racomitrium prunosum*) in between. Other native species present include scab weed (*Raoulia australis*, *R. haastii*, *R. tenuiculmis*), *Scleranthus uniflorus*, *Poa maniototo*, *Epilobium melancaulon*, *Rytidosperma pumila*, *R. setifolium*, *Leucopogon muscosa*, *Meuhlenbeckia axillaris*, *Brachyglottis bellidioides*, *Celmisia gracilentia*, and *Wahlenbergia albomarginata*. Hawkweeds (*Hieracium pilosella*, *H. praetum*), brown top (*Agrostis capillaris*), sweet vernal (*Anthoxanthum odoratum*) and silvery hair grass (*Aira caryophylla*) are sporadic throughout but tend to make up a minor proportion of the total cover. Older terraces tend to be more modified and dominated by exotic grasses, hawkweed, and briar (*Rosa rubiginosa*) especially in the lower parts of both the Jollie and the Fork rivers, although fescue tussock and inter tussock native species can also be abundant in these sites. Pine spread is a particular problem in the lower Jollie and along the western boundary.

Induced short tussock (*Festuca novae-zealandiae*) is common in localised areas throughout Braemar, but especially on sunny faces and at lower altitudes. The main areas of short tussock include the lower flanks of the Fork River (including the eastern corner above Heart Lagoon) and the western margin along Camp Stream. Exotic species are often common in these areas, in particular mouse-ear hawkweed, and can form the dominant cover in some localised areas. However native inter tussock species diversity can also be high. Hard tussock cover varies from 30% in better sites, to around 10% in the poorest sites. Other common species include brown top, sheeps sorrel, blue tussock (*Poa colensoi*), dwarf heath (*Leugopogon fraserii*), sweet vernal (*Anthoxanthum odoratum*) and matagouri (*Discaria toumatou*).

Wetlands

Braemar probably contains the most diverse and extensive range of wetlands found in the Mackenzie Basin. Almost all the gully floors are dominated by red tussock. Red tussock (*Chionochloa rubra*) is dense in these areas and commonly forms up to 70% - 80% of total cover. The inter-tussock species are typically *Sphagnum*, *Ranunculus gracilipes*, *Schoenus pauciflorus*, *Oreobolus pectinatus* and many low herbs, such as *Caltha obtusa* and *Gnaphalium mackayii*, *Juncus articulatus* and *J. conglomeratus* are also present in these areas. Within these wet red tussock corridors are areas of occasional open water similar to those mentioned above. *Empodisma minus*, a plant uncommon to Canterbury is abundant in these areas. Perched wetlands on the terraces above the gullies are also a feature of this area and these form an integral part of the wetland sequences. These tend to be dominated by turf and mat vegetation, such as *sphagnum*, comb sedge (*O. pectinatus*), with various wetland herbs, such as *Ranunculus gracilipes*, *Viola cunninghamii* and *Gnaphalium dellicatum*.

Bogs and seeps occur throughout the gentle hill country of the lower Braemar Dome, but also occur surprisingly high up. Included are several string bogs that form interesting patterns of turf and open water. These communities tend to be very species rich due to the suitable habitat for both small turf species and taller rushes and sedges. At the time of the field visit abundant flowering of the snow gentian, eyebright (*Euphrasia zelandica*) and bladderwort (*Utricularia monanthos*) was a feature of these sites.

Tarns and Kettle Holes

Many tarns and kettle holes are scattered throughout the mixed red/short tussock on the lateral moraine country on the western boundary of Braemar. These vary considerably in size, but most are small. At the time of visit, most of the kettleholes on the higher moraine were dry, with only the larger, lower tarns and kettleholes retaining water.

Varied sedge, rush and turf communities exist on these ephemeral wetlands - some are fringed by tall sedges and rushes (*Carex secta*, *C. virgata*, bog rush, *Juncus gregiflorus*, *J. distegus*), others consist of turf vegetation. Distinct zonation of species due to plant colonisation with retreating water levels is a feature of these wetlands. Plant species diversity is high and different patterns of species dominance exist due their different water-holding capacities. Some of the dominant turf species found in these areas include; *Leptinella meniototo*, *Gallium perpusillum*, *Hypsella rivalis*, *Juncus pusillus*, *Crassula sinclairii*, *Glossostigma elatinoides*, *Epilobium angustatum*, *Carex gaudichaudiana*, *Eleocharis acuta*, *Gnaphalium mackayi*, *G. traversii*, *G. deliticum*, *Agrostis muscosa*, *A. meulleriana*, *Deschampsia chapmanii*, *Lachnagrostis filliformis* and *Plantago triandra*. These species often form extensive patches.

Other common species include; *Parahebe canescens*, *Hypericum japonica*, *Hydrocotyle sulcata*, *H. hydrophila*, *Neopaxia australasica*, adders tongue (*Ophloglossum coriaceum*), *Pratia angulata*, *P. perpusilla*, *Poa lindsayi*, *Stackhousia minima*, *Limosella lineata*, *Coprosma perpusilla*, *Carex flaviformis*, bog rush, and bladderwort (*Utricularia monanthos*).

The threatened species, *Isolepis basilaris*, was abundant around the margins of some of these wetlands.

Weed species are present, especially around the margins, but are also found sporadically though out drier areas. Mouse ear hawkweed, brown top, sweet vernal, and white clover (*Trifolium repens*) are the main weed species, but suckling clover (*Trifolium dubium*), orange foxtail (*Alopecurus aequalis*), jointed rush (*Juncus articulatus*), toad rush (*Juncus bufonius*), soft rush (*Juncus effusus*) and *Juncus conglomeratus* are also locally present. However, weed invasion is predominantly limited to the margins and the majority of these wetlands remain overwhelmingly indigenous in character.

Shrublands

Grey Scrub

- Jollie R. / Fork R. / Landslip Ck

Grey scrub is prevalent on the western margin of Braemar, in particular along the Jollie River and in the tributaries to Lake Pukaki, such as Landslip Creek. Grey scrub is also found in the Fork River valley, but to a lesser extent. These shrublands tend to occupy the lower moisture sites on hill slopes, often on broken coarse rock and scree. It regularly forms impenetrable thickets of small leaf shrubs and climbers (although cover can be sparse on scree). Dominant species include matagouri (*Discaria toumatou*), *Coprosma propinqua*, mountain wine berry (*Aristolotta fruticosa*) and *Corokia cotoneaster*. All are in approximately equal proportions. The climbers *Rubus schmidelioides*, *Muehlenbeckia complexa*, native jasmine (*Parsonsia capsularis*) and *Clematis marata* are common, as is the dwarf mistletoe (*Korthasella clavata*) on shrubs in the lower Jollie River. Other species present include mountain toatoa (*Phyllocladus alpinus*), porcupine shrub (*Melicactus alpinus*), *Melicactus* sp, cottonwood (*Ozothamnus leptophylla*), *Hebe sub-alpina*, *H. salicifolia*, *Coprosma cheesemanii*, *C. taylorii*, *C. rugosa*, coral broom (*Carmichaelia crassicaule*), *C. petriei*, speargrass (*Aciphylla aurea*), snow totara (*Podocarpus nivalis*) and the hybrid between snow totara and hall's totara (*Podocarpus hallii*). Hall's totara, including some large specimens up to 5m in height, is found on several screes in the Jollie River, present with large specimens of broadleaf (*Griselinia littoralis*), and mountain toatoa.

Grey scrub diversity is higher close to stream edges and on rock bluffs where a number of species in addition to those above are found. These include the shrub daisies (*Olearia bullata*, *O. avicenniifolia*, *O. cymbifolia*, *O. odorata*), *Brachyglottis cassinoides*, *Helichrysum intermedium*, *Hebe salicifolia*, porcupine shrub (*Melicactus alpinus*) the native broom (*Carmichaelia australis*), tutu (*Cortaria sarmentosa*) and mountain ribbon wood (*Hoheria tyallii*). A small population of the threatened whipcord hebe (*Hebe cupressoides*) was found in the riparian grey scrub in Landslip Creek, and two plants of the threatened tree daisy (*Olearia fimbriata*) were found in the Jollie River valley. In addition, *Hebe odora*, *Carmichaelia crassicaule*, *Aciphylla aurea*, *A. subflabellata* and *Coprosma intertexta*, listed as sparse (de Lange 1989) can be found on some of the stream edges which drain the Braemar Dome.

Subalpine Shrublands

Extensive areas of subalpine shrublands exist. These mainly occur in the headwaters of the Jollie and Fork rivers. These shrublands appear to be dominated by *Dracophyllum uniflorum* and snow totara with an abundance of herbs and grasses in between (*Celmisia* and snow tussock).

Scree and Boulder Field

Scree and boulder field is predominantly found in the upper reaches of the Jollie and Fork rivers, but patches exist throughout. A number of specialised scree plants were noted, such as *Aciphylla dobsonii*, *Phyllacne rubra*, *Epilobium* sp, and *Raoulia hectorii*. Other more widespread species are also present such as *Poa colensoi*, *Kelleria dieffenbachii*, bristle tussock, and *Colobanthus alicularis*, although many other specialised scree plants are expected to exist in these areas.

Podocarp Forest

Hall's totara (*Podocarpus hallii*), including some large specimens up to 5m in height, is found on several scree and boulder fields in the Jollie River. These sites tend to be small and are often present with large specimens of broadleaf (*Griselinia littoralis*) and mountain toatoa. A Hall's totara, broadleaf and kowhai (*Sophora microphylla*) remnant is also found in the lower section of First Creek.

The area as a whole has an important hydrological function for the region, being a headwater catchment and water storage area for the Mary Burn and Fork River.

Major Weed Threats

Pines – are spreading from Mt Cook station and Coxs Downs to the west and northwest. They are invading the western flank of Braemar, but also are present further east. Wildings are a significant problem already, and threaten important values. Immediate control is critical or the problem will become unmanageable.

Broom – also has potential to become a problem. Small pockets are present in First Creek and in the southwestern corner of the property. Hieracium is abundant throughout, particularly at lower altitudes and amongst short tussock grasslands.

Evaluation

M Braemar station contains an outstanding diversity of natural communities within a large ecologically robust area including a variety of tussocklands, wetlands, shrublands and small forest remnants.

The majority of the property retains tall tussock communities that are highly representative of those that were previously much more widespread in the basin - extensive slim leaved snow tussock cover between 1200 and 1600m; red tussock in moist gully floors, on gentle hillslopes and on moraines, plus areas of narrow leaved snow tussock common in the Forks and Jollie Rivers between 900 and 1200 m, and around 1200m on the Braemar dome.

Of particular importance is the occurrence of sequences of tall tussock communities still intact to relatively low altitudes, and on landforms that have been extensively modified elsewhere throughout the Ecological Region. It is one of the largest and intact areas of tall tussock that occur in sequence across an altitude and moisture gradient that remains in the Mackenzie Ecological Region. These tall tussock communities are in remarkably good condition. There is a high diversity of native inter-tussock species with very few weed species present.

The red tussock community is also very likely the largest of its type in the ecological region, and is the only known site where red tussock cover dominates lateral moraine landforms. The area contains an outstanding range of natural variation, within and between communities. The change from *Chionochloa rubra* to *C. rigida* and *C. macra* with increasing altitude via a hybrid zone between the species is not known elsewhere in the district.

Braemar contains the largest assemblage and most diverse range of wetlands found on any one property in the Ecological Region. This includes dense *C. rubra* swamps, *Carex* swamps, seepages, string bogs, open water, streams, tarns, kettleholes, bogs and riparian wetlands. These wetlands are comparatively un-modified and are important for the hydrological functioning of the region, being headwater catchments and water storage area for the Mary Burn, Irishman Creek and Forks River. These wetlands also provide habitat for threatened and uncommon wetland plants such as wire rush (*Empodisma minus*) and *Isolepis basilaris*.

Montane and subalpine shrublands have been reduced in extent in the Mackenzie basin but are still prevalent in some areas of Braemar, such as in tributary and head water streams. The

occasional Hall's totara remnant is also present, testament to the 'pre-human' forest cover that once covered large areas of the Mackenzie Ecological Region.

2.5 Fauna

2.5.1 Birds

Fauna records and observations made by staff and ornithologists over the last 20 years list a total of 39 bird species recorded on Braemar (Appendix 1). For the endemic species the main habitats these birds are found in are the Forks and Jollie Riverbeds and associated flats (black-fronted terns, black shag, banded dotterel), tarns along the western side of the property (black stilt, black-fronted tern, banded dotterel, black-billed gull as well as a selection of native species), and in shrubland remnants (tomtit, rifleman, grey warbler). Pipits are found across the whole property, and New Zealand falcon are regularly seen over most of the property and are probably nesting in the bluffs of the Jollie River and upper Forks.

2.5.2 Reptiles

The three species that are known from this property are the common gecko (*Hoplodactylus* aff. *maculatus* 'Southern Alps') in rocks, scrub and scree, the common skink (*Oligosoma nigriplantare polychroma*) and McCann's skink (*Oligosoma maccanni*).

2.5.3 Freshwater fish

In the Jollie River koaro (*Galaxias brevipinnis*) are the main fish found. In the Forks River there are koaro, Canterbury galaxiid (*Galaxias vulgaris*), alpine galaxiid (*Galaxias paucispondylus*), long-jawed galaxiid (*Galaxias prognathus*), upland bully (*Gobiomorphus breviceps*) and in the lower reaches brown trout (*Salmo trutta*). The Forks Stream is one of the only braided streams in the area where all these fish species are found together, and, except for the lower reaches, the stream does not appear to have trout – normally a significant threat to native fish.

2.6 Public Recreation

2.6.1 Physical characteristics

Braemar Pastoral Lease contains most of the southern end of the Gammack Range between 800m and 1500m and a wide swathe of rolling moraine and terrace land to the south. The northern section of the property is made up of the steep lower slopes of these mountain lands in the Jollie and Forks River. The property dominates the middle distance views from lookout points in the Tekapo area when looking towards Mt Cook (Aoraki) and is a major part of the landscape on the road to Mt Cook.

According to DOC's recreation opportunity descriptors Braemar has the primary characteristics of a back-country environment. This means the property is a modified environment but one that is generally dominated by natural vegetation and is natural looking.

2.6.2 Legal access

Legal access to the pastoral lease is available from Braemar Road via an unformed legal road near Mt Cox in the far southern corner and a number of other unformed legal roads which traverse the property (marked as black lines on the topo-cadastral map). On the western boundary access is available via the crown river bed of the Jollie River.

2.6.3 Activities

Current recreational use of the Braemar area is low, mainly because of the lack of ^{practical} legal access, but there is potential especially considering the lease adjoins large areas of remote mountainous terrain such as retired land of the Gammack Range and Mt Cook Station, and Mt Cook National Park. Uses of the lease have traditionally been: skiing (cross-country and downhill); tramping and mountaineering; hunting; mountain biking; horse riding; and passive (photography, botanising).

Braemar Dome is a commercial helicopter site for skiing. It is possible to cross-country ski from the Braemar road to the top of Braemar Dome and back in one day.

The terrain of Braemar Dome, Mt Stevenson and the Jollie and Fork Stream valleys offers much for tramping and climbing.

The easier, lower altitude terrain is well-suited to riding and mountain biking. The general landscape and the striking features within it (e.g. tarns, Landslip Creek moraines) provide excellent subject matter for arts-based recreation. The exceptional ecological values are of great interest to recreational botanists, entomologists and ornithologists.

PART 3

OTHER RELEVANT MATTERS AND PLANS

3.1 Consultation

Meetings were held on 25 September 2001 in Christchurch and 26 September 2001 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.

The main issues brought up in the meetings were:

- There should definitely be access up the Jollie and on the Northern side up the Forks River.
- There are high thar numbers but shooters can't get access.
- Tussock grasslands and red tussock which are significant
- Would like access for ski touring.
- Wilding trees are a problem.

3.2 District Plans

Braemar Pastoral Lease lies within the Mackenzie District. Their proposed plan, as amended by Council decisions, was notified in September 1999.

Under this plan Braemar is zoned Rural. The plan identifies one site of natural significance on Braemar - Site 25 "Irishman Creek". Originally linked together as one large site as advocated by the Department of Conservation they are now split into two - one section is over Landslip Creek and closely resembles the original priority natural area" Tekapo 2 and the other is in head of Irishman Creek and is more or less the original priority natural area Tekapo 17.

The District Plan contains a number of rules that apply to sites of natural significance, riparian areas and high altitude areas (areas above 900m).

3.3 Conservation Management Strategies & Plans

Braemar Pastoral lease lies in the CMS unit known as Waitaki. The key priorities for this unit are:

- To identify, maintain and seek to enhance the natural landscapes and natural landscape values of the unit – through appropriate methods such as tenure review and district plans.
- To identify the significant native vegetation and threatened species of the unit and to use a range of effect methods to protect a representative range of Indigenous biodiversity of the unit 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 and 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 the robust grasshopper, black stilt, black-fronted tern and banded dotterel.

PART 4 MAPS, ADDITIONAL INFORMATION ETC.

4.1 Additional Information - Appendices

Appendix 1: Bird species found on Braemar

Endemic species

Kaki/black stilt	<i>Himantopus novaezealandiae</i>
Black billed gull	<i>Larus bulleri</i>
Black fronted tern	<i>Sterna albostrata</i>
Paradise shelduck	<i>Tadorna variegata</i>
Grey warbler	<i>Gerygone lgata</i>
New Zealand falcon	<i>Falco novaeseelandiae</i>
Bellbird	<i>Anthornis melanura</i>
Pipit	<i>Anthus novaeseelandiae</i>
Tomtit	<i>Petroica macrocephala</i>
Rifleman	<i>Acanthisitta chloris</i>

Native species:

Australasian harrier	<i>Circus approximans</i>
Spur winged plover	<i>Vanellus miles novaehollandiae</i>
White faced heron	<i>Ardea novaehollandiae</i>
Welcome swallow	<i>Hirundo tahitica neoxena</i>
Pied stilt	<i>Himantopus himantopus leucocephalus</i>
Australasian shoveler	<i>Anas rhynchos</i>
Grey duck	<i>Anas superciliosa</i>
Black shag	<i>Phalacrocorax carbo</i>
Black backed gull	<i>Larus dominicanus</i>
Pied fantail	<i>Rhipidura fuliginosa</i>

Silvereye
Banded dotterel
Grey teal
Pied oystercatcher

Zosterops lateralis lateralis
Charadrius bicinctus
Anas gibberifrons gracilis
Haematopus ostralegus finschi

Introduced species

House sparrow
Hedge sparrow
Blackbird
Song thrush
Starling
Chaffinch
Goldfinch
Greenfinch
Redpoll
Yellow hammer
Skylark
White backed magpie
Canada goose
Black swan
Chukor
Rock pigeon

Passer domesticus
Prunella modularis
Turdus merula
Turdus philomelos
Sturnus vulgaris
Fringilla coelebs
Carduelis carduelis
Carduelis chloris
Carduelis flammea
Emberiza citrinella
Alauda arvensis
Gymnorhina tibicen hypoleuca

4.2 Photographs

4.4 Illustrative Maps

4.4.1 Topo/Cadastral

4.4.2 Values



(A Stewen 1996)

Wire rush is a distinctive wetland element



(A Stewen 1996)

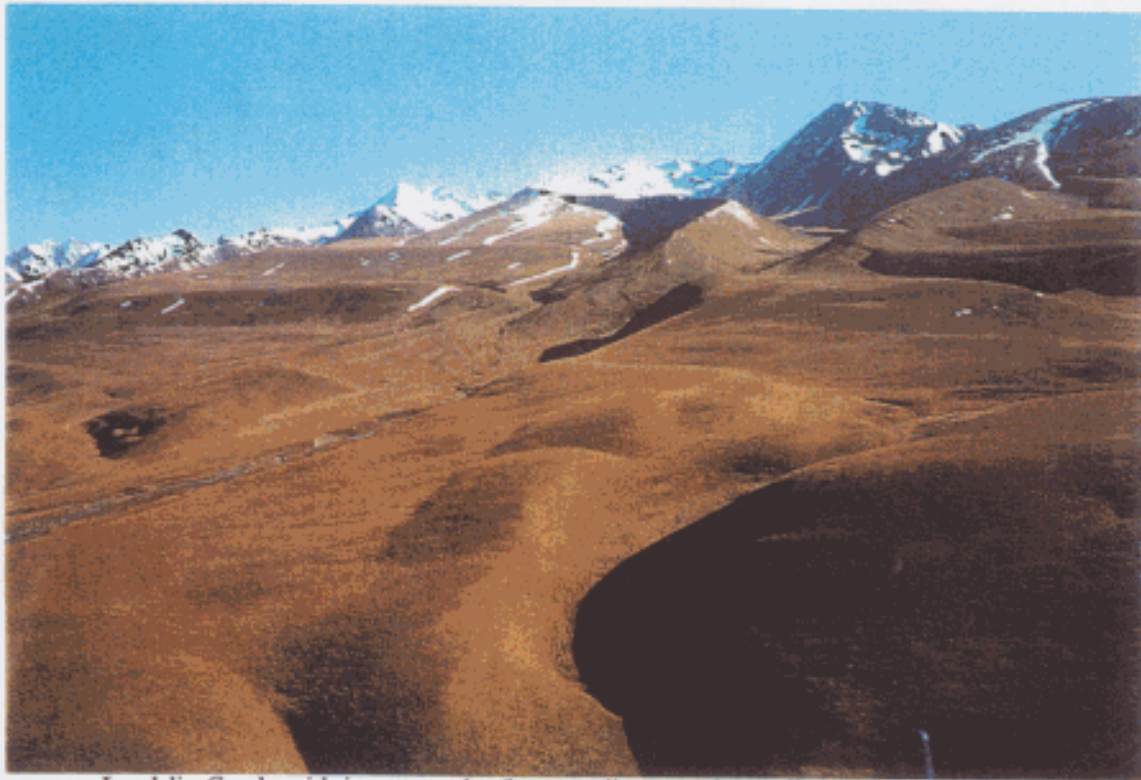
Vast open expanse of tussock-covered landforms on Braemar, as experienced from the Braemar Road



The Jollie Valley

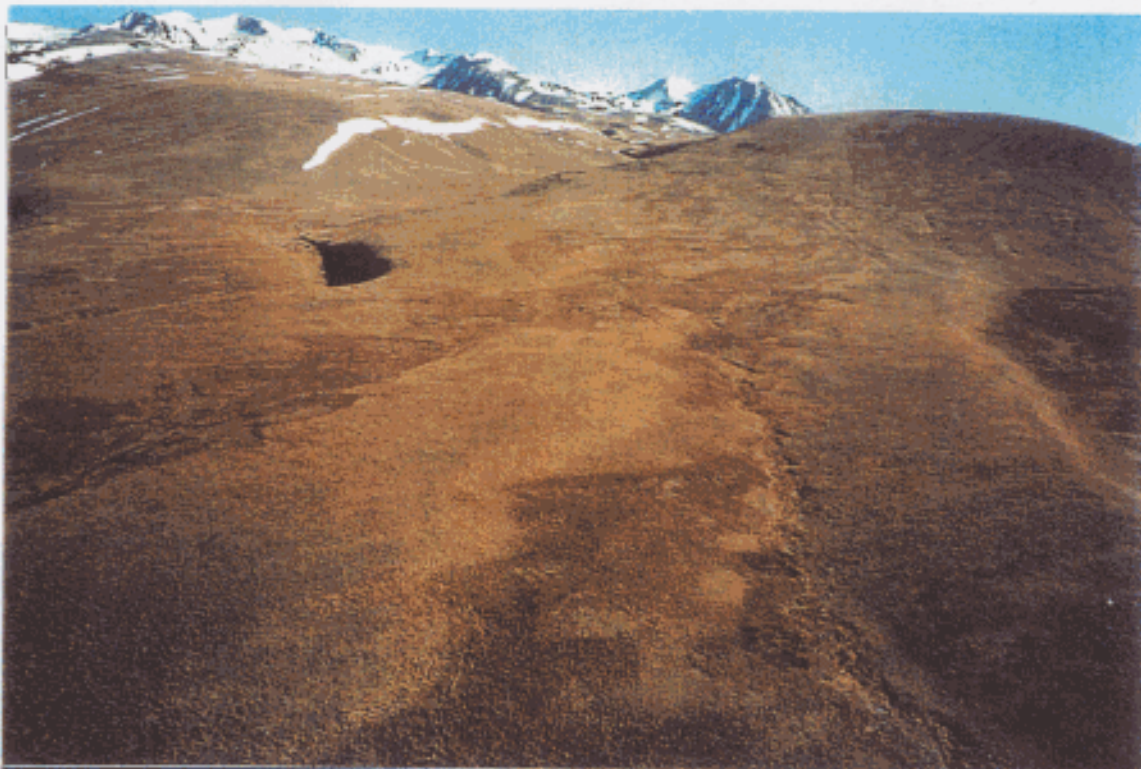


Fork Stream Valley



Landslip Creek, with its spectacular free-standing moraine walls

(A Staven 1996)



Irishman Creek Outwash Surface

(A Staven 1996)

RELEASED UNDER THE
OFFICIAL INFORMATION ACT