

## **Crown Pastoral Land Tenure Review**

**Lease name : TWINBURN**

**Lease number : PO 198**

### **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.

Note: Plans which form part of the Conservation Resources Report are published separately.

These documents are all released under the Official information Act 1982.

**March**

**06**

## DOC CONSERVATION RESOURCES REPORT ON TENURE REVIEW OF TWINBURN PASTORAL LEASE

### PART 1 INTRODUCTION

This report describes the conservation resources of Twinburn Station, a 7861 hectare property located at the northern end of Central Otago. Most of the property is in the headwaters of the West Branch of the Manuherikia River, on the eastern flanks of the St Bathans Range. A small part of the property is in the headwaters of Omarama Stream between the St Bathans and Ewe Ranges at the south end of the upper Waitaki Basin. The western edge of the property runs along the range crest from Mt St Bathans north to a major ridge running south-east to Omarama Saddle. The north boundary extends down this ridge to the Saddle then down the Manuherikia River West Branch, and then west up a prominent ridge to Mt. St Bathans. The altitudinal range within the property extends from around 600 metres to almost 2100 metres.

The adjacent pastoral properties are Dunstan Peaks to the north, Berwen in the east, Dunstan Downs along the western boundary and Michael Peak to the south.

Twinburn is in the St. Bathans Ecological District, within Waitaki Ecological Region. It has not been surveyed under the Protected Natural Areas Programme and there are no protected natural areas present on the property.

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

#### 2.1 Landscape 2.1.1 Landscape context

Most of the property is on the eastern flanks of the St Bathans Range in the headwaters of the Manuherikia River. The remainder of the property comprises an unnamed range (referred to in this report as the "*Saddle Range*") joining the St Bathans and Hawkdun Ranges, and a small part of an alluvial fan of the Omarama Stream. Twinburn is thus part of two separate hydrological and visual catchments – the Manuherikia Valley which flows into Central Otago and the Omarama Stream catchment which flows into the Waitaki Basin.

The Upper Manuherikia Valley is a distinctive and discrete part of Central Otago, a fault-structured range and valley landscape. It is enclosed between the St Bathans and Hawkdun Ranges, which are distinctive, cirque-glaciated, fault-block mountains. The dissected, but more gently sloping dip-slope of the St Bathans range to the west of the Manuherikia contrasts with the much steeper scarp of the Hawkdun Range on the east side of the valley. The Manuherikia valley is characterised by a sense of remoteness and relative naturalness, and the road is little more than a farm track. A special feature of the landscape is the tall tussock cover extending to the valley floor.

The Saddle Range is one of the surrounding ranges that make up the defining edge of the Upper Waitaki/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" (BMP and LA 1993).

## **2.1.2 Landscape description**

### **Land Types**

The Saddle Range and the northern part of the St Bathans Range are broadly synonymous with the 'Semi-Arid to Humid Fault Block Mountain Range Land Type' defined by Lynn for the Mackenzie Basin (see Boffa Miskell and Lucas Associates, 1993). Typical features include broad plateau crests, cirque glaciation, extensive scree and bedrock outcrops, broad rolling spurs and deep, steep-sided stream valleys.

The basin floor flats are within the 'Basin Floor Outwash Plains Land Type'. They are characterised by fluvio-glacial outwash plains, piedmont fans, river/stream floodplains and backswamps.

### **Property Level Landscape Description**

Three landscape units and three sub-units can be recognised on the property.

#### **1. Omarama Stream Flats**

This small unit of alluvial fan and terrace was formed by the Omarama and Little Omarama Streams. It is completely developed with irrigated paddocks, coniferous shelterbelts and some deer paddocks and contains the homestead.

#### **2. Saddle Range**

The "Saddle Range" is a hard-rock mountain range that runs at right angles to, and between the St Bathans and Ewe/Hawkdun Ranges. It is visually continuous with the adjacent range slopes.

Snow tussock grassland is the dominant vegetation, though it is rather open. Grey shrubland is associated with gullies, talus and rock outcrops, while fellfield communities occupy boulderfields at higher altitude. At mid to lower altitudes, over-sowing and topdressing (OSTD), burning and grazing has significantly altered the vegetation, which is dominated by exotic grasses, clovers, hieracium and other herbs. Short tussock remains in patches or scattered through the turf, and tall tussock occurs occasionally. Much of the shrubland has been destroyed, and bulldozed lines have been cut through some remaining shrublands. Extensive regrowth of matagouri is being stimulated by increased fertility and sweet brier is also common. A ribbon of valley floor floodplain supports a mosaic of dense grey shrubs, sweet brier, wetlands and exotic turf.

The vegetation of Omarama Stream Spur has distinct aspect differences. The west side is a mosaic of dense matagouri, green turf, scattered short tussock, and older grey shrubs. Grey shrubland is prominent at the north end and along the base of the spur, while the ridge crest supports a very dense grassy turf. The shady east side is a mosaic of short and tall tussock, spaniards and grey shrubs.

The Saddle Range is extensively grazed and divided into at least four grazing blocks. A well-formed 4WD track winds up the northern spur to Camp Creek Saddle, from where it descends into Central Otago. A 4WD track traverses the range crest and descends to Omarama Saddle, and another extends for about 1km east of Camp Creek Saddle. The top boundary fence follows a bulldozed line. From Omarama Saddle, a well-formed contour

track descends behind Omarama Stream Spur to the Omarama Stream bed. A rough and steep track zig-zags directly down the western boundary spur from Omarama Saddle to the Omarama Stream Valley.

The mid to upper slopes of the Saddle Range have a high degree of naturalness, coherence, intactness and legibility. Exotic species are a minor and visually insignificant component. Tracking and fencing has caused substantial scarring near the saddles but it does not significantly reduce the inherent qualities of the range, when viewed from nearby roads and SH8. In contrast, the mid to lower slopes are very modified and lack the qualities of the higher areas, except for the east side of Omarama Stream Spur. Rock outcrops and mixed shrublands remain notable natural elements.

### 3. St Bathans Range

Twinburn contains a large portion of the eastern side of the St Bathans Range, one of the major fault-block ranges at the northern end of Central Otago, forming a roughly rectangular area 10-11km long by 6-7km wide. Within the lease, altitude ranges from 820m in the valley floor to 2088m asl at Mt St Bathans, the highest peak in Central Otago district. Much of the range crest is over 1800m asl. The block is comprised of three W-E catchments on the true right of the West Branch of the Manuherikia River, which flows south into Central Otago.

The upper part of the range is composed of low-grade semi-schist of the Haast Schist Group (Chlorite Subzone II). The middle and lower slopes are composed of strongly indurated dark grey greywacke and black argillite with localized siliceous grey-blue greywacke. The transition zone is not obvious on the ground, with cirque glaciation, periglacial and fluvial processes being more responsible for topographical changes.

The range is extensively grazed and subdivided into four grazing blocks. A post and wire fence and associated 4WD track traverses the property boundary and major side ridges. A mustering hut and stock yards are located in the valley floor in the upper Manuherikia River.

#### (i) Upper Range

The upper range is characterised by a series of glacial cirque basins immediately east of the range crest. They are very distinctive and visually impressive elements. Most are shallow and more than 1km across with steep sidewalls punctuated by rock bluffs and outcrops, and supporting summer snowbanks. The basins often contain small tarns, the northern basin presenting a vivid image of a large, brilliantly coloured blue-green tarn and contrasting rock bluffs. The basin floors contain patches of alpine tussockland and cushion bogs with small watercourses winding through them. In combination with the masses of shattered angular rock, this produces a rich mosaic of textures and colours. The steep slopes below are dominated by tall tussock and rusty red mats of *Dracophyllum*.

The actual summit is flat to broadly rolling in the north, and more narrow and rocky in the south, Mt St Bathans being the prominent knob in the south. Amongst the extensive fellfield and rocks is a variety of vegetation. Sweeps of tall tussock and alpine grasses occur over the boundary, but have been largely grazed out on Twinburn. Plants of different colours are clumped among or cover the rocks, including *Dracophyllum*, rosettes of *Aciphylla*, cushion plants and lichens.

#### (ii) Mid-Lower Range Ridges and Valleys

Below the summit and cirque basins, the topography changes dramatically to large ridges and deep winding valleys. Side-slopes are dissected, but the overall impression is of very steep slopes plunging into the valleys below. It is a raw, dramatic, large-scale landscape.

Ridge crests are broad to narrowly rounded, and often rock-paved like the range crest. Rock outcrops are common, and pale grey screes and older dark grey talus patches are extensive. At lower altitudes slopes are more angular with sharper ridges and fewer rock outcrops.

The pale ochre of the dominant tall tussock contrasts with the screes and talus. Other plants such as *Dracophyllum*, snow totara, fellfield and cushion plants produce a colourful mosaic in combination with screes, talus, rock outcrops and tall tussock. Grey shrublands are common at mid to lower altitudes in gullies, around rock outcrops and along valley floors.

Burning and grazing has caused a loss of tall tussock and alpine grasses on ridges, reduced tussock density and stature, and increased the cover of cushion plants. Short tussock, spaniard and *Hieracium* occur locally and shrublands have been reduced and often restricted to rock outcrops and talus patches. The lower slopes have been strongly modified by OSTD, burning and grazing. Short tussock, matagouri, green exotic turf and *Hieracium* are common, with scattered stunted grey shrubs. Tall tussocks are patchy or scattered while snow totara on talus patches are distinctive natural features.

### (iii) Valley Floors

The Manuherikia River West Branch has formed a narrow winding floor comprised of older and more recent boulder and gravel floodplains. The stream occupies a boulder bed with occasional patches of smoother gravel. Boundary Creek also occupies a boulder bed but has formed a much wider floodplain where an airstrip is present. Both valley floors are extensively grazed in conjunction with the slopes above.

Vegetation is a mosaic of dense grey shrubland (mostly matagouri), short tussock, exotic grasses, native herbs, scattered shrubs (e.g. *Coprosma* and native broom), ferns, cushion and wetland plants.

With the exception of the lower modified slopes, the landscape of the St Bathans Range block has a very high degree of naturalness, coherence, intactness and legibility. It is a very distinctive and dramatic landscape, rich in vivid images. The cirque basins and summit are very special places with their own character. The fencelines and tracking form significant scars when viewed at close range, and are clearly visible from a distance too. Despite this, the scale and drama of the landscape is overwhelming, and the scarring does not significantly detract from its qualities. In many views from within the area, the fences and tracks are relatively minor elements or not visible at all.

### 2.1.3 Visual values

Visual values are a major component of landscape values and are closely tied to other values (eg, ecological, geological/scientific). They are assessed in terms of inherent visual values and visibility.

#### 1. Inherent Visual Values

These relate to what the landscape actually looks like regardless of whether it is publicly visible. High visual quality is characterised by:

- A high degree of perceived naturalness and intactness.
- Visual coherence (the degree to which the elements fit together, including cultural ones).
- Legibility (the ability to clearly see the different elements and how they were formed).

- Visual distinctiveness/vividness and how memorable it is e.g. (unusual things or contrasting elements).

These attributes also contribute to the special character or "sense of place" of an area. Indigenous flora and fauna and landforms in their natural state are particularly important, though cultural patterns can be very important too.

*(i) St Bathans Range*

The St Bathans Range is largely a very natural looking area with high coherence, intactness and legibility which confer high inherent visual quality. It is a very distinctive landscape with special visual character. The broadly rolling plateau summits and spurs have a smooth, sweeping and simple visual appearance in contrast to the steep rock-studded slopes adjacent. The expanses of shattered rock pavement, ancient talus and younger scree are overwhelmingly dominant on the summit and upper slopes. The cirque basins are sharply defined and highly impressive features. The juxtaposition of steep sidewalls, rock outcrops, snowbanks, basin floors and tarns forms a vivid visual image. Below the cirque basins the range is deeply dissected and forms a very dramatic, large scale landscape. Slopes are steep and sheer and patterned with streaky mosaics of pale grey scree, dark grey talus, rusty *Dracophyllum* and pale ochre tussock. Mottled patterns of olive snow totara and dark talus are also present, and rock outcrops add to the drama.

Vivid images also occur at a detailed level. They include the texture of shattered rock, patterns of stone drains, rich colours of fellfield and rock outcrops contrasting with pale, fine-textured snow tussock.

Along the valley floor of the Manuherikia River there are several rock outcrops with snow tussock which are distinct and attractive natural features.

Excellent views are gained from the summit and main ridges. These include views of the range itself, the nearby Hawkdun Range and more distantly into Central Otago and the Mackenzie Basin.

*(ii) Saddle Range*

The summit and mid to upper slopes are less dramatic than the St Bathans Range. However, the range has high inherent visual quality due to its high degree of naturalness, intactness, coherence and legibility. The lower slopes have been substantially modified and "greened" but there is little apparent modification over the upper slopes. There is visual scarring from tracking and fencing near both saddles, and along the summit but the overall value remains high. The range has some of the rich visual images of the St Bathans Range. These include a plateau summit with rock pavement, extensive rock outcrops, screes, talus and the visual detail of rock and vegetation.

Visually the summit is part of the more dramatic cirque basin landscape on the south side of the range, beyond the property. The east end is visually integral with the distinctive landscape around Little Omarama Saddle.

Excellent views can be gained from here, including those into Otago and Canterbury.

## **2. Visibility**

This refers to the visibility of a landscape or area from public viewpoints such as roads, lookouts and recreational areas. Landscapes that are more regularly seen from public areas have more values for more people.

Most of the Saddle Range is clearly visible from SH8 from just north of Killermont homestead to around 7kms further north, where the Ewe Range screens it from view. Omarama Saddle, Omarama Stream Spur and the lower western slopes not visible. While it is about 12kms away the landforms and tracks are easily identifiable in clear light conditions. The contrast between "greened" lower slopes with dark shrub cover, and the undeveloped upper slopes is obvious in spring and early summer.

The range is readily perceived as one of the enclosing ranges of the basin, with its continuous skyline and the adjacent Little Omarama Saddle and Ewe Range. Attention is drawn to the saddle area or the high point at the other end of the range, and then along the skyline between them. Similar views would be gained from local service roads and, more distantly, from the Clay Cliffs protected area.

The top of the St Bathans Range is visible from these viewpoints too, but it is very and distant. Mt St Bathans and higher points of adjacent ridges can be seen from the Hawkdun Runs Road, particularly on the east side of the Manuherikia Valley. It appears as a high altitude, cirque-glaciated range behind lower rangelands, complementing the Hawkdun Range on the other side of the valley. Similar views would be gained from public conservation areas on the Hawkdun Range, though more of the range would be visible. The St Bathans Range is not visible from any main road or settlement and the Hawkdun Runs Road is little more than a farm track at its northern end. Thus recreationalists are likely to be the main viewers.

The upper Manuherikia valley is a very special landscape due to its relatively undeveloped character and tall tussock on the valley floor. The St Bathans Range forms the mountain backdrop and encloses the valley along its western side. The grey, cirque-glaciated tops and their snowbanks add much to the remote natural character of the valley. The contrast between the gently sloping St Bathans Range and the steeper face of the Hawkdun Range is striking.

#### **2.1.4 Evaluation**

The middle and upper slopes of the Saddle Range, and the St Bathans Range have significant natural landscape values. These areas are part of the distinctive, dramatic and very special transitional landscape between the Canterbury greywacke and Otago schist mountains. Their fault-block structure, cirque glaciation and periglacial processes have created a unique landscape, which these areas are part of. The dominant rock, scree and snow tussock cover is relatively natural and of high inherent landscape value. More special features are the cirque basins, tarns, rock pavements, patterned ground, and the large patches of ancient talus with snow totara.

The Saddle Range is a clearly visible range enclosing the Omarama basin, and is thus part of the Upper Waitaki-Mackenzie Basin, a regionally outstanding landscape. The range skyline is particularly eye-catching and significant.

Although the St Bathans Range is not very visible from public roads, it makes an important contribution to the special and distinctive landscape character of the upper Manuherikia Valley.

The Saddle Range and most of the St Bathans Range are a major part of the visual experience of recreational users of the 4WD routes across Camp Creek Saddle and Omarama Saddle. Small rock outcrops with snow tussock and grey shrubland are detailed features encountered along the Omarama Stream and Manuherikia valley floors.

Excellent panoramic views are gained from the main ridges and crests of both ranges, including simultaneous views into Otago and Canterbury.

## **2.2 Landforms & Geology**

Twinburn Pastoral Lease is comprised of two separate blocks of hill and mountain range country. The Saddle Range block is a west-east trending hill range in the south-east of the Upper Waitaki Basin where it forms one of the enclosing ranges. The second block includes a large portion of the eastern side of the St Bathans Range, within the upper Manuherikia valley of Central Otago. A small portion of the basin floor is also within the lease

These ranges are part of the fault-block mountain ranges that form the transition from Canterbury greywacke to Otago schist. They are distinctive for their cirque glaciation and peri-glacial features. Fluvial and slope processes have shaped the land at mid to lower altitudes.

These provide the framework for describing the landforms and geology, which are subdivided into the following geomorphic units.

### **2.2.1 Mountain Ranges**

#### **(i) Saddle Range**

This is comprised of the north-west and east faces of a 5km long hard-rock mountain range, which runs northeast-southwest and rises from approximately 700m to 1746m asl. It is composed of strongly indurated dark grey greywacke and black argillite of the Torlesse Group (Chlorite Subzone I), with siliceous grey-blue greywacke locally. The range connects the St Bathans and Ewe/Hawkdun Ranges, running at right angles between them.

Slopes are planar to broadly rolling with smooth surfaces between numerous rock outcrops. Rock outcrops are common along the summit and upper slopes. The slopes are dissected several streams draining into Omarama or Little Omarama Streams at the foot of the range. The Range crest is quite broad, and together with the upper slopes is characterised by extensive scree, talus, rock pavement and rock outcrops. The range is generally well-vegetated and lacks level of natural erosion typical of most Canterbury ranges.

Towards the western end of the Saddle Range, the discrete Omarama Stream Spur rises from the valley floor to a distinct saddle where it joins the main range. Side slopes are planar with occasional rock outcrops and small patches of talus and scree.

#### **(ii) St Bathans Range**

Twinburn contains a large portion of the eastern side of the St Bathans Range, one of the major fault-block ranges at the northern end of Central Otago. Altitude ranges from 820m in the valley floor to 2088m asl at Mt St Bathans, the highest peak in Central Otago district. Much of the range crest is over 1800m asl. The block is comprised of three W-E catchments on the true right of the West Branch of the Manuherikia River, which flows south into Central Otago.

The upper part of the range is composed of low-grade semi-schist of the Haast Schist Group (Chlorite Subzone II). The middle and lower slopes are composed of strongly indurated dark grey greywacke and black argillite with localized siliceous grey-blue greywacke. The transition zone is not obvious on the ground, with cirque glaciation, periglacial and fluvial processes being more responsible for topographical changes.



(a) *Upper Range*

The upper range is characterised by a series of glacial cirque basins immediately east of the range crest. Most are shallow and more than 1km across with steep sidewalls broken by rock bluffs and outcrops, and supporting summer snowbanks. Their hummocky floors are largely comprised of ground moraine and shattered rock, and they drop steeply into the valleys below. Minor lateral moraines are sometimes present near the mouths of the basins. Side ridges are often thin, sharp and rocky due to the effects of ice scouring. The basins often contain small tarns.

The actual summit is flat to broadly rolling in the north, and more narrow and rocky in the south. It is thought to be the remains of an ancient uplifted peneplain, where rock outcrops have been weathered under periglacial conditions to a flat pavement of extensive angular rock. Patterned ground such as stone drains, nets and stripes are present. Some are still active but many are relict features.

(b) *Mid-Lower Range Ridges and Valleys*

Below the summit and cirque basins, the topography changes dramatically to large ridges and deep winding valleys. Greywacke and argillite rather than semi-schist dominate the underlying geology. Side-slopes are dissected, but the overall impression is of very steep slopes plunging into the valleys below. Ridge crests are broad to narrowly rounded, and often rock-paved like the range crest. Rock outcrops are common, and screes and older talus patches are extensive. At lower altitudes, slopes are more angular with sharper ridges, fewer rock outcrops and a greater vegetation cover.

(c) *Valley Floors*

The Manuherikia River West Branch has formed a narrow winding floor comprised of older and more recent boulder and gravel floodplain. The stream occupies a boulder bed with occasional patches of smoother gravel. Boundary Stream also occupies a boulder bed but has formed a much wider, well-vegetated floodplain.

### **2.2.2 Basin Floor Plains**

There is a small area of gently sloping alluvial fan comprised of unweathered greywacke and semi-schist gravels, between the confluence of Omarama and Little Omarama Streams.

### **2.3 Climate**

On valley floors and lower slopes the climate is continental like with high sunshine hours, hot summers and cold winters as well as extreme ranges in diurnal temperature. According to climate records from the NZ Met Service for the Waitaki basin, rainfall is normally evenly spread throughout the year, but there is a wide seasonal and annual variability from year to year. On average, snow may fall on lower slopes 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). There is no season which may be called frost free, and the months of April to November have, on average, more than 10 days with frost

On the St Bathans Range strong altitudinal gradients of climate from the basin floors to the alpine summits are the major factor controlling the ecological patterns. Precipitation increases with altitude to 1100-1500 mm on the tops with a winter maximum, much of it falling as snow. Although the rainfall increases with altitude the St Bathans Range is still relatively low compared to other mountain districts. Temperatures below freezing occur all

year round with frequent freeze-thaw cycles. At intermediate altitudes with intermediate temperatures and precipitation, the summer water deficit is reduced or absent, and aspect differences (sunny or shady slopes) and the resulting microclimates dominate the local ecological patterns.

## 2.4 Vegetation

### 2.4.1 Introduction

Most of the property consists of steep hill country above 800m, with very little flat land. There are several cirque basins along the crest of the St. Bathans Range, which drain into the Manuherikia River West Branch via deeply incised streams. Periglacial features such as stone nets, stone stripes, soil hummocks, solifluction terraces and lobes are common at higher altitudes. The soils are shallow and stony especially on steeper slopes, but are locally deeper on the rolling summits, in hollows and in cirque basins.

All the land below about 1200m has been oversown and topdressed (OSTD), much burning and heavy grazing has occurred, and most ridges are tracked and fenced, including the summit. This has contributed to the loss of shrublands and reduced indigenous vegetation cover generally. Hawkweeds are common in lower areas, and extend up to summit ridges in some places. Despite this, indigenous communities dominate at least 80% of the property, largely because of the relatively high altitude. The indigenous plant communities present include short tussockland, tall tussockland, shrubland, alpine cushion-fellfield, alpine bogs and flushes, snow bank communities, scree and rock outcrop associations. Much of the broad summit ridges and basins are comprised of boulderfields, scree or fellfield with a sparse cover of cushion plants and slim-leaved snow tussock (*Chionocholea macra*). The upper slopes have a good snow tussock cover, particularly on shady slopes where it extends to lower altitudes.

### 2.4.2 Shrublands

Diverse shrublands are comparatively rare. The best ones remain in the Omarama Stream valley and adjacent hill slopes, in patches along the rocky sides of the Manuherikia River and in a small side valley upstream of Boundary Creek. This latter valley probably contains the most intact and diverse shrubland remaining on the property in the Manuherikia catchment. A small patch of lowland *Dracophyllum* occurs in the rocky gorge of the most northern tributary. Lower altitude shrublands are dominated by matagouri (*Discaria toumatou*), *Coprosma propinqua* and porcupine shrub (*Melicactus alpinus*). In the Omarama Stream valley *Olearia odorata* (an important invertebrate host plant) is prominent, together with matagouri, *Coprosma propinqua*, and porcupine shrub. Other species include indigenous broom (*Carmichaelia petriei*), mountain wineberry (*Aristotelia fruticosa*), and the scramblers *Parsonsia capsularis*, *Clematis marata* (a threatened species), *Muehlenbeckia australis*, *M. complexa* and *Rubus schmidelioides*. The ferns *Polystichum vestitum* and *Hypolepis millefolium* are locally prominent, as is the introduced sweet brier (*Rosa rubiginosa*). Indigenous skinks are common where the ground is stony.

The same shrub species occur in the Manuherikia valley, though there are few *Olearia odorata*. *Olearia bullata*, a plant more associated with damp ground and stream banks, is more common here. *Coprosma intertexta* (a threatened species) occurs on rocky sites, and the only remaining patch of *Dracophyllum uniflorum* is found in the central tributary of the Manuherikia. This small rocky gorge also contains *Olearia cymbifolia*, *Podocarpus nivalis*, *Pimelea traversii*, *Coprosma ciliata*, matagouri, coral broom (*Carmichaelia crassicaule*) and mountain toatoa (*Phyllocladus alpinus*).

At higher altitudes, especially on shady stony or rocky slopes, *Dracophyllum pronum* forms a low, open shrubland, often with cushion plants.

### 2.4.3 Introduced Grassland

The flat land is dominated by white clover (*Trifolium repens*) and the introduced grasses sweet vernal (*Anthoxanthum odoratum*) and browntop (*Agrostis capillaris*). These plants are also prominent on the wider valley floors and OSTD slopes, especially above the Omarama valley. They are also found in higher altitude sheep camps on ridge tops. In these situations, hard tussock (*Festuca novae-zelandiae*) often occurs as scattered plants and it can be quite prominent on shady slopes, or where shrubland remains. It is prominent in the Manuhierikia valley with silver tussock (*Poa cita*).

Turf areas along stream edges contain a surprising number of small indigenous herbs, grasses and sedges, with up to 30 indigenous species being present. They include *Coprosma atropurpurea*, *Gaultheria parvula*, *Prasophyllum oligantha*, *P. colensoi*, *Pentachondra pumila*, *Bulbinella angustifolia*, *Deyeuxia avenoides*, *Carex kirkii*, *Helichrysum filicaule*, *Ranunculus multiscapus*, *Lagenifera cuneata*, *Wahlenbergia albomarginata*, *Celmisia gracilentia* and *Geranium sessiliflorum*. Sweet vernal, browntop (*Agrostis capillaris*), Yorkshire fog (*Holcus lanatus*) and mouse ear hawkweed (*Hieracium pilosella*) are usually present. Mouse ear hawkweed is prominent throughout the lower country, and king devil (*H. praealtum*) and tussock hawkweed (*H. lepidulum*) are also present. Hawkweeds extend to high altitude, being present in some upper fellfield and cushion plant communities.

### 2.4.4 Short tussock grasslands

Above valley floors, hard tussock or mountain fescue (*Festuca mathewsii*) are dominant where burning and grazing have removed shrublands or snow tussock. Associated indigenous plants include patotara (*Leucopogon fraserii*), *Coprosma petriei*, *Pimelea traversii*, *P. oreophila*, *Raoulia subsericea*, *Anisotome flexuosa*, *Brachyscome sinclairii*, harebell (*Wahlenbergia albomarginata*), *Viola cunninghamii*, *Geranium sessiliflorum*, *Celmisia gracilentia*, *Scleranthus uniflora*, *Luzula rufa*, blue tussock (*Poa colensoi*), *Rytidosperma pumilum*, *Blechnum penna marina*, lichens and mosses. The shrubs, coral broom (*Carmichaelia crassicaule*), *Coprosma cheesemanii* and *Leucopogon suaveolens* occur sporadically. On shady faces scattered narrow-leaved snow tussock occurs, and in open, stony places *Stellaria gracilentia*, everlasting daisy (*Anaphalioides bellidioides*), *Colobanthus strictus* and the grass *Koeleria cheesemanii* are found. At higher altitudes mountain fescue and blue tussock are more prominent. Mouse ear hawkweed and white clover (*Trifolium repens*) are often prominent.

### 2.4.5 Tall tussockland

Tall tussock communities are the most widespread on the property. Narrow-leaved snow tussock (*Chionochloa rigida*) is present on valley floors as scattered plants, and becomes dominant on slopes up to about 1500m on sunny aspects. This community is relatively open due to the stony soils and dry climate. Narrow-leaved snow tussock cover is typically 20-40%, with plants being up to 600mm tall, and rock and stones usually comprise 25-30% cover. In damp sheltered areas such as gullies, tussock cover may be as high as 80%. Associated plants include mountain fescue, *Raoulia subsericea*, mouse ear hawkweed, tussock hawkweed (*Hieracium lepidulum*), patotara, blue tussock, *Rytidosperma pumilum*, *Lycopodium fastigiatum*, golden speargrass, *Celmisia lyallii*, *Celmisia densiflora*, *Leptinella pectinata*, *Celmisia gracilentia*, *Luzula rufa*, *Carex breviculmis*, *Carmichaelia vexillata* (a threatened species), *Carmichaelia crassicaule*, browntop, sweet vernal and sometimes, clover. *Dracophyllum pronum* and cushion plants can be widespread where the soils are especially thin. areas.

In OSTD areas tussock cover is similar, but introduced plants can be very prominent. A typical community cover at 1080 m on a shady face would be narrow-leaved snow tussock 30%, mountain fescue 10%, white clover 25%, mouse ear hawkweed 20%, blue tussock, sweet vernal, brown top, patotara, *Scleranthus uniflora* and matagouri. A similar community is present on sunny faces, but with less snow tussock, clover and more hawkweed. Above Boundary Creek, clover was present beyond 1300m. In a burned area at 1400m, mountain fescue cover was 40 to 45% and snow tussock was much reduced.

Above 1500m thin-leaved snow tussock (*Chionochoa macra*) becomes dominant and occurs in patches to the summit area where the soils are deeper, such as in hollows. It is very heavily grazed in some places. On the exposed ridge tops there is a mixed community of slim-leaved snow tussock, cushion plants and open fellfield.

#### 2.4.6 Wetlands

Bogs are prominent in cirque basins, and a few small wetlands are found on steeper slopes and in gullies. Overall, wetlands are uncommon on Twin Burn compared to the adjacent Dunstan Peaks Pastoral Lease. Bogs are floristically rich with up to 50 vascular species being present, plus mosses, liverworts and lichens. They include *Schoenus pauciflorus*, *Oreobolus pectinatus*, *Coprosma atropurpurea*, *Abrotanella caespitosa*, *Nertera balfouriana*, *Epilobium komarovianum*, *Gaultheria parvula*, *Isolepis aucklandica*, *Lagenifera barkeri*, *Pratia angulata*, *Agrostis pallescens*, *Deschampsia chapmanii*, *Ranunculus cheesemanii*, *Brachyscome* sp. rhizomatus, *Luzula leptophylla*, *Bulbinella angustifolia*, *Uncinia divaricata*, *Agrostis muscosa*, *Ourisia glandulosa*, *Ourisia caespitosa*, *Psychrophylla obtusa*, *Colobanthus apetalus*, *Neopaxia sessiliflora*, *Luzula tenuis*, and *Celmisia sessiliflora*. The tussock-like sedge *Carex muelleri* sometimes forms large straw-coloured patches.

#### 2.4.7 Cushion vegetation and snow banks

Cushion communities occur on exposed ridge tops where the soil is thin. The plants present include *Dracophyllum muscoides*, *Raoulia hectorii*, *Hectorella caespitosa*, *Chionohebe thompsonii*, *Craspedia lanata*, *Kelleria villosa*, *Leptinella pectinata* var. *villosa*, *Luzula pumila*, *Chionohebe densifolia* and *Brachyscome "montana"*. Where the soil is deeper (e.g. in small hollows), mats of *Celmisia viscosa* can cover large areas with patches of slim-leaved snow tussock. Plants of stony or rocky ground include *Schizeilema hydrocotyloides*, *Colobanthus buechananii*, *Agrostis muelleriana*, *Celmisia laricifolia*, *Raoulia petriensis*, *Raoulia grandiflora* and lichens.

Snow banks are not extensive and contain a similar cushion plant community. *Celmisia sessiliflora* is prominent with several tiny plants such as *Lobelia linnaeoides*, *Plantago lanigera*, *Euphrasia zealandica* and several mosses and lichens.

#### 2.4.8 Fellfield, scree and rock outcrops

Ridge tops contain much shattered rock with scattered cushion plants and tufts of slim-leaved snow tussock. Among the angular rocks are *Dracophyllum muscoides*, *Raoulia hectorii*, *Luzula pumila*, *Poa colensoi*, *Dracophyllum pronum*, *Phyllachne colensoi*, *Hebe buechananii*, *Anisotome flexuosus* and lichens. The small scree hebe, *Hebe haastii* var. *humilis* is occasionally present, and large areas contain virtually no vascular plants except for the occasional orange mound of *Aciphylla dobsonii*.

Specialised scree plants include *Ranunculus haastii* (rare in this area), *Ranunculus crithmifolius* and *Epilobium pchnostachyum*. Rock outcrops provide habitat for *Celmisia*

*angustifolia*, *Celmisia densiflora*, *Koeleria cheesemani*, *Epilobium tasmanicum*, *Luzula traversii* and *Epilobium porphyrium*.

#### 2.4.9 Evaluation

Apart from small areas in the Omarama and Boundary Creek Valleys, the entire property is over 800m and less than 15% is under 1000m. Flat land probably occupies less than 5%, the remainder being steep mountain land with extensive screes, talus and fellfield. Extensive burning has occurred and grazing pressure is heavy in places. Most of the flat land has been developed into pasture and OSTD of lower slopes means that clover is present in some communities at 1300m. Despite these modifications, indigenous plant communities are still widespread though their composition is modified and they are reduced in area and stature. Introduced plants are most evident but rarely dominate at lower levels. Snow tussock cover and shrublands have been reduced in area, and cushion-mat communities have also replaced high altitude snow tussock. Aspect differences are important, with the cooler S and E faces being more diverse and having a greater vegetation cover than the drier, sunny north and west faces.

The high cirque basins with their periglacial features are important for developing microhabitats for vegetation. The small flush and bog communities support a diversity of plants including the threatened *Gentiana lilliputiana*, which was found near the boundary with Dunstan Peaks. It may occur in bogs and cirque basins further south as it was relatively widespread on Dunstan Peaks. The threatened *Carmichaelia vexillata* occurs as scattered plants in tussockland on adjacent mountain slopes. *Coprosma intertexta* and *Clematis marata* are both threatened and found in shrublands in the Manuherikia River and Omarama Stream valleys respectively. The type locality for *Raoulia petriensis* is Mt St Bathans, and this plant occurs irregularly in fellfield. The scree buttercup (*Ranunculus haastii*) occurs in very small numbers and is highly palatable. Coral broom is often chewed to ground level by animals and normally is only found irregularly, but on this property it occurs in good numbers though the tussocklands.

Overall there is a good diversity of indigenous plants in tussockland, cushion and fellfield communities. If they were protected from burning and grazing, the snow tussock would slowly regenerate and spread. The *Dracophyllum pronum* shrublands on upper rocky slopes would also be likely to expand.

The diverse shrublands of valley floors and lower hill slopes have important natural values as a community in their own right, and as habitat for invertebrates, lizards and birds. They have the potential to recover and recolonise their former habitat where they have been reduced by burning and grazing. They are part of a community that was once much more widespread (McGlone 1998) in pre-human times i.e. mountain toatoa, bog pine (*Halocarpus bidwillii*), Halls totara, snow totara, other small trees and grey shrub species. Halls totara and bog pine are no longer present here and only one tree of mountain toatoa was seen.

## 2.5 Fauna

### 2.5.1 Birds

Fauna records and observations made by staff and ornithologists over the years record some 30 plus bird species. For the endemic species the main habitats these birds are found in are the stream systems (black-fronted terns, black shag, banded dotterel), along with tomtit, rifleman, grey warbler in the shrubland remnants. Pipits and skylarks occur over most of the property, along with the New Zealand falcon.

### 2.5.2 Fish

A total of 4 freshwater species were recorded on the property, two endemic and two species of introduced fish. These were the Canterbury galaxiid (*Galaxias vulgaris*) and the upland bully (*Gobiomorphus breviceps*). Both were not common in any stream, due to the presence of Brown trout which was common. Brook Char has also been recorded.

### 2.5.3 Invertebrates

In all 158 insect species were recorded at the family level and a further 8 species of spiders were recorded too.

#### *Snow tussock - speargrass Aciphylla aurea*

Grasshoppers and green cicadas were quite prominent among the tussock grassland among the herbivores, while the large and predatory robber fly *Neoitamus varius* complex was also readily seen in this habitat along the valley floor of the west Branch of the Manuherikia valley as well as the north ridge of boundary creek. The dark brown largish weevil *Inophloeus sulcifer* was found on *Aciphylla aurea* seed head, and it is never common in tussock grassland (Barratt pers com.).

#### Pollinators

Five species of solitary, ground nesting native bees were observed at Twinburn and Killermount stations. The larger black Colletidae *Leioproctus hudsoni*, *L. pekanui* and the yellow *L. fulvescens* were present both in snow tussock and in grassland with adjacent shrubs towards the head of the Manuherikia valley. *L. pekanui* was collected off male flowers of *Aciphylla aurea* and was co-dominant with *L. fulvescens* in the snow tussock.

*Lasioglossum maunga* was only detected among the snow tussock in Omarama saddle at 1145m and *L. sordidum* from the grey shrubland/improved grassland site at 710m in the Omarama valley. *L. fulvescens* was collected from sites ranging from 710 to 1145 m in the district and *L. pekanui* from 960 to 1400m. Stable nesting sites could be inferred from the presence of the nest parasite *Pseudophoenus* in the upper Manuherikia valley near the Boundary creek and Camp Creek junctions (Berwen Station) with the West and east branches of the Manuherikia river at 805m. The twig nesting *Hylaeus capitosus* was also collected in the pan traps from the grey shrubland/improved grassland site at 710m in the Omarama valley. *Hylaeus* and *H. sordidum* visit a wide range of flowers in different families, but *Hylaeus* which rely on twig nest sites are generally considerably less common and are another insect species that is associated with grey shrubland in this region.

#### Predators and parasites

The presence of the robber fly indicates the presence of ground dwelling scarabid beetles probably both *Pyronota* and *Odontria* species, on which their larvae probably prey. Adults of the similarly slender and almost as large grey stiletto fly *Anabaryhchus robustus* were less common and the presence of both groups of predators on the North ridge is an excellent indication of a high level of naturalness of the snow tussock invertebrate community. Habitat degradation with further encroachment of *Hieraceum* is likely to eventually reduce invertebrate species diversity considerably, because few herbivore to root feeding species inhabit such vegetation (Macfarlane 2002a).

In addition there were several species of the moth and beetle parasitic Tachinidae flies in this zone visiting male flowers of *Aciphylla aurea*.

*Scree plateau*

The weevil *Lycerobius barbarae* was collected in damaged crowns of *A. dobsoni* on Dunstan Peak less than 5 km away. Thus these plants are likely to be periodically infested with this flightless weevil and this plant resource is an important reserve for these weevils on the upper parts of the Wether and St Bathans ranges. In addition, crowns of both *A. dobsoni* and *Aciphylla aurea* damaged by the weevil were found to have both the little known native earthworm *Megadrillus alpinus* and a large (3.5-4mm long) root gnat (apparently *Bradysia ?brunnipes*).

*Alpine semi-peat area*

Apart from several species of moths, which were not all collected this area had at least one characteristic undescribed species of *Hilara* (dance flies) as well as quite a range of parasitic Tachinidae flies. Also the grey wolf spider *Anetoopsis hilaris* was quite conspicuous in this area. Larvae of the dance flies probably live among the damp peaty soil. The spectrum of flies from this special habitat are to the best of current knowledge excellent examples of species that are alpine species or species that extend into this area. The thrip *Azeothrips neatus* is only known from the Dunstan Range at 1585 m (Mound and Walker 1986) so this is the type of other less obvious insect that could well be present in the alpine zone.

A considerable fauna of small day flying moths and an exciting diversity of distinctive tachinid parasitic flies were observed in this habitat.

*Grey shrubland*

Among the most natural, extensive and diverse grey shrubland on Twinburn was present in the upper Omarama stream upstream from the junction of the southern creek valley, which the modern track to the saddle uses. Pan traps among the improved grassland and mixed grey shrubland there gathered a quite extensive range of insect species including the root aphid *Smynthuroides betae* within a few hours, but nothing too uncommon. Flowering *Olearia odorata* in the upper Omarama stream valley showed there were many thrips and also associated with them a smallish predatory rove beetle (Staphylinidae).

*Leioproctus pekanui* was collected off flowers of grey shrubland with the localized *Olearia cymbifolia* as were *L. hudsoni* and the smaller *Lasioglossum sordidum*. *Olearia odorata* was just beginning to flower and thrips and a smallish rove beetle were common among these flowers. The rove beetles were probably preying on the thrips.

*Freshwater insects*

Stonefly nymphs were readily recovered within the water quite readily from both branches of the Manuherikia river including the predatory *Sternaperla*. Adult stone flies were also collected from the station and district sheltering in *Olearia* shrubs near to the streams. The presence of both *Sternoperla* and *Zelandobius* indicates high quality water as they have MCI values of 9 and 10 respectively (Collier and Winterbourn 2000).

Mayfly diversity in the district includes a new species of *Deleatidium*, which is among the species in inland south Island with a more restricted distribution. The density of *Deleatidium* was high at Boundary Creek and, within a few meters of water, 5 five adult inanga were seen as we crossed the ford.

Three species including at least an undescribed *Hilarempis* species near *ochrozona* were present in the Omarama stream and Manuherikia river catchments during this period.

Further species including the undescribed *Heterophlebus* species found in Dunstan Peaks are likely to be present in the few similar looking seepages in the upper reaches of the Manuherikia valley above 1000m

The Environment Canterbury sample of over 420 insects at 620m on Omarama stream was close to the Twinburn homestead. The dominant insects in the water at this site were *Deleatidium* (mayflies), *Aoteapsche*, *Olinga*, *Pycnocentra* and *Pycnocentroides* (caddisflies) and elmid beetles. This site is downstream of irrigation inlets, but it indicates the likely composition of insects in the larger streams at these lower altitudes. Smaller samples a further 60m upstream on Little Omarama stream (Berwen station, Macfarlane 2002) provided guidance on the *Hydriobiosis* species, which the Environment Canterbury survey recorded to genus.

Only some of the typical and common caddisfly species were collected in water at the top ford of the west Branch of the Manuherikia River and the Boundary creek ford (Appendix 1). The upper Manuherikia river catchment has not received much investigation for caddisflies.

Among the flies, one undescribed, large species of *Spilogona* (Muscidae), which is widespread, was readily apparent but not netted on stones by and within the streams. Pan trapping also confirmed the presence of *Scatella* species (Ephydriidae), but on Twinburn, there are fewer upland springs and wetlands compared to Dunstan Peaks at a similar altitude (above 1500m) to those where the undescribed *Heterophlebus* species was found there (Macfarlane 2002 ) or in the Kakanui Range (Barratt 2002). Three of the more extensive wetland are quite well west of the upper Manuherikia ford, on the upper side of the NW lake and near the road as it leaves the southern tributary creek.

The common red-coated damselfly *Xanthocnemis zelandica* was collected or observed along the full length of the upper Manuherikia valley. The bluish females were seen in flight even at the top of the St Bathans range up to 1750m immediately west of the NW lake. The southern fringe of the North-west lake was checked for the presence of any damselflies in cool conditions in the late afternoon. The vegetation had snow tussock towards the fringe of the shore, but the upper western shore and adjacent wetland might be more suitable for any damselflies. The area was checked, because this was the most suitable area, where the alpine redcoat damselfly might inhabit. No damselfly adults were seen along the shore and no nymphs were active along the lake edge in the water. The creek outlet had only *Austrosimulium* (sandfly larvae) on the stones. The giant dragonfly *Uropetala ?chiltoni* was seen in flight in the upper Manuherikia valley, above the upper ford, but is was not seen as regularly as the damselfly.

Potentially interesting fly freshwater species in the smaller tertiary creeks at higher altitudes (1000-1400m) were not sampled, but catches of flies on Berwen and Dunstan Peak station indicate a range of currently poorly known and undescribed Muscidae and Empididae species are likely to be present in this section of the creeks.

## 2.6 Public Recreation

### 2.6.1 Physical characteristics

Twinburn is located at the southern end of the Wether Range and at the northern end of the St Bathans Range. The upper reaches of the property are a back country environment that is natural and very open. The Manuherikia River is quite an enclosed valley system that is primarily natural.



## 2.6.2 Legal Access

Legal access is available to the property boundary via the Broken Hut Road. From the homestead unformed legal roads follow the northern boundary up Omarama Stream to Omarama Saddle and then south along the boundary of the property down the Manuherikia River. Another unformed legal road cuts up a spur towards the Berwen Pastoral lease to the tops.

## 2.6.3 Activities

Current recreational use is relatively low, largely due to the fact no legal access exists on the property. A number of farm 4WD tracks that traverse the property and one of these tracks allow access over Omarama Saddle into Otago. This access track is available if permission of the lessee is sought. Another 4WD track branches up a spur to the airstrip and goes to the top of the ridge. The tops and valley systems provide access for tramping, Mt biking, horses and cross country skiing.

## 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 a range of umbrella groups and organisations.

The main issues brought up in the meeting were -

- St Bathans Block down to Omarama Saddle should go to DOC. The cirque basins are quite impressive, predominantly natural and relatively remote.
- The area connects to adjacent legal roads. Maps should show legal access adjacent to these areas. There is access up the West Branch up the Manuherikia.
- Essential outcome is to regularise and sort out secure access. From Omarama side it deviates off the road but try and get access. False Omarama Saddle is an access way so there is an assumed access from both North and South.
- Dividing Range is also very attractive.
- These tops are a valuable link from St Bathans to the Hawkdun Range, from the ridge crest on the right to Omarama Saddle.
- Dunstan Peaks looks down onto Omarama Stream.
- Omarama Saddle catchment is still a natural area.
- Left hand half of the property should be reserved with assured public access Omarama Stream and along the crest from both north and south of the property.

#### 3.2 District Plans

Twinburn lies within Waitaki District and Central Otago Districts. The Proposed Waitaki District Plan was publicly notified in December 1996. Under this plan Dunstan Peaks is zoned RS (rural scenic). The Rural Scenic Zone contains areas of the District which have significant scenic values - the high country, rangelands and inland basin areas.

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.

### 3.3 Conservation Management Strategies

Twinburn 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, black-fronted tern and banded dotterel.

## **PART 4**

### **MAPS ETC.**

#### **4.1 Additional information**

##### **4.1.1 References**

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Hitchmough R et al. 2001. Draft threatened species database, November 2001. Department of Conservation, Wellington.

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## **4.2 Illustrative Maps attached**

### **4.2.1 Topo/Cadastral**

### **4.2.2 Values**