

## **Crown Pastoral Land Tenure Review**

**Lease name : REES VALLEY**

**Lease number : PO 311**

### **Conservation Resources Report - Part 1**

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

They are released under the Official information Act 1982.

**March**

**05**

# **REES VALLEY PASTORAL LEASE**



## **CONSERVATION RESOURCES REPORT**

**Department of Conservation**

**June 2004**

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## **PART 1 INTRODUCTION**

This report describes the inherent values present on Rees Valley Pastoral Lease. Rees Valley Pastoral Lease covers an area of approximately 18812 ha on the Richardson Mountains northeast of Glenorchy in Otago. Most of the property is located on the western flank of the Richardson Mountains, in the Rees Valley. A smaller triangular-shaped section is located on the eastern flank of the Richardson Mountains in the Shotover River catchment. The property lies between the head of Rees Valley and the Ox Burn on the western side of the Richardson Mountains, and covers the headwaters of the Flood Burn and Savage Burn on the eastern side. It ranges in altitude from approximately 400 m in the Rees Valley to 2480 m at Mt Ferguson.

Rees Valley Pastoral Lease adjoins Earnslaw Pastoral Lease to the west across the Rees River, Mount Aspiring National Park (Land Unit F38500; 192854 ha) to the northwest and north across the Rees Valley, Shotover Conservation Area (Land Unit E40057; 3500 ha) to the northeast, The Branches Special Lease and The Branches Pastoral Lease to the east, Mt Aurum Recreation Reserve (Land Unit E40059; 9100 ha) to the southeast and Temple Peak Pastoral Lease to the south. Other areas of public conservation land adjacent or near to the property are Invincible Mine Historic Reserve (Land Unit E40060; 2.5 ha) within the property boundary near Invincible Creek, Upper Rees Valley Marginal Strip (Land Unit E40056; 10 ha) along the Rees River at the northern end of the property, Rees River Marginal Strip (Land Unit E40051; 80 ha) along the Rees River on the western property boundary, and Rees Valley Road Stewardship Area (Land Unit E40072; 7.5 ha) at the southwest corner of the property.

Most of the property lies in the Richardson Ecological District, within Lakes Ecological Region (McEwen, 1987). A small northern part of the property, comprising Twenty Five Mile Spur and head of the valley, lies in the Dart Ecological District within Aspiring Ecological Region. No Protected Natural Areas Programme surveys have been undertaken in these ecological districts.

Rees Valley Pastoral Lease lies within a spectacular mountain setting. The property adjoins, and is effectively an enclave within, some of New Zealand's best-known mountain country. Its proximity to the Rees-Dart Walking Track, the high mountain peaks of Mount Aspiring National Park and the Main Divide of the Southern Alps, gives the property an iconic status. The landscapes, vegetation and fauna habitats of Rees Valley Pastoral Lease are contiguous with and complementary to important landscapes, vegetation and habitats within surrounding protected natural areas. These attributes give the property special importance as a high country property and as a natural area for conservation and recreation.

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

### **2.1 LANDSCAPE**

#### **2.1.1 Landscape Context**

Rees Valley Pastoral Lease includes river flats in Rees Valley, moderate to steep mountain slopes on the west side of the Richardson Mountains and rugged terrain on the east side of the mountains in the upper Shotover catchment. Glaciation and subsequent weathering are the principle processes that have shaped the appearance of the landscape. Rees Valley is a steep-sided U-shaped valley and includes ice-sculptured hummocky terrain, ice-scraped valley sides and moraine. The braided Rees River is a major feature on the valley floor. The property is close to the Main Divide of the Southern Alps and on the edge of the wetter beech forest and tussock covered mountains to the west and the drier tussock dominant landscapes to the east. The vegetation within the property reflects this transition and includes areas of montane beech forest, shrubland, sub-alpine scrub, tussockland and alpine plant associations.

For the purposes of this landscape assessment Rees Valley Pastoral Lease is divided into three landscape units, reflecting areas of similar landscape character. For each landscape unit a description of landscape character is followed by a description of the key visual and scenic attributes. The inherent values of each landscape unit are then evaluated against the following criteria:

1. Intactness: the condition of the natural vegetation, patterns and processes, and the extent to which they are modified.
2. Legibility: the extent to which the landscape demonstrates its formative processes.
3. Aesthetic Factors: including distinctiveness (the quality that makes a particular landscape visually striking, such as when contrasting natural elements combine to form a distinctive and memorable visual pattern), coherence (intactness, unity, continuity and compatibility) and things that detract from coherence (intrusions, alterations and disruptions).
4. Historic Factors: historically valued attributes in the context of a high country landscape.
5. Visibility: the visibility of the landscape from public places such as highways, waterways and local vantage points.
6. Significance: the local, regional or national significance of the characteristics and features of the landscape.
7. Vulnerability: the susceptibility of the landscape to deterioration.

## **2.1.2 Landscape Description**

### **Landscape Unit 1, Rees Valley Faces**

#### Character Description

This landscape unit includes most slopes of the Richardson Mountains and valley floor (within the lease) on the eastern side of Rees Valley. The mountain slopes consist of a series of southwest-trending spurs and deep gullies leading off the main ridge of the Richardson Mountains. Although the landscape unit exhibits similar patterns and characteristics, it is separated into three sub-units for further description.

#### *Valley Floor*

The valley floor sub-unit is a narrow section of the river floodplain with low terraces and a complex of backwaters and wet areas. Vegetation is a mix of short tussockland, native herbfield and extensive pasture. The prevalence of exotic grasses decreases up valley. The valley floor retains natural patterns and processes and, in the context of the surrounding mountain slopes, appears as a largely natural landscape. Human-made features are limited to vehicle wheel tracks (mainly on the valley floor), musterers' huts, and the track and signs associated with the Rees-Dart Track. A notable and important feature is the paucity of fences on the valley floor and adjoining slopes.

#### *Lower Mountain Slopes*

The lower mountain slopes (below approximately 1100 m altitude) consist of moderately steep colluvial slopes with slump topography and moraine that appears as a lumpy undulating landform, and benched areas alternating with steeper slopes. Vegetation is a mix of short tussockland and snow tussockland with pasture species and expanding patches of mixed shrubland and grey shrubland. North of Arthurs Creek, a band of regenerating scrub and bracken is more or less continuous on the lower slopes. Down valley are patchy matagouri shrublands, pasture and rock outcrops. Above this, on undulating slopes is pasture, scattered tussock (mainly short tussock) and scattered low shrubs such as inaka. The effects of burning and grazing are evident on the lower mountain slopes. Some areas appear to have been over-sown and top-dressed. Slot gorges separated by open tussockland, shrubland and pasture are a significant feature on the lower slopes. Beech forest and mixed tussockland-shrubland are present within and adjacent to the gorges. Beech forest also occurs in scattered patches and as a large stand at the entrance to the Rees Valley between Invincible Creek and Muddy Creek.

#### *Upper Basins and Mountain Slopes*

This area includes the upper Rees Valley (above Twenty Five Mile Creek) and all basins and mountain slopes above approximately 1000 m altitude. Above the narrow slot gorges, the various tributaries (Twenty Five Mile, Big Devil, Little Devil, Arthurs, Bridges, Invincible and McDougalls creeks) open out to rugged steep-sided sub-alpine and alpine gullies and basins, separated by broad spurs. Upper mountain slopes are notable for their steep slopes, massive block failures, boulderfields, screes and rugged grey/black schist mountain tops. Glacial and peri-glacial imprints are apparent in upper basins. Ice-scraped sides are a feature of mid and upper slopes. Open fissures or rents on steep faces are a characteristic feature.

Vegetation on the upper slopes and basins (above the tree line) includes a diverse mix of snow tussockland, herbfield and sub-alpine scrub within the basins, and alpine fellfield and scree. In the upper Rees Valley, beech forest occupies a large stretch on the northwest face of Twenty Five Mile Spur. Above the beech forest in the upper basin is mixed sub-alpine scrub and tussock. Naturalness in the upper basins and mountain slopes is very high. Evidence of grazing is apparent but all natural patterns and characteristics are intact. Upper

tributaries at the northern end of the lease (Twenty Five Mile and Big Devil creeks) appear in near pristine condition. At the southern end, the Ox Burn is very natural within the steep gorge though appears more modified around Cashes Flat.

#### Visual and Scenic Values

Landscape Unit 1 has spectacular and highly impressive visual and scenic values, primarily due to its location within the western mountain/valley landscape and its proximity to the Main Divide of the Southern Alps. The glaciated landscape has high inherent values derived from dramatic and impressive landforms, highly legible formative processes, and the natural and varied vegetation patterns. While grazing and burning have modified the valley floor and lower slopes, the impact in landscape terms is minimal. The scale and overwhelming grandeur of the mountain valley system dominates and forms a natural landscape of outstanding beauty and significance.

#### Evaluation Summary

<b>Criteria</b>	<b>Value</b>	<b>Comment</b>
Intactness	High	High on upper slopes; medium on lower slopes, though natural patterns and characteristics remain intact and dominant.
Legibility	High	Glacial and fluvioglacial processes are highly legible.
Aesthetic Factors	Very High	Dramatic glacial landforms combined with vegetation patterns within the context of the Main Divide of the Southern Alps create a visually distinctive and impressive landscape.
Historic Factors	Medium	Associated with pastoralism and early mining at Invincible Creek.
Visibility	Medium	Visible from Rees Valley Walking Track.
Significance	High	On the boundary of Mount Aspiring National Park, and with similar values.
Vulnerability	High	Very fragile, especially at higher altitudes.

### **Landscape Unit 2, Shotover**

#### Character Description

This landscape unit lies entirely within the Shotover catchment, though has similar characteristics to the upper mountain slopes of Landscape Unit 1. It includes extremely steep and rugged schist mountain slopes and upper basins characteristic of the Upper Shotover. Steep slabby bare rock with massive block failures and open fissures is interspersed with intact tussockland, herbfield, fellfield and scree. Naturalness is very high, with little or no sign of human activity.

#### Visual and Scenic Values

The dramatic broken topography, schist basement rock and naturalness of the vegetation create a spectacular and highly distinctive landscape. The steep faces, huge slabs of grey rock and scree, and the somewhat sinister appearance of the Richardson Mountains are particularly memorable.

#### Evaluation Summary

<b>Criteria</b>	<b>Value</b>	<b>Comment</b>
Intactness	Very High	All natural patterns and processes are intact.
Legibility	Very High	Glacial and fluvial processes are highly legible.

Aesthetic Factors	Very High	Very distinctive and visually impressive.
Historic Factors	Low	Not significant.
Visibility	Low	Not visible from readily-accessible places.
Significance	Very High	Part of the Richardson Mountains, close to the Main Divide of the Southern Alps and on the boundary of Mount Aspiring National Park.
Vulnerability	High	Very fragile, especially at higher altitudes.

### **Landscape Unit 3, Lower Rees Gorge**

#### Character Description

This comparatively small landscape unit includes the lower eastern slopes at the southern end of the property between the Ox Burn and Invincible Creek. It is located at the entrance to Rees Valley and landform patterns are similar to other lower eastern slopes of the valley. The slopes comprise undulating topography and glacial benches alternating with moderately steep colluvial slopes. Forested gorges of the Ox Burn and McDougalls and Invincible creeks are incised into the mountain slope. Vegetation includes scattered shrubland, bracken and pasture. Some areas appear to be quickly reverting to dense bracken and shrubland with manuka and cabbage tree, while other areas are developed pasture. The area either side of the Ox Burn is fenced into small blocks and is mainly developed farmland with areas of matagouri shrubland. Exotic trees such as willow, poplar and sycamore have spread adjacent to the Rees Valley Road. At the northern end of the landscape unit at the edge of the beech forest is the historic Invincible Mine. Manuka shrubland is prominent on the edge of the beech forest and around the mine.

#### Visual and Scenic Values

Landscape Unit 3 has moderate visual and scenic values. It forms the entrance to Rees Valley and a gateway to Mount Aspiring National Park. It is also part of the wider landscape of the Glenorchy/Head of the Lake area. The remnant and regenerating shrubland is important in terms of retaining indigenous character along the corridor above and below the Rees Valley Road and for providing context to Rees Valley and Mount Aspiring National Park.

#### Evaluation Summary

<b>Criteria</b>	<b>Value</b>	<b>Comment</b>
Intactness	Medium	Previously burnt and grazed, but shrubland is present.
Legibility	Medium to High	Glacial benches, lumpy topography and incised gorges legible.
Aesthetic Factors	Medium	Not visually distinctive or remarkable, but typical of lower eastern slopes of the Richardson Mountains. Visually cohesive.
Historic Factors	Medium	The Invincible Mine is a very significant early mining site.
Visibility	Medium	Visible from Rees Valley Road and the Paradise/Diamond Lake area.
Significance	Medium to High	Part of Rees Valley that is recognised as an area with outstanding landscape values. Forms the entrance to Rees Valley and Mount Aspiring National Park.
Vulnerability	Medium	Vulnerable to further burning and removal of vegetation.



### **2.1.3 Significance of the Landscapes**

All parts of Rees Valley Pastoral Lease, except a small area south of the Ox Burn, have significant inherent landscape values.

Landscape Unit 1 (Rees Valley Faces) has natural characteristics and patterns that are intact. The valley floor and lower slopes are partly modified by grazing and burning, but appear as a natural landscape especially when viewed in the context of the whole valley and in association with the mountains to the west. The upper slopes and basins are highly natural with extremely dramatic and impressive landform and vegetation patterns. The almost seamless appearance and lack of fragmentation of the landscape is very important. The scale, grandeur and magnificence of the mountain/valley system are the most important aspects of the landscape values of Rees Valley Pastoral Lease. The proximity of the property to the Main Divide of the Southern Alps and to Mount Aspiring National Park increases its landscape significance. The landscape unit is a backcountry landscape of outstanding significance.

The significance of Landscape Unit 2 (Shotover) is defined by its scale and alpine splendour. The Richardson Mountains and Shotover catchment are renowned for the sheer ruggedness of the mountain peaks and slopes, the distinctive high-grade schist basement rock and the pattern of vegetation dominated by tussock grassland and alpine plant associations. Naturalness within this area is at the highest end of the scale with almost no sign of human activity. Remoteness and wilderness are important aspects.

Landscape Unit 3 (Lower Rees Gorge) has remnant and regenerating vegetation that is important for the retention of landscape character and providing context for the entrance to Rees Valley and Mount Aspiring National Park.

## 2.2 LANDFORMS AND GEOLOGY

Rees Valley Pastoral Lease covers the western flank and part of the eastern flank of the rugged northern section of the Richardson Mountains, between the Rees and Shotover valleys in west Otago. The property lies between Mt Cunningham (1948 m) close to Rees Saddle in the north and the Ox Burn near Glenorchy in the south. It spans an altitude of over 2000 m, from 400 m in the Rees Valley to 2480 m at Mt Ferguson. Within or on the property boundary are a number of other named peaks including Cleft Peak (2250 m), Lapith Peak (2280 m), Stair Peak (2175 m) and Mt Aurum (2245 m), and several un-named peaks that are higher than 2000 m.

The summit of the Richardson Mountains is characterised by small sharp arêtes separated by broad ice-scoured basins. Small areas of permanent snow are present on higher south-facing slopes and basins. High-altitude slopes on the eastern side of the mountains descend precipitously over 1000 m to the tributary valleys of the Shotover River. Upper slopes on the western side descend slightly less steeply into a series of high-altitude hanging valleys. These valleys end abruptly at the ice-smoothed mid-altitude slopes of the U-shaped Rees Valley. Streams from these valleys then descend these slopes through narrow incised gorges to emerge on the broad floor of the Rees Valley. Glacial benches and post-glacial slump features are prominent on the mid and lower slopes.

Rees Valley Pastoral Lease covers mountainous country characteristic of areas just east of the main divide of the Southern Alps. Mt Earnslaw (2830 m) dominates the mountains opposite the property on the western side of the Rees Valley, and other high peaks of Mount Aspiring National Park lie north of the property. The Richardson Mountains extend south of the property towards Queenstown. The property is drained by tributaries of the Rees and Shotover rivers, both of which eventually drain to the Clutha River.

Basement geology of Rees Valley Pastoral Lease comprises well-foliated slightly-segregated to strongly-foliated segregated schist of the Haast Schist Group. Minor areas of recent alluvium are present on valley floors and areas of scree and colluvium at higher altitudes. The Moonlight Fault System, one of the largest in southern New Zealand, traverses the Shotover Valley east of the property (Turnbull, 2000). Gold is present in the schist rock on the property and has been recovered from alluvial deposits in the area and mined at the Invincible Mine within the property boundary. Scheelite and associated minerals are present in quartz lodes within schist rock on the property (Turnbull, 2000).

Soils on the property are predominantly Haast podzolised yellow-brown earths. Areas of Moonlight yellow-brown earths are present on slopes at the southern end of the property, alpine soils at high-altitude sites and areas of sandy loams on the valley floor. Soil fertility is moderate and drainage good over most of the property (Leathwick *et al*, 2003).

### Significance of the Landforms and Geology

Rees Valley Pastoral Lease covers an area of spectacular mountain country that is contiguous with the high rugged mountains of the Southern Alps and Mount Aspiring National Park. The property is dominated by a series of high peaks and the broad glacially-carved western flanks of the Richardson Mountains. This mountain range forms an imposing barrier between the Rees and Shotover valleys and an impressive backdrop for recreational use of the area. Special features on the property include the ice-carved arêtes and upper valleys, the precipitously steep slopes on the eastern slopes of the Richardson Mountains, the incised stream gorges on the western slopes, the benched mid- and low-altitude slopes, and the broad floor of the Rees Valley on the western boundary of the property.

## 2.3 CLIMATE

Rees Valley Pastoral Lease lies on the edge of an area with a cool wet mountain climate. Rainfall is high (1500 to 5000 mm) and spread throughout the year. Temperatures are mild in summer and cold in winter. Snow lies on upper slopes for several months and small areas of permanent snow are present near the major summits. Winds are predominantly from the northwest and can be strong (Tomlinson, 1976). Slight annual water deficits are experienced on lower slopes (Leathwick *et al*, 2003).

## 2.4 LAND ENVIRONMENTS OF NEW ZEALAND

The property supports five main Level II Land Environments as proposed by Leathwick *et al* (2003). Land Environment R1, covering all high-altitude areas (56% of the property), is described as originally supporting tussockland, herbfield, cushionfield and rock. Land Environment Q1, covering most mid-altitude areas (37% of the property), is described as originally supporting beech forest dominated by mountain beech and to a lesser extent red beech and silver beech, with mountain totara and mountain toatoa forest in the east. Land environments O2 and P5, covering lower slopes in the Rees Valley (5.5% of the property), are described as originally supporting beech forest. Land Environment M2, covering some valley floor sites (0.5% of the property) is described as originally supporting red beech and silver beech forest. Other land environments (N2, O1, O3, O4, Q2, Q3, Q4 and T1) cover the remaining 1% of the property, mostly on the valley floor (Leathwick *et al*, 2003).

Analysis of the extent to which the main Land Environments of the property are represented within existing protected natural areas indicates that approximately 86% of Land Environment R1, 30% of Land Environment Q1, 64% of Land Environment O2, 71% of Land Environment P5 and 26% of Land Environment M2 are protected (Department of Conservation, *unpublished data*, November 2003). However these data should be interpreted with caution, as the predicted extent and suggested vegetation types for each Land Environment have been extrapolated from limited field data.

## 2.5 VEGETATION

### 2.5.1 Ecological Context

The vegetation of the Richardson Ecological District is characterised by patches of montane beech forest in valleys (mostly mountain beech with some silver beech and red beech) with extensive tussockland and shrubland (mostly narrow-leaved snow tussock with *Brachyglottis cassinioides* and inaka) in sub-alpine areas, and fescue tussockland with manuka in montane areas. Other vegetation in the Richardson Ecological District includes patches of bracken fernland, kohuhu-dominated shrubland and podocarp forest (on islands in Lake Wakatipu). The Richardson Mountains support a distinctive and unusually species-rich alpine flora which has affinities with both Central Otago and the Main Divide of the Southern Alps. The Dart Ecological District supports beech forest, sub-alpine scrub and extensive alpine plant communities.

Much of the extant vegetation on Rees Valley Pastoral Lease is indicative or representative of the pre-human vegetation that is likely to have been present. Beech forest would have extended throughout the property up to an altitude of 1100 to 1200 m with shrubland present at rocky sites, wet areas and forest edges. Sub-alpine shrubland is likely to have been more extensive in gullies and above beech forest, particularly on the southern half of the property where it has been replaced mostly by tall tussockland. Valley floor grasslands would have been dominated by indigenous species and have had more extensive matagouri and *Olearia* shrubland. At the southern end of the lease, the composition of forest may have included more podocarp elements, such as those still present on islands in Lake Wakatipu. The eastern part of the property in the Shotover catchment may have included elements of the ‘interior low forest-scrub-grassland zone’ described by McGlone (2001), such as low forest dominated by mountain totara and mountain toatoa.

It appears that the original vegetation of Rees Valley Pastoral Lease was dominated by beech forest on the western slopes of the Richardson Mountains below approximately 1200 m and tussockland, shrubland, scrub, cushionfield, herbfield and rockland above that altitude. Areas on the eastern side of the Richardson Range may have supported low forest of mountain totara and mountain toatoa (instead of beech forest) at lower altitudes, and scrub, shrubland and tussockland at higher altitudes. The floor of the Rees Valley appears likely to have supported a mosaic of sedgeland (wetlands), short tussockland, herbfield, gravelfield and shrubland.

### 2.5.2 Plant Communities

Plant communities of Rees Valley Pastoral Lease are in a natural state over a large part of the property. Exceptions are the valley floor grasslands, the small block south of the Ox Burn and some west-facing slopes below approximately 1100 m altitude where beech forest has been removed. In these areas pasture grasses are the dominant cover, often mixed with short tussock and native inter-tussock herbs and/or patches of manuka-mingimingi-matagouri shrubland. Bracken fernland is extensive below approximately 800 m altitude on the slopes between the Ox Burn and McDougalls Creek. Introduced woody weeds are prominent among native shrubland and fernland along the roadside in that area.

The most extensive indigenous plant community is tall tussockland which dominates mid-altitude slopes. Large areas of beech forest are present on lower slopes, especially at the northern end of the property. Areas of inaka-dominated sub-alpine shrubland are present on the south-facing slopes of the spurs of the Richardson Mountains and are mixed with tall tussockland above the present and former limits of beech forest. High-alpine cushionfield,

fellfield, scree and snowbank communities are present above the limits of tall tussockland in the upper gullies and spurs of the Richardson Mountains. Other indigenous plant communities include low mountain toatoa forest on the eastern side of the Richardson Mountains, and alluvial short tussockland, wetland and riverbed vegetation on the floor of the Rees Valley.

Plant communities are described below for each part of the property.

### **Rees Valley-Richardson Mountains north of McDougalls Spur**

This area covers most of the property including the Rees Valley floor and the bulk of the western face of the Richardson Mountains, including the many almost parallel spurs and gullies of the area. The vegetation over most of this area is relatively unmodified and follows a broad altitudinal sequence from the mountain tops to the valley floor.

In the basins at the valley-heads along the Richardson Mountains (c. 2000 m altitude) high-alpine cushionfield, fellfield and snowbanks grade down-slope to swards of *Chionochloa crassiuscula* and scattered herbfield vegetation. Below this, slim snow tussockland grades into narrow-leaved snow tussockland at about 1500 m altitude, with grassland on sunny faces and sub-alpine shrubland on the darker and generally steeper slopes. Mixed tall tussockland and inaka dominated sub-alpine shrubland then grade down-slope into beech forest at about 1200 m altitude. In areas where beech forest has been removed, tussockland-shrubland grade down slope into modified tall tussockland and then modified short tussockland and manuka shrubland or scrub. The vegetation on the lower slopes without beech forest is mostly pasture swards with native herb species and manuka shrubland.

#### Beech forest

Beech forest dominated mostly by mountain beech is present on lower slopes north of Twenty Five Mile Hut in the upper valley and on lower slopes between Muddy and McDougalls creeks in mid-valley. Beech forest has been reduced from pre-human times when it would have covered all the slopes in Rees Valley up to approximately 1200 m altitude. The extant beech forest on Twenty Five Mile Spur still extends upslope to the natural treeline, whereas that on Muddy Spur has been removed above c. 800 m altitude.

Mountain beech forest at higher altitudes is less diverse than that at lower altitudes with snow totara, mountain toatoa and mosses the other main species present. Silver beech is co-dominant at mid altitudes. Mistletoe *Peraxilla tetrapetala* is common, and *Alepis flavida* occasionally present, on mountain beech. Red beech is present at lower altitudes and becomes co-dominant with silver beech in places between 600 and 700 m altitude. Towards the bottom of the slopes, mountain beech becomes dominant again. The understorey is more diverse at mid to low altitudes and along the many creeks running through the forest.

Common species present in beech forest include *Coprosma rhamnoides*, *C. pseudocuneata*, *C. lucida*, *C. ciliata*, *C. sp. 't'*, *Uncinia rupestris*, *U. clavata*, *Astelia nervosa*, marbleleaf, lancewood, horopito, wineberry, broadleaf, tree fuchsia, mingimingi, kohuhu, *Helichrysum aggregatum*, *Raukaua simplex*, mountain totara, *Myrsine divaricata*, *Rubus schmidelioides*, *Lagenifera strangulata* and *Corybas* sp. A number of ferns are present including *Blechnum fluviale*, *B. novae-zelandiae*, *B. penna-marina*, *B. chambersii*, *Microsorium pustulatum*, prickly shield fern, thousand-leaved fern, *Grammitis* sp., *Asplenium richardii*, *A. flaccidum*, *A. appendiculatum*, *Pyrrosia serpens* and *Hymenophyllum* spp.

#### Shrubland

Sub-alpine shrubland is common and extensive on the property, mostly on steep south facing slopes, up valley from the limits of beech forest towards Rees Saddle, and mixed with tall tussockland above the treeline.

Among tall tussock and on darker slopes of spurs in the southern half of the property, sub-alpine shrublands are usually dominated by inaka (with some *Dracophyllum longifolium*), while *Brachyglottis cassinioides* becomes more important in sub-alpine shrublands in the northern half of the property. Other shrubs present include *Dracophyllum pronum*, *Gaultheria crassa*, *Olearia cymbifolia*, *Coprosma cheesemanii*, *C. ciliata*, *C. pseudocuneata*, *C. fowerakeri*, mingimingi, snow totara, *Myrsine nummularia*, *Hebe rakaiensis*, *H. odora*, and an unidentified species of *Hebe*. *Aciphylla* ‘lomond’ is common in and around areas of sub-alpine shrubland.

Rapidly regenerating shrubland is present on formerly forested sites in the Rees Valley and often overlaps with sub-alpine shrubland at the former treeline in these areas. These shrublands are mostly present on the lower slopes between Twenty Five Mile Spur in the north and Muddy Spur in the south. They will eventually regenerate to beech forest in the absence of burning and grazing. These areas of shrubland vary in extent and are mostly surrounded by a mixture of pasture and fescue tussockland with most of the native herbs and sub-shrubs described below for tall tussockland and alluvial short tussockland.

Shrubland is usually dominated by manuka with other shrubs including mingimingi, *Coprosma* sp. ‘t’, *C. ciliata*, *C. rugosa*, *Gaultheria crassa*, sweet brier, matagouri, *Aristotelia fruticosa*, *Dracophyllum longifolium*, *Olearia arborescens*, mountain toatoa, tauhinu, inaka, *Pimelea traversii*, *Leucopogon suaveolens* and *Gaultheria antipoda*. Other common species include bracken, tutu, *Coriaria plumosa*, prickly shield fern, *Rubus schmidelioides*, *Muehlenbeckia australis*, scrub pohuehue and tangle fern. In pasture glades among dense regeneration the tall native grass *Elymus* sp. is conspicuous.

More forest species are present closer to seed sources in gullies such as around lower Twenty Five Mile Spur, including *Myrsine divaricata*, lancewood, horopito, three finger, cabbage tree, marbleleaf, mountain totara, broadleaf and beech species. Rocky areas often support mountain flax, koromiko, snow totara (at higher altitudes), *Olearia avicenniifolia* and thousand-leaved fern. Around seepages or creeks at low altitude *Olearia bullata* is present in places, although is nowhere common. Shrubland on the slopes behind the hut near Arthurs Creek includes exotic species such as elder, crack willow, mint, raspberry, sweet brier and apple.

#### Narrow-leaved snow tussockland

Tall tussock dominated by narrow-leaved snow tussock is the most extensive tussockland community on the property, with tussock cover ranging from 25 to 50% and in condition from good to virtually unmodified. Tall tussock becomes more modified at altitudes below the former treeline where a transition between tall tussock and modified short tussock-pasture exists. Introduced pasture species tend to increase at lower altitudes, around favoured grazing areas and in gullies further south on the property.

Common species in narrow-leaved snow tussockland include blue tussock, *Festuca matthewsii* (replaced by fescue tussock at lower altitudes), snowberry, *Raoulia subsericea*, *Pentachondra pumila*, *Celmisia gracilentia*, *Viola cunninghamii*, *Euphrasia zelandica*, *Rytidosperma setifolia*, *Aciphylla* ‘lomond’, *Luzula rufa*, *Leucopogon fraseri*, *Lagenifera cuneata*, *Acaena caesiiglaucula*, *Pimelea oreophila*, *Lycopodium fastigiatum*, *Ranunculus multiscapus*, catsear, harebell, and various moss and lichen species (mostly *Racomitrium* sp. and *Cladia aggregata*).

Other species present include browntop, tauhinu, *Geranium sessiliflorum*, *G. microphyllum*, *Helichrysum filicaule*, *Epilobium atriplicifolium*, *Anisotome aromatica*, *Gaultheria parvula*, *Gonocarpus aggregatus*, *Blechnum penna-marina*, *Microtis uniflora*, *Luzula rhadina*,

*Epilobium* spp., *Oreomyrrhis colensoi*, *Kelleria dieffenbachii*, *Rytidosperma pumilum*, *Gentiana bellidifolia*, *Trisetum tenellum* and *Thelymitra* sp.

In rocky areas at higher altitudes additional species include *Polystichum cystostegia*, *Celmisia angustifolia*, *C. lyallii*, *Brachyglottis bellidioides*, *Deyeuxia avenoides*, thousand-leaved fern, *Parahebe lyallii*, *Colobanthus strictus* and *Grammitis poeppigiana*.

Alongside streams at higher altitudes important or common species include *Neopaxia sessiliflora*, *Raoulia grandiflora*, *Anaphalioides bellidioides*, *Coprosma perpusilla*, *Parahebe decora*, *Dracophyllum pronum* and *Muehlenbeckia axillaris*. Other species present include *Poa novae-zelandiae*, *Hebe odora*, *Craspedia* sp., *Dolichoglottis scorzonoides*, *Gingidia montana*, *Geum parviflorum*, *Lycopodium scariosum*, bog rush, *Ourisia caespitosa* var. *gracilis*, *O. sessilifolia*, *Stellaria gracilentia*, *Epilobium brunnescens*, *Viola cunninghamii* and *Cardamine uniflora*. Additional species at lower altitudes include *Raoulia tenuicaulis*, *Epilobium melanocaulon*, silver tussock, sweet vernal, browntop, white clover, Yorkshire fog, *Acaena anserinifolia*, *Olearia bullata*, Scotch thistle, *Coprosma atropurpurea*, harebell and *Acaena inermis*.

#### Slim snow tussock grassland

Slim snow tussock grassland is generally in good to excellent condition although has been affected by stock on sunny aspects in some gullies. Slim snow tussock cover generally ranges from 25 to 50%. Common species present include *Chionochloa crassiuscula*, blue tussock, *Ourisia caespitosa*, *Acaena saccaticupula*, *A. inermis*, *Phyllachne rubra*, *Carex wakatipu*, *C. breviculmis*, *Celmisia laricifolia* and *Aciphylla* ‘lomond’.

Other species present (at 1850m) include snowberry, *Dracophyllum muscoides*, *Celmisia lyallii*, *Raoulia grandiflora*, *Anisotome flexuosa*, *Luzula pumila*, *Hebe hectorii*, *Blechnum penna-marina*, *Raoulia youngii*, *Brachyglottis bellidioides*, *Epilobium tasmanicum*, *Viola cunninghamii*, *Koeleria cheesemanii* and other species associated with narrow-leaved snow tussockland and cushionfield.

#### High-alpine cushionfield/fellfield

High-alpine cushionfield and fellfield is rarely dominated by any one species. Important species include *Celmisia sessiliflora*, *Colobanthus buechananii*, *Scleranthus uniflorus*, *Dracophyllum muscoides*, *Phyllachne colensoi* and *Raoulia youngii*. Common species present include *Gentiana divisa*, *Gentiana* sp., *Anisotome imbricata*, *Abrotanella inconspicua*, *Raoulia grandiflora*, *Coprosma perpusilla*, *Chionohebe thomsonii*, *Marsippospermum gracile*, *Luzula pumila*, *Plantago lanigera*, *Hectorella caespitosa*, *Ourisia glandulosa*, *Rytidosperma setifolia*, blue tussock, *Kelleria lyallii*, *Schizeilema exiguum*, *Haastia sinclairii* and *Uncinia drucei*.

Other species occasionally present include *Agrostis muelleriana*, *Rostkovia magellanica*, *Leptinella pectinata* ssp. *willcoxii*, *Carex pyrenaica* var. *cephalotes*, *Poa novae-zelandiae*, *P. buechananii*, *Pachycladon novae-zelandiae* and *Chionohebe ciliolata*. Additional species present on rock outcrops include *Anisotome pilifera*, *Cheesemanina fastigiata* and *Hebe buechananii*.

Below high-alpine cushionfield, swards of *Chionochloa crassiuscula* are present (cover often around 80%) with many of the herbs and cushion species described above. Additional species include *Hebe hectorii*, *Acaena saccaticupula*, *Myosotis pulvinaris* and *Forstera sedifolia*.

### Scree

Species commonly present on high-altitude scree include blue tussock, *Epilobium purpuratum*, South Island edelweiss, *Raoulia youngii*, *Brachyglottis bellidioides* and *Kelleria lyallii*.

### Snowbank

Many of the cushion plants described above are present in areas where snow persists into the summer. Snowbanks are common in the upper basins and usually contain *Chionochloa oreophila* and/or *C. crassiuscula* with several mosses, *Colobanthus buechananii*, *Abrotanella inconspicua*, *Kelleria lyallii*, *Epilobium purpuratum*, *Plantago lanigera*, *Carex pyrenaica* var. *cephalotes*, *Poa buechananii*, *Brachyscome sinclairii*, *Raoulia grandiflora*, *Coprosma perpusilla*, *Euphrasia* sp., *Anisotome imbricata*, *Celmisia haastii*, *C. angustifolia*, *Marsippospermum gracile* and *Ourisia glandulosa*.

### Cushion bog/wetland

Wetland and cushion bog are present on the valley floor (particularly in the mid reaches of Rees Valley) where streams cross the alluvial flats. Wetland channels meander through alluvial grassland and a string of sphagnum cushion bogs are present along the toe of the slope on the edge of the flats. Other wetland areas, including sphagnum bogs, are associated with glacial benches, particularly on lower Twenty Five Mile Spur and also on the slopes below Long Charlie Spur. All wetlands at lower altitudes are surrounded by pasture and at least partly modified by pasture species.

Wetland channels are also modified by introduced species and usually dominated by *Carex sinclairii*, various mosses and the introduced rush *Juncus articulatus*. Other introduced species include *Epilobium ciliatum*, *Ranunculus flammula* and *Myosotis discolor*. Native species present include *Eleocharis acuta*, *Hydrocotyle sulcata* and *Juncus gregiflorus*.

Grasslands associated with areas of wetland include species such as *Ranunculus glabrifolius*, *rautahi*, *Leptinella squalida* ssp. *mediana*, *L. pusilla*, *Lagenifera petiolata*, *Prunella vulgaris*, tarweed, *Lotus pedunculatus*, toad rush, soft rush and *Luzula migrata*.

Sphagnum cushion bogs are dominated by sphagnum moss. Other important species are various mosses and liverworts, comb sedge, *Gaultheria parvula*, *Coprosma perpusilla* and *Gonocarpus micranthus*. Common species present include *Pratia angulata*, *Plantago triandra*, grass lily, *Schizeilema nitens*, *Ranunculus cheesemanii*, *Colobanthus apetalus*, *Galium perpusillum*, *Microtis uniflorus*, *Geranium sessiliflorum*, *Gunnera dentata*, *Euchiton* spp., *Carex gaudichaudiana* and *Luzula leptophylla*. Species occasionally present include *Carex lachenalii*, *Juncus novae-zelandiae* and *Aporostylis bifolia*. A small population of the nationally-endangered marsh arrow-grass (*Triglochin palustris*) was found in sphagnum bog near Twenty Five Mile Hut.

The aquatic *Potamogeton* sp. is present in standing water in the deeper channels on alluvial flats, and in several permanent or ephemeral tarns on lower Twenty Five Mile Spur. Seepages areas are common on the slopes of the Richardson Mountains. Species present include bog rush, comb sedge, *Plantago novae-zelandiae*, *Coprosma atropurpurea*, *Gonocarpus micranthus* and *Craspedia* sp.

### Valley floor and alluvial short tussockland

Valley floor grasslands are mostly highly modified and dominated by dense swards of browntop (60-80% cover). Important species present are sweet vernal, Yorkshire fog, *Festuca rubra*, white clover, mouse-ear chickweed, *Trifolium dubium* and sheep's sorrel. Other species present include soft rush, slender rush, Californian thistle, *Carex sinclairii*, *Gonocarpus aggregatus*, *Muehlenbeckia axillaris*, *Hydrocotyle novae-zelandiae* var. *montana*, *Rumex crispus*, red clover, *Acaena novae-zelandiae*, *A. fissistipula*, *Ranunculus*



*multiscapus*, *Celmisia glandulosa*, *Leucopogon fraseri*, *Euchiton* sp., *Helichrysum filicaule*, *Scleranthus brockiei*, yarrow and tarweed.

Alluvial short tussockland is present on a river terrace north of Twenty Five Mile Hut and on adjacent river flats. The dominant species are blue tussock and *Festuca matthewsii* with extensive patches of *Celmisia glandulosa*. Other common species include *Rytidosperma unarede*, browntop, sweet vernal, *Lycopodium fastigiatum* and *Pimelea prostrata*. Other species occasionally present include *Anisotome aromatica*, catsear, *Prasophyllum colensoi*, the lichen *Cladia aggregata*, moss *Racomitrium* sp., *Trisetum tenellum*, comb sedge, *Blechnum penna-marina*, *Gentiana bellidifolia*, snowberry and *Leucopogon fraseri*.

### **Shotover catchment (east side of Richardson Mountains)**

This area is a large triangular block bounded by straight lines between Mt Ferguson, Mt Aurum and Stair Peak, and by part of the main ridge of the Richardson Mountains. The terrain is generally steeper than that on the western side of the mountains. Tall tussockland and sub-alpine shrubland are the most extensive plant communities. Goats are plentiful in this block and are affecting tall tussocklands and shrubland communities, especially on sunny slopes. Tussock hawkweed is common though does not form dense swards.

Tall tussockland is dominated by narrow-leaved snow tussock. Tall tussockland is often mixed with sub-alpine shrubland in the upper valleys and has a similar range of species to that described for the less modified areas of tall tussockland on the western side of the Richardson Mountains.

#### Shrubland

This area contains some of the most extensive and diverse sub-alpine shrubland on the property. Extensive *Brachyglottis cassinioides* shrubland is present on the true left of the Flood Burn. Other common shrub species include *Hebe odora*, porcupine shrub, *Coprosma cheesemanii*, *C. ciliata*, *C. pseudocuneata*, snow totara, mountain toatoa, an unidentified *Hebe*, *Aristotelia fruticosa*, *Olearia cymbifolia* and *Gaultheria crassa*, along with the occasional *Hoheria lyallii*.

A small area of mountain toatoa low-forest is present on the true left of the Flood Burn. It contains a similar range of species to the *Brachyglottis cassinioides* shrubland except that mountain toatoa is the dominant canopy species.

Mixed tall tussockland and sub-alpine shrubland are present on the slopes above Prince of Wales Flat. The most common shrubs are inaka, *Hebe subalpina* and an unidentified species of *Hebe*. Other shrubs include many of those listed above along with *Dracophyllum prunum* and *Hebe hectorii*. On the bluffs above Prince of Wales Flat *Helichrysum intermedium* is present. On the sunnier north-facing side of the Flood Burn, shrubland is less extensive but still common in places. The most frequent species present are matagouri, *Olearia odorata*, porcupine shrub, native broom, *Coprosma ciliata* and *Aristotelia fruticosa*.

#### Riverbed

Areas of riverbed vegetation are present on the property above and below a small area of Unallocated Crown Land in the upper Flood Burn where the stream becomes slightly braided. The dominant species are *Raoulia tenuicaulis* and *R. hookeri*. Common species present include blue tussock, *Rytidosperma buchananii*, *Acaena inermis*, *Epilobium melanocaulon*, *E. microphyllum*, *Muehlenbeckia axillaris*, *Coprosma atropurpurea*, *Poa novae-zelandiae*, *Lachnagrostis lyallii*, harebell, *Cardamine* sp., *Luzula rufa* and various species of moss and lichen.

Exotic pasture species such as browntop, sweet vernal, white clover, mouse-ear chickweed, tussock hawkweed and catsear are also present. On more stable surfaces and on stream margins in this vicinity, alluvial short tussockland in very good condition is present. The dominant species are *Rytidosperma setifolia* and *Festuca matthewsii*.

### **Rees Valley-Richardson Mountains south of McDougalls Spur**

Slopes above 1200 m altitude in this area appear relatively unmodified. Below 1200 m beech forest is present along McDougalls Creek and the Ox Burn and tall tussockland is present down to approximately 1000 m altitude. Modified short tussockland and scattered shrubland are present below this altitude, and the lower slopes (below 700 to 800 m altitude) of this block contain the most extensive bracken fernland on the property. There is strong regeneration of native shrubs, notably manuka, on mid-slopes and infestations of a variety of woody weeds near the road.

#### Bracken fernland

Large patches of bracken fernland are present between the road and c. 700 m altitude in this area. Patches of manuka and cabbage tree are conspicuous among the bracken fernland, and many common shrubs and some forest tree species are also present.

#### Shrubland

Manuka shrubland is present above and around the bracken fernland. Species present in the manuka-dominated shrubland include *Hebe rakaiensis*, *Coprosma rugosa*, *mingimingi*, *Pimelea traversii*, *Olearia avicenniifolia*, koromiko, cabbage tree, *Leucopogon suaveolens*, tutu, bracken, marbleleaf, snowberry, *Rubus schmidelioides*, prickly shield fern, *Blechnum penna-marina*, *Lycopodium scariosum*, *Leucopogon fraseri*, *Viola filicaulis*, harebell, *Geranium microphyllum*, *Acaena caesiiglauca*, *Trisetum tenellum* and mountain flax.

Modified mixed fescue tussockland-snow tussockland is present above the shrubland belt (above c. 800 m). The threatened plant *Kirkianella novae-zelandiae* was found in this habitat. Other species present include *Dracophyllum pronum*, *Coprosma atropurpurea*, *Ranunculus foliosus*, *Elymus rectisetus*, *Hebe pauciramosa* and other inter-tussock herbs.

On the banks between the road and the Rees River a number of forest tree species are present among manuka and bracken fern, including tree fuchsia, kohuhu, broadleaf, *Olearia avicenniifolia*, three finger and wineberry. The naturalised sycamore is common in this area and becomes dominant in places.

### **2.5.3 Significance of the Vegetation**

Rees Valley Pastoral Lease supports almost the full range of indigenous vegetation types present in the Richardson Ecological District. This includes high- and low-alpine communities in excellent condition and beech forest modified only by introduced animals. High-alpine cushionfield, fellfield and snowbank, sub-alpine scrub, shrubland and tall tussockland, and montane beech forest are highly representative of the pre-human vegetation. These plant communities cover most of the property. Montane tussockland is largely induced, though has high naturalness values. Montane scrub and shrubland is in most areas induced, though they have components of the original plant communities, high naturalness values and will readily regenerate to beech forest.

The property spans the entire western face of the Richardson Mountains, a significant proportion of which lies above the natural timberline. The property lies in an area

recognised as unusually species rich, and complements and buffers plant communities protected within Mt Aspiring National Park.

A substantial proportion of the property supports vegetation and flora with significant inherent values. The only areas that do not have significant inherent values are lower-altitude sites on the southern part of the property where pasture development and the spread of woody weeds have displaced the natural plant communities. Nine species on the property are considered to be notable with a threat classification listed by Hitchmough (2002), including the nationally endangered *Triglochin palustris*.

**Table 1** Threatened plant species recorded on Rees Valley Pastoral Lease, February 2004.

<b>Plant Species</b>	<b>Known Distribution on Property</b>
<b>Nationally Endangered</b>	
<i>Triglochin palustris</i>	Rare in sphagnum bog wetland areas at the toe of slopes near Twenty Five Mile Hut.
<b>Gradual Decline</b>	
<i>Alepis flavida</i>	Occasional in mountain beech forest.
<i>Cheesemanella fastigiata</i>	Occasional on high-altitude rock bluffs.
<i>Deschampsia cespitosa</i>	Cashs Flat (collected previously-John Barkla, <i>pers. comm.</i> ).
<i>Peraxilla tetrapetala</i>	Common in mountain beech forest.
<b>Range Restricted</b>	
<i>Hebe buechananii</i>	Common in fellfield in the upper reaches of gullies on the Richardson Mountains.
<b>Sparse</b>	
<i>Epilobium purpuratum</i>	Occasional in damp fellfield and scree at high altitude.
<i>Olearia bullata</i>	Occasional in damp areas of montane shrubland or grassland.
<i>Kirkianella novae-zelandiae</i>	Rare in montane modified short tussockland in Twelve Mile Block near McDougalls Creek.
<b>Data Deficient</b>	
<i>Carmichaelia crassicaule</i> var. <i>racemosum</i>	Rare in sub-alpine shrubland and tussockland.

## 2.5.4 Problem Plants

Introduced plants that may have an important effect on indigenous plant communities on the property, and that can be controlled or contained, are listed and discussed below. Other ubiquitous naturalised species, for which containment or control are probably impractical, such as pasture grasses, are not discussed here but are listed in the vegetation descriptions.

**Table 2** Problem plant species recorded from Rees Valley Pastoral Lease, February 2004.

<b>Common name.</b>	<b>Recorded distribution on the property.</b>
apple	Several plants in a small area of shrubland behind the hut at Arthurs Creek.
barberry	Occasional in pasture and manuka shrubland in lower half of the block below the Ox Burn.
blackberry	Common along road between the Ox Burn and the lower ford.
broom	Occasional along road for 2 km north of the Ox Burn.
Californian thistle	Patchy in pasture on the valley floor and lower modified slopes.
cotoneaster	Several plants are present in the vicinity of the powerhouse.
crack willow	Several small young plants near a clump of dead old trees near Twenty Five Mile Hut. Common at the southern end of the property.
dodder	Occasional in stony pasture along the Rees-Dart track near the bottom of Twenty Five Mile Spur.
Douglas fir	Several plants near the powerhouse.
elder	Rare in manuka shrubland throughout the property below Twenty Five Mile Spur.
hawthorn	Occasional in manuka shrubland and bracken fernland between the Ox Burn and lower ford.
Himalayan honeysuckle	Common in bracken fernland and shrubland along the road for 2 km north of the Ox Burn.
macrocarpa	Several plants near the powerhouse.
mint	Common in a small area of shrubland behind the hut at Arthurs Creek.
old man's beard	Several plants climbing among small trees in the lower paddock of the block below the Ox Burn.
ragwort	Common along road between the Ox Burn and Invincible Mine area where it is present in pasture around manuka shrubland.
raspberry	Common in a small area of shrubland behind the hut at Arthurs Creek.
rowan	Occasional near powerhouse.
Russell lupin	Occasional along road for 2 km north of the Ox Burn with a small infestation present in the Ox Burn below the powerhouse.
strawberry	Occasional along road for 2 km north of the Ox Burn.
sweet brier	Occasional in manuka shrubland and alluvial grassland in the mid-valley. More common in manuka shrubland and pasture in lower block south of the Ox Burn.
sycamore	Common to dominant in shrubland between the road and river for 2 km south of the lower ford. Also in bracken fernland and shrubland above the road in this area.
tree lupin	In the Ox Burn below the powerhouse.

## 2.6 FAUNA

### 2.6.1 Invertebrate Fauna

The entomological information most relevant to the Rees Valley area is the invertebrate survey undertaken during the tenure review of the adjacent Temple Peak Pastoral Lease (Vink and McGuinness, 2003). Apart from spiders, Vink and McGuinness targeted beetles, particularly Carabidae, Curculionidae, and Tenebrionidae, moths, Hymenoptera and tachinid flies. They collected 37 species of beetles, including nine species of carabids, eight species of weevils, and five species of tenebrionids. They recorded two nationally threatened species, the shield bug *Hypsithocus hudsonae* and the geometrid moth, *Gingidiobora subobscurata*. In December 1999, the large speargrass weevil, *Lyperobius spedenii*, was collected on Rees Saddle (Emberson and Syrett, *pers. comm.*) and also found on Temple Peak Pastoral Lease by Vink and McGuinness (2003).

Because of the limited time available for this survey, and the expertise available, invertebrate sampling was concentrated on beetles (Coleoptera) and grasshoppers. Beetles comprise the largest and most diverse group of insects in New Zealand. They occur in all terrestrial and freshwater habitats and have the widest range of feeding habits of any group of terrestrial invertebrates. They are relatively well known in New Zealand and have been extensively used in ecological surveys.

Survey locations were selected to provide good representation of the less modified areas of the property and locations where representative and unusual invertebrates might be present. Terrestrial invertebrates are described below for the six main lower-altitude areas surveyed and for the two high-altitude zones. Freshwater invertebrates are described separately. Notable species are listed in Table 3.

#### South of McDougalls Creek

The areas along the Rees River have been modified through grazing and the invasion of woody weeds. However, there are substantial patches of remnant beech forest along the Ox Burn. A small representative collection of beetles associated with beech forest was collected from the bottom of the Invincible Ski Field road. The only specimen of the clerid, *Balcus* sp., found on the property was also collected. Otherwise, the beetle fauna of this area was meagre.

#### Between McDougalls and Bridges creeks, west of the Richardson Mountains

Between McDougalls and Muddy creeks, the lower valley slopes support red beech and mountain beech forest. All five species of longhorn beetle collected from the property were from this area of beech forest. Eight species of weevil collected here were found nowhere else. The darkling beetle, *Zeadelium ?hudsoni*, which is limited in distribution, and the borer beetle, *Xenocera* sp., which is rare in collections, were collected only from this area. This area has a diverse and representative beetle fauna with two notable species.

#### Triangle area east of the Richardson Mountains

This part of the property is steep and rugged with permanent snowfields on the higher summits, large areas of bare rock and scree, and tussockland, scrub and shrubland at lower-altitudes. Beating shrubby vegetation on slopes above the Flood Burn yielded several species each of leaf beetles, native ladybirds, weevils and flower beetles. Other beetles found in this habitat included a new southernmost record of the water scavenger beetle, *Rygmodus cyaneus*. The range-restricted shield bug, *Hypsithocus hudsonae*, was collected

from the Flood Burn valley. The area supports high populations of butterflies and diurnal moths. The large noctuid moth, *Graphania nullifera*, mines speargrass stems and was causing obvious damage to plants. Two species of riparian ground beetle and two species of rove beetle were collected along the Flood Burn. Four different rove beetles and the small native carrion beetle, *Paracatops* sp., were collected from a dry goat carcass. These are all native beetles, in contrast to the largely naturalised fauna often associated with carrion.

Based on the presence of the range-restricted shield bug this area is ‘outstanding’ as an SSWI. The area appears to have a largely intact and representative insect fauna of high diversity, and supports a water scavenger beetle at a new southern limit.

### **Between Bridges and Little Devil creeks**

In this area there are extensive swampy areas on the valley floor, grassland on the lower slopes, scattered scrub and beech forest along the creeks, tussockland and scrub on upper slopes, and cushionfield, rock and scree at higher altitudes. Two species of riparian ground beetle and a lichen-inhabiting rough mould beetle were found under stones in the riverbed. The shrubby vegetation above Twenty Five Mile Hut yielded a representative insect fauna comprising native ladybird beetles, weevils, marsh beetles and flower beetles. In the beech forest, ground beetles and rove beetles were collected from under rotten logs. At higher altitudes, moss beetles, ground beetles, and cockroaches were found under rocks. The range-restricted shield bug *Hypsithocus hudsonae*, was observed on the upper slopes.

Based on the presence of the range-restricted shield bug this area is ‘outstanding’ as an SSWI. The upper slopes have a diverse and representative insect fauna including ground beetles, weevils and grasshoppers.

### **Terrace between Twenty Five Mile Creek and the Rees River**

In this area a rolling terrace, rising to about 680 m, between the Rees River and Twenty Five Mile Creek provides a diversity of habitats, including rank pasture, scrub, small patches of forest, wetlands and one small tarn. Beating shrubs produced a high diversity of beetle species. The tarn contained two species of diving beetles, backswimmers and water boatmen, and provided excellent habitat for a range of dragonflies and damselflies. This area scores high for representativeness and diversity of both habitat and fauna.

### **North of Little Devil Creek, excluding the above terrace**

This area includes an altitudinal sequence of vegetation types from beech forest on the lower slopes through sub-alpine scrub to tussockland and cushionfield at higher altitudes. Collecting was concentrated on Twenty Five Mile Spur where a range of habitats was sampled between approximately 1100 and 1700 m. Beating mountain beech at the bushline (1100 m) yielded a rich and diverse fauna of beetles (12 species from eight families). Additional species were collected under bark and dead logs in mountain beech forest at this site including the large ground beetle, *Mecodema costipenne*, and the smaller *M. rectolineatum* at a new south-western limit. Further up the spur, tall tussock and inaka scrub had a comparatively meagre beetle fauna. At the highest point sampled (1700 m), moss beetles, darkling beetles and ground beetles, together with cockroaches were plentiful under rocks. Based on previous records in similar locations, the habitat would be expected to support the speargrass weevil, *Lyperobius spedenii*. This area scores very highly for naturalness, representativeness, and diversity of both habitat and fauna. The beetle fauna included two notable species and the most diverse fauna beaten from vegetation on the property.

### **Alpine Zone (above 2000 m)**

High-altitude parts of the property are highly natural, with extensive areas of rock, scree and cushionfield. A rich collection of invertebrates was recorded in this zone. A new species of grasshopper (*Sigauss* ‘Queenstown’) was collected on Mt Ferguson up to an altitude of 2140 m. At present this new species of grasshopper is known from only the Richardson and Eyre mountains. The population of *Sigauss* ‘Queenstown’ on the property is the northern-most known and is the second highest recorded site for any New Zealand grasshopper species.

A large population of alpine cave weta was recorded on rock outcrops along the ridges. Several species of weevil including *Zenographus metallescens* were observed under small rocks or feeding on cushionfield plants on gentler terrain. A large species of ground weta was recorded under large flat rocks in this area, and several small dark diurnal moths including the black mountain ringlet were observed flying and sunning themselves on open slopes. A range of other native invertebrates were observed including flies, wasps, cockroaches and the black cicada.

### **Sub-Alpine Zone**

Tussocklands in this zone were sampled and a diverse range of invertebrate species observed, including ants, butterflies (boulder copper, common copper, southern blue and tussock ringlet), flies (brown blowfly, crane, hover and robber flies), wasps (ichneumon, solitary bees, spider wasp and ground nesting sub-social bees), weevils, beetles (ground, tiger, pill and darkling beetles), crickets, spiders (wolf and jumping spiders), longhorn beetles, grasshoppers and cockroaches. Other noteworthy invertebrates observed include New Zealand’s largest dragonfly, the mountain giant dragonfly, at its southern distribution limit. Two species of grasshopper, the common lowland grasshopper and *Sigauss campestris*, were recorded on the western slopes of Mt Ferguson. The common lowland grasshopper was also recorded along the grassy river flats of the Rees Valley.

### **Freshwater Habitats**

High-altitude parts of the property support a diverse range of aquatic habitats in excellent condition. The diversity and quality of the habitat is indicated by the 26 species of native caddisfly fauna observed. Families and species recorded were: Conoesucidae (*Confluens olingoides*, *Pycnocentrodes aeris*, *Pycnocentria evecta*), Hydrobiosidae (*Costachorema callistum*, *Edpercivalia fusca*, *Hydrobiosis charadraea*, *Hydrobiosis harpidiosa*, *Hydrobiosis johnsi*, *Hydrobiosis parumbripennis*, *Hydrobiosis umbripennis*, *Neurochorema forsteri*, *Psilochorema leptoharpax*, *Psilochorema macroharpax*, *Tiphobiosis cowiei*), Hydropsychidae (*Aoteapsyche colonica*, *Aoteapsyche tepoka*, *Aoteapsyche tipua*), Leptoceridae (*Hudsonema alienum*, *Hudsonema amabile*, *Triplectides dolichos*) Oeconesidae (*Oeconesus incisus*, *Pseudoeconesus stramineus*), Philopotamidae (*Hydrobiosella stenocerca*), Philorheithridae (*Philorheithrus lacustris*) and Polycentropodidae (*Plectrocnemia maclachlani*, *Polypsectropus puerilis*).

Invertebrates observed in lower-altitude freshwater habitats include *Deleatidium* sp., *Nesameletus* sp., *Megaleptoperla grandis*, *Pycnocentrodes aeris*., *Pycnocentria* sp. and *Olinga feredayi*.

## Significance of the Invertebrate Fauna

During the entomological survey of Rees Valley Pastoral Lease, 141 insect species were collected or observed from 35 collection sites across the property. Nearly all were identified to genus or species. One-hundred-and-ten species of beetles from 34 families were collected, none of which are known to be naturalised. Seven notable insect species were recorded. One is a threatened species with limited distribution and type locality essentially on the property at Mt Aurum, one is probably an un-described species of limited distribution, two have limited distributions, two represent range extensions, and one is uncommon in collections.

Three areas on the property are identified as having high significant inherent values for invertebrate conservation. These are the triangular area east of the Richardson Mountains, which supported the range-restricted shield bug, *Hypsithocus hudsonae* and two other notable species. The second is the area between Bridges Creek and Little Devil Creek above 1000 m altitude where the range-restricted shield bug was also found. The third area is the part of the property north of Little Devil Creek excluding the low terrace between Twenty Five Mile Creek and the Rees River. The beetle fauna of this area included two notable species and the most diverse fauna beaten from vegetation on the property. A fourth area, the remnant beech forest between McDougalls and Muddy creeks, is rated medium-high for its significant inherent entomological values. Two notable species and a representative range of beech forest insects were found here.

**Table 3** Notable invertebrate species recorded from Rees Valley Pastoral Lease, February 2004.

Invertebrate Species	Comment/Distribution
<b>Range Restricted</b>	
<i>Hypsithocus hudsonae</i> Bergroth	Known only from Central Otago and Otago Lakes. Type locality Mt Aurum.
<b>Possibly un-described species of limited distribution</b>	
<i>Sigauss</i> ‘Queenstown’	Known only from the Richardson and Eyre mountains. New northern record.
<b>Limited Distribution</b>	
<i>Mecodema costipenne</i> Broun	Known only from Fiordland, Otago Lakes and Southland. Type locality Routeburn, Lake Wakatipu.
<i>Mecodema rectolineatum</i> Castelnau	Previously known only from Central Otago, Dunedin, Mackenzie Basin and South Canterbury. New south-western record.
<i>Zeadelium ?hudsoni</i> (Broun)	Known only from Westland, Otago Lakes, Fiordland and Southland.
<b>New southern-most record</b>	
<i>Rygmodes cyaneus</i> Broun	New record for Otago, relatively common further north.
<b>Uncommon in Collections</b>	
<i>Xenocera</i> sp.	Not previously present in Lincoln University collection.

The threatened shield bug, *Hypsithocus hudsonae*, is highly distinctive. There is only a single species in the genus, which is endemic to New Zealand, and its nearest relatives (assumed to be from outside New Zealand) have not yet been identified (Larivière, 1995). It is flightless and known from relatively few sites on mountain ranges in Otago. In addition to the five locations noted by Larivière (1995), it was also collected from several sites on Temple Peak Pastoral Lease (Vink and McGuinness, 2003).



## 2.6.2 Avifauna

Beech forests of the region provide habitat for many indigenous bird species including the threatened South Island kaka (nationally endangered), yellow-crowned parakeet (gradual decline) and yellowhead (nationally endangered). High altitude tussockland and rockland are inhabited by kea (nationally endangered) and New Zealand falcon (gradual decline). The riverbeds of the Dart and Rees valleys are braided and provide important breeding and nesting habitat for banded dotterel (gradual decline), wrybill (nationally vulnerable) and black-fronted tern (serious decline). Blue duck (nationally endangered) have been recorded close to the confluence of Hunter Creek and the Rees River (McEwen, 1987; Department of Conservation, 1998; DOC Blue Duck Database).

Occasional bird surveys and casual observations have recorded a number of threatened bird species on Rees Valley Pastoral Lease and adjacent properties between 1986 and 2004. An Operation Raleigh bird survey (1986) recorded yellowhead in beech forest in the Rees Valley, including two locations on Rees Valley Pastoral Lease (Elliott, 1990; Elliot, 1992). More recently, two family groups of yellowhead were seen at Slip Flat within a few hundred metres of the property (March 2004, B. Lawrence, *pers. comm.*). High numbers of kea are regularly recorded on the property, particularly in the triangular section to the west of the Richardson Mountains, with up to 40 birds seen in Flood Burn area during helicopter surveys in 1991, 1997 and 1998 (DOC records). Rock wren (nationally vulnerable) and New Zealand falcon have been recorded adjacent to the property at Rees Saddle and Shelter Rock. The lessee has also reported South Island fernbird (sparse) in shrublands in the southeast corner of the property (DOC databases; B. Lawrence, *pers. comm.*).

Birds observed on Rees Valley Pastoral Lease are described below for the four main habitats surveyed. Birds using the riverbed in Rees Valley were also recorded, although very little of the riverbed is located within the property boundary. Indigenous bird species observed on the property are listed in Table 4.

### Higher altitude tussockland, rockland, cushionfield and fellfield

Sub-alpine habitats are dominated by tall tussockland and alpine habitats characterised by cushionfield, fellfield, rockland and scree. A kea was heard at the head of Invincible Creek and a group of five kea was seen from the helicopter while flying over the Flood Burn Valley. Southern black-backed gull, Australasian harrier and New Zealand pipit were observed throughout high-altitude areas, with New Zealand pipit particularly common around the ski field in Invincible Creek. A small colony of southern black-backed gulls was observed just below Prince of Wales Flat in the Flood Burn. A group of seven kea (including five juveniles) and a pair of New Zealand falcon were seen at lower altitude by another member of the survey team just outside the property boundary near Shelter Rock Hut in the upper Rees Valley.

### Beech forest

The steep west-facing slopes along the property boundary in the Rees Valley between McDougalls and Muddy creeks are dominated by mountain beech forest with areas of mixed beech forest (red beech-mountain beech-silver beech) at lower altitudes. Northwest-facing slopes along the property boundary in the upper Rees Valley above Twenty Five Mile Creek are dominated by red beech forest with areas of mixed beech forest. Birds were surveyed in the lower area of beech forest, Muddy Creek car park, Twenty Five Mile Hut and at several locations in the upper area of beech forest between lower Twenty Five Mile Spur and Clarke Slip.

Almost all forest birds representative of lower-altitude beech forest were present, including brown creeper, South Island robin, yellow-crowned parakeet, bellbird, tui, South Island tomtit, grey warbler, South Island fantail and South Island rifleman. New Zealand falcon were seen or heard at two separate low altitude forest locations. Yellowhead was not recorded during this survey, but two family groups of yellowhead were seen at Slip Flat within a few hundred metres of the property by a reliable witness in March 2004 (B. Lawrence, *pers. comm.*). Introduced passerines were recorded throughout.

### **Shrubland and rockland**

Birds were surveyed in shrubland around Twenty Five Mile Hut, Invincible Mine, Bridges Creek and at locations north of the Ox Burn. Playback tapes were used to listen for South Island fernbird. Silvereye, grey warbler and bellbird were numerous at all locations, with brown creeper, South Island tomtit and South Island rifleman present in less developed areas. New Zealand falcon were seen or heard at two separate low altitude shrubland-grassland locations. An unconfirmed sighting of a South Island fernbird was made by another member of the survey team near Twenty Five Mile Hut. Introduced passerines were present throughout.

### **Valley floor wetland and bog**

Wetlands and sphagnum cushion bogs on the valley floor below Twenty Five Mile Hut and along the forest edge north of the hut were surveyed. An adult Australasian harrier feeding two fledglings, paradise shelduck and black shag were recorded.

### **Rees Valley riverbed**

Birds recorded on the bed of the Rees River included spur-winged plover, southern black-backed gull, paradise shelduck, black shag and a group of at least 15 banded dotterel.

**Table 4** Indigenous bird species recorded from Rees Valley Pastoral Lease.

Bird species Common name	Scientific name	Known Distribution on Property
Australasian harrier/kahu	<i>Circus approximans</i>	Throughout, breeding near Twenty Five Mile Hut.
banded dotterel	<i>Charadrius bicinctus bicinctus</i>	Rees River, riverbed.
bellbird/korimako	<i>Anthornis melanura melanura</i>	Rees Valley, beech forest.
black shag/koau	<i>Phalacrocorax carbo novaehollandiae</i>	Rees River, riverbed and wetland.
brown creeper	<i>Mohoua novaeseelandiae</i>	Rees Valley, beech forest and shrubland.
grey warbler/riroriro	<i>Gerygone igata</i>	Rees Valley, beech forest and shrubland.
kea	<i>Nestor notabilis</i>	High altitude tussock and rockland.
New Zealand falcon/karearea	<i>Falco novaeseelandiae</i>	Several locations, low altitude.
New Zealand pipit/pihoihoi	<i>Anthus novaeseelandiae novaeseelandiae</i>	Throughout, tussockland and rockland.
paradise shelduck/putakitaki	<i>Tadorna variegata</i>	Rees Valley, riverbed.
silveryeye	<i>Zosterops lateralis lateralis</i>	Rees Valley, beech forest and shrubland.
South Island fantail/piwakawaka	<i>Rhipidura fuliginosa fuliginosa</i>	Rees Valley, beech forest and shrubland.
South Island fernbird/mata <sup>1</sup>	<i>Bowdleria punctata punctata</i>	Shrubland and wetland.
South Island rifleman/titipounamu	<i>Acanthisitta chloris chloris</i>	Rees Valley, beech forest.
South Island robin/kakaruai	<i>Petroica australis australis</i>	Rees Valley, beech forest.
South Island tomtit/miromiro	<i>Petroica macrocephala macrocephala</i>	Rees Valley, beech forest.
southern black- backed gull/karoro	<i>Larus dominicanus dominicanus</i>	Throughout.
spur-winged plover	<i>Vanellus miles novaehollandiae</i>	Rees Valley, riverbed.
tui	<i>Prosthemadera novaeseelandiae novaeseelandiae</i>	Rees Valley, beech forest.
yellow-crowned parakeet/kakariki	<i>Cyanoramphus auriceps auriceps</i>	Rees Valley, beech forest.
yellowhead/mohua <sup>2</sup>	<i>Mohoua ochrocephala</i>	Rees Valley, beech forest.

<sup>1</sup> Unconfirmed records from the lessee and a member of survey team.

<sup>2</sup> Recorded on the property in 1986 and just outside property boundary at Clarke Slip in March 2004.

### Significance of the Avifauna

Rees Valley Pastoral Lease supports a large number of bird species, reflecting the diversity and abundance of habitats on and in the vicinity of the property. A total of 31 bird species were recorded on the property: 19 indigenous species (14 endemic species or sub-species, and five native) and 12 introduced species. A further two endemic bird species were recorded either before or after the inspection: yellowhead in beech forest on the property in 1986 and within a few hundred metres of the property in March 2004, and South Island

fernbird have been previously recorded on the property and an unconfirmed sighting during this survey. Of these species, seven are classified as threatened by Hitchmough (2002): New Zealand falcon (gradual decline), banded dotterel (gradual decline), black shag (sparse), kea (nationally vulnerable), yellow-crowned parakeet (gradual decline), yellowhead (nationally endangered) and South Island fernbird (sparse).

Yellowhead and kea populations on or in the vicinity of the property are particularly significant. The Rees Valley is considered an important stronghold for yellowhead (Colin O'Donnell, *pers.comm.*), and Rees Valley Pastoral Lease provides a significant area of suitable yellowhead habitat. The Richardson Mountains support high numbers of kea. As many as 40 kea have been recorded on Rees Valley Pastoral Lease during previous surveys, representing a significant proportion of the national population of approximately 5000 individuals.

**Table 5** Threatened bird species recorded from Rees Valley Pastoral Lease.

<b>Bird Species</b>	
Common name	Scientific name
<b>Nationally Endangered</b>	
yellowhead	<i>Mohoua ochrocephala</i>
<b>Nationally Vulnerable</b>	
kea	<i>Nestor notabilis</i>
<b>Gradual Decline</b>	
banded dotterel	<i>Charadrius bicinctus bicinctus</i>
New Zealand falcon	<i>Falco novaeseelandiae</i>
yellow-crowned parakeet	<i>Cyanoramphus auriceps auriceps</i>
<b>Sparse</b>	
black shag	<i>Phalacrocorax carbo novaehollandiae</i>
South Island fernbird	<i>Bowdleria punctata punctata</i>

### 2.6.3 Herpetofauna

Two species of lizard were recorded on Rees Valley Pastoral Lease: McCann's skink and the recently discovered 'Moke' gecko. McCann's skinks were common in the valley of the Flood Burn, especially lower in the valley near the property boundary. One 'Moke' gecko was observed at 1450 m altitude on Twenty Five Mile Spur. Another lizard was observed, but not positively identified, nearby in habitat similar to that favoured by the 'Moke' gecko.

#### Significance of the Herpetofauna

The discovery of a 'Moke' gecko on the property is highly significant. This is only the second time that this gecko has been recorded; the first was on Mt Creighton Station in 2002. The 'Moke' gecko appears to be a new taxon occupying mountainous country northeast of Lake Wakatipu, though its identity is still under investigation. There appears to be a large area of favoured tussockland-herbfield-rockland habitat for the 'Moke' gecko on the property.

## **2.6.4 Aquatic Fauna**

Rees Valley Pastoral Lease is situated north of Lake Wakatipu in the Clutha River catchment. The property covers tributaries of the Rees and Shotover rivers, including Twenty Five Mile, Big Devil, Little Devil, Arthurs, Bridges, Invincible and McDougalls creeks and part of the Ox Burn in the Rees Valley, and the headwaters of the Savage Burn, Flood Burn and Duncan Creek in the Shotover Valley. The Rees River flows into Lake Wakatipu and the Shotover River flows into the Kawarau River.

One of the distinguishing features of the Clutha River system is the presence of hydroelectric dams. This has two major effects on fish communities. The first is that fish communities upstream from the dams are generally composed of only non-diadromous species (those species without a marine phase in their lifecycle), although some exceptions do occur (e.g. longfin eel may still be present and common bully and koaro have become non-diadromous substituting lakes for the sea). The second effect is that fish communities are separated into discrete populations preventing re-colonization of previously dewatered streams.

The New Zealand Freshwater Fish Database has 1118 records (at 18<sup>th</sup> February 2004) from the Clutha River catchment (McDowall and Richardson, 1983). Brown trout is the only species recorded from rivers near Rees Valley Pastoral Lease. Records from the nearby Dart Valley include koaro, longfin eel, common bully and rainbow trout. Freshwater crayfish have also been recorded. Records from the Shotover River indicate the presence of a similar range of species, though there are no records from within the property boundary.

Five different freshwater habitats were surveyed on the property. These are classified by water source and surrounding vegetation type. These habitats and the fish species observed are described below.

### **Rivers**

The Rees River and the lower section of Twenty Five Mile Creek are the only areas of this habitat on or adjoining the property (Rees River is separated from the property by marginal strips). These rivers flow through grassland, tussockland, shrubland and beech forest. All parts of this habitat are accessible to stock, and the Rees River is crossed by a four-wheel-drive track at several locations. The Rees River is braided for some of its length and is between 40 and 80 metres wide and between 600 mm and two metres deep. The lower part of Twenty Five Mile Creek is approximately 20 metres wide and 500 mm deep, and occasionally greater than two metres deep.

One site was surveyed in Twenty Five Mile Creek. Several brown trout were recorded, including some larger than 300 mm in length. There are other records of brown trout from the Rees River, so this species is likely to be present throughout this habitat type.

### **Tarns**

This habitat occurs in several locations on the property, particularly in high-altitude basins. The tarns are surrounded by rockland, gravelfield and occasionally herbfield. All are accessible to stock or naturalised browsing mammals such as chamois, though access is restricted by snow. The tarns are generally less than 200 m<sup>2</sup> in total area and less than one metre deep on average. This habitat was not surveyed for fish. Most tarns are expected to freeze over during winter so it is unlikely that fish will be present.

### **High Altitude Streams**

These streams are present in all the larger upper valleys on the property. They generally have a gentle gradient, dropping less than five metres over a distance of 100 metres. Most flow through tussockland, scrub or shrubland. The stream substrate is usually bedrock with a covering of cobbles and gravels. All are accessible to stock though access is restricted by snow cover in winter. Generally the high-altitude streams are between three and 12 metres wide and between 200 and 500 mm deep.

Eight sites were surveyed for fish, but none were found. The lessee has reported seeing “cockabullies” in several locations in this habitat. It is likely that these were koaro which migrated as juveniles from the lake. If so, they may be present in low numbers, present only in areas not surveyed, or they may have been flushed from the system during floods. The habitat appears suitable for koaro.

### **Low Altitude Streams**

This habitat is present in the small tributaries of the Rees River on the property. Commonly these streams flow down steep valley sides before levelling off on the valley floor. The Ox Burn is dammed for power generation, modifying the entire stream bed in that vicinity. Stream substrates are bedrock covered with boulders, cobbles, gravel and sand. All flow through tussockland at higher altitudes and grassland nearer the valley floor. Some flow through areas of beech forest or scrub. This stream habitat is generally accessible to stock and also accessible to vehicles on the valley floor. The streams vary considerably in size, from less than two metres to greater than 10 metres wide and have an average depth of approximately 250 mm. Three sites were surveyed by electro-fishing, and brown trout found at one site. An unidentified native fish (possibly a species of mudfish) was observed in shallow ponds on the valley floor.

### **Forested Streams**

This habitat includes all the streams flowing through large patches of beech forest, including the sections of these streams that flow through grassland on the valley floor. The substrate of these streams is mostly cobbles and gravel with areas of bedrock at steeper sections. Stock access is restricted in places by the incised gorges and vegetation. Lower reaches of these streams are crossed by a vehicle track and a poled tramping route. The streams vary from one and a half to seven metres in width, and have an average depth of approximately 200 mm.

Two sites were surveyed but no fish found. As these streams appear to contain areas of good fish habitat (good substrate, vegetation and hydrological characteristics), it is likely that they occasionally support koaro populations or that koaro are permanently present in low numbers.

### **Significance of the Aquatic Fauna**

The limited occurrence of fish in the Rees River catchment and the lack of fish in the Shotover River catchment are not unexpected. Waterfalls appear to exclude trout from migrating into the upper catchments, and the effect of heavy rain will deplete fish populations by washing fish out of the streams over successive heavy rain events. These streams are likely to at least occasionally support koaro, but populations will be limited by flood events.

### **2.6.5 Mammals**

The threatened South Island long-tailed bat (nationally endangered) is common in the Dart Valley, and is known from one or two locations in the lower Rees Valley. South Island long-tailed bat records are scarce in Otago, with the only other known population occurring in Catlins Conservation Park. The Dart Valley bat population is one of the three largest known South Island long-tailed bat populations and is recognised as a priority population for conservation management (O'Donnell, 2000).

South Island long-tailed bats were recorded at five locations along the beech forest-grassland edge in Rees Valley within the property boundary. Bat pass rates of up to 47 passes per night were recorded, indicating high levels of activity. These records extend the known range of South Island long-tailed bats in this area.

#### **Significance of the Mammals**

South Island long-tailed bats on Rees Valley Pastoral Lease are particularly important because they extend the range of the Dart Valley-Rees Valley bat population. This is one of the three largest known South Island long-tailed bat populations, and is recognised as a priority population for conservation management. South Island long-tailed bats are listed as nationally endangered by Hitchmough (2002).

### **2.6.6 Problem Animals**

Introduced animals that may have an important effect on indigenous plant or animal communities on the property, and that can be controlled or contained, are discussed below. Other ubiquitous naturalised species for which containment or control are probably impractical (such as rodents and mustelids), or domesticated animals that are grazed on the property, are not discussed here.

Approximately 20 feral goats were observed in a relatively short section of the Flood Burn valley. Browsing and tracking damage by goats is obvious in this area, especially on the sunny faces towards the eastern (Duncans Flat) property boundary. Goats are presently controlled by the Department of Conservation, as this area is within a buffer control zone for Mount Aspiring National Park. Enhanced goat control will be necessary to protect conservation values in this area.

Other naturalised wild animals recorded on the property were rabbit, hare, brushtail possum, chamois and red deer. Control of these species may be required to protect conservation values of areas set aside for protection. White-tailed deer are also present on the property and formed the basis of guided free-range safari hunting operation under a recreation permit granted in 1999 for a one-year term.

## **2.7 HISTORIC**

### **Maori Sites**

There are no recorded Maori historic sites on the Rees Valley Pastoral Lease. There is a pit (New Zealand Archaeological Association Site No. E40/14) recorded on land adjacent to the homestead but this is likely to be of European or Chinese mining origin.

### **European Sites**

The principal historic sites on the property are associated with the mining of gold and scheelite. Many of the creeks flowing from the Richardson Mountains are gold-bearing and there are quartz reefs that contain scheelite (an ore of tungsten) and occasionally gold.

The Rees Valley supported a small population of alluvial gold miners who worked many of the side creeks on a small scale. There is little physical evidence of this mining, except for low tailings in Twenty Five Mile Creek, possible tailings on the terrace on the true left of Invincible Creek near its junction with the Rees River, a possible hut mound on the true right bank of Invincible Creek just west of the road, and tailings around the mouth of the Ox Burn. At the Ox Burn site there is a reasonably extensive area of tailings on the terrace above and west of Rees Valley Road. There are also remnant tailings on the low terrace across the Ox Burn from the powerhouse.

Probably the most significant historic sites on the property are those associated with the Invincible Mine. Unlike other underground mines in the Glenorchy area this was a gold mine. The mine was developed in the 1880s and was successful for a short time until the line of the gold bearing reef was lost in 1889. Several subsequent attempts to re-open the mine failed.

The two sections of the Invincible Mine Historic Reserve incorporate only a small part of the Invincible Mine site. At the start of the steep zig-zag track to the Invincible Mine workings is the stone ruin of McDougall's Store and Post Office which serviced the mine workers. Within the stone walls are the remnants of Donald Watherston's hut. Watherston worked and prospected many mines in the Richardson Mountains during the mid-1900s. A more detailed inspection may reveal other hut sites in the vicinity of McDougall's, as at one time 50 people were living in the vicinity of the Invincible Mine.

The existing track to the mine is the original 1880s dray track. Part way up the track is the ruin of a log-cabin built by George Thompson. The quartz reef worked by the Invincible Company runs southwest from the access track. It is probable that there are prospecting trenches along the line of the reef but the area is now covered by forest and scrub.

The track extends beyond the upper part of the reserve to Invincible Creek. In this area the track has been neatly revetted with stone. There are also several hut sites within the regenerating beech forest adjacent to the track. Some of these huts are visible in a historic Burton Brothers' photograph of the Invincible Mine in the 1880s. There are other hut sites in the regenerating forest where the track crosses Invincible Creek, and there are two probable chimney/fireplace mounds visible on the grassy flat beside Invincible Creek. On the bluff above the flat, five iron rods protruding from the rock are probably supports for an old flume. Adjacent to where the track crosses the creek there is terrace with a well preserved fire place, revetted wall and possible forge base.

The track continues on for more than a kilometre north of Invincible Creek. Near where the track exits from the forest there is a corrugated iron hut (marked on the topographical map)



which is in fair condition. This section of the track also appears to have been constructed in the 1880s as it is visible in the Burton Brothers’ photograph.

The southeast corner of the property is traversed by a route originally used by miners travelling between the Shotover Valley and Glenorchy, via the Flood Burn and Ox Burn valleys.

### **Significance of the Historic Sites**

The Invincible Mine is significant as a site where technology was used to treat ore that was high in iron pyrites. The only buddle on the southern goldfields was used at the Invincible Mine. The intactness of the Invincible Mine site and the extent of the relics, including the store and post office, dray track, mine workings and miners’ huts, make it a particularly significant historic site. The tailings in the lower Ox Burn are locally significant as the most extensive workings of this type in the Rees Valley-Glenorchy area.

## **2.8 PUBLIC RECREATION**

### **2.8.1 Physical Characteristics**

Rees Valley Pastoral Lease lies within the ‘remote’ recreation opportunity setting in the Department’s Otago Conservation Management Strategy (CMS) (1998). The CMS defines the remote recreation opportunity setting as being characterised by a sense of complete isolation from human interaction and activity, with the naturalness of the setting as an important component of the experience. Access to these areas requires some effort, self-reliance is necessary, and the recreation experience is likely to be associated with tranquillity and solitude.

A backcountry recreation opportunity setting adjoins the property on the western side of the Rees Valley. This recreation opportunity setting is characterised by a feeling of relative remoteness from populated areas yet with good recreational facilities. All three classes of the backcountry opportunity recreation setting are present on the western boundary of the property: drive-in (Rees Valley Road); 4x4 drive-in (Rees Valley riverbed); and walk-in (Rees-Dart Track).

The physical characteristics of Rees Valley Pastoral Lease are described below.

#### **Rees Valley**

This part of the property covers the floor of the Rees Valley and the lower slopes of the Richardson Mountains adjacent to the valley floor. Rees Valley is a broad glaciated valley with wide gently-sloping valley floor and moderately-steep lower valley sides. The braided Rees River and surrounding river flats are the dominant features on the valley floor. Ice-carved slopes, with prominent glacial benches and slumps, are features of the valley sides. The valley floor is dominated by pasture with gravelfield on the riverbed and small wetlands and seepages on the flats. The valley sides are dominated by relatively extensive areas of beech forest, with scrub, shrubland and tussockland on modified slopes.

The valley separates the high summits of Mt Earnslaw and the Forbes Mountains from the rugged Richardson Mountains. These impressive mountain ranges provide a spectacular backdrop to the valley. This is a semi-natural recreation setting surrounded by a highly-natural recreation setting. The Rees Valley Road provides access for cars up the valley to Muddy Creek. A four-wheel-drive track continues beyond Muddy Creek to the river flats

near Twenty Five Mile Hut. The Rees Valley Walking Track follows a poled-route up the valley from Arthurs Creek to the start of the track through beech forest in the head of the valley. This track also provides access to the track to Kea Basin and route to Mt Earnslaw on the western side of Rees Valley. A well-formed track provides foot access from Rees Valley Road to the Invincible Mine site between McDougalls and Invincible creeks. A stock track provides access from Twenty Five Mile Hut to Big Devil Hut in the mid-reaches of Twenty Five Mile Creek. Twenty Five Mile Hut was built by the Otago Tramping and Mountaineering Club.

## **Richardson Mountains**

This part of the property covers the mid and upper slopes of the Richardson Mountains and comprises the bulk of the property. The Richardson Mountains are steep, rugged and relatively isolated. The main summits are higher than 2000 m and separated by heavily glaciated basins. Eastern slopes are precipitous and western slopes have steep-sided spurs that frequently terminate in bluffs. Mid slopes on the western flank are more even, though still moderately steep and incised by the numerous large streams draining to the Rees River. Small patches of permanent snow lie on high-altitude south-facing slopes, and snow may lie over much of the range for several months during winter.

The Richardson Mountains provide a highly natural recreation setting dominated by tussockland, scrub and shrubland at lower altitudes, and cushionfield, fellfield, rock and scree at higher altitudes. There are no formed tracks on the upper part of the range, though foot access along most upper slopes is practical for experienced backcountry recreationists. A small ski area operates during winter in the upper Invincible Valley. Access to the ski area is by helicopter. The part of the property on the eastern side of the Richardson Mountains, in the Shotover catchment, is relatively inaccessible.

### **2.8.2 Legal Access**

A legal road provides access up the Rees Valley alongside or just within the western property boundary to just beyond Twenty Five Mile Spur. The formed Rees Valley Road provides good vehicle access to the western side of the property up valley to Arthurs Creek, though not all sections of the formed road follow the legal road alignment.

The lease title permits *“without restriction the free passage of members of the general public on foot or by private motor car or truck in along and over that part of the land hereby demised as adjoins the Rees River for the distance that river is within the boundaries of the land hereby demised and for a width of 10 chains hereto as shall be measured by a perpendicular line at any point to the mean bank of the said river and this reservation shall apply also in the same manner in respect of the land hereby demised as adjoins the southern bank of the said river after it re-enters the said demised land at northern end thereof.”*

A legal easement provides full, free, uninterrupted and unrestricted foot access for members of the public, and foot and vehicle access for staff of the Department of Conservation, along the formed track between the lower and upper parts of the Invincible Mine Historic Reserve. Another legal road provides access through the southwest corner of the property from Rees Valley Road.

### **2.8.3 Activities**

The CMS describes common recreation activities within the remote and backcountry recreation opportunity settings as tramping, hunting, fishing, tent camping, climbing, mountain biking, outdoor education and nature appreciation.

Recreational activities on the lower-altitude parts of the property (Rees Valley) are those associated with the Rees Valley Road and the Rees-Dart Track. These include tramping, walking, camping, hunting, fishing, driving, mountain-biking, historic resource appreciation and nature appreciation. Most popular are tramping (Rees-Dart Track and access to Kea Basin/Mt Earnslaw) and driving (Rees Valley Road), though walks to the historic sites associated with the Invincible Mine and hunting are also popular. Much of this recreational activity occurs adjacent to the property, or just within the western property boundary, except where the Rees-Dart Track passes through the northern part of the property.

Recreational activities on higher-altitude parts of the property (Richardson Mountains) are tramping, climbing, hunting and skiing. Recreational use of this area is low, as access is difficult and the terrain rugged. The tramping route through the upper Flood Burn between Duncans Flat and Cashs Flat receives occasional use and ascents or traverses of the Richardson Mountains may also be popular. Recreational hunting is primarily associated with populations of white-tailed deer in the Rees Valley. Most skiing is at the ski area in the Invincible Valley and as part of the associated heli-ski operation. Other parts of range are suitable for cross country skiing or ski mountaineering but difficult access limits these activities.

A recreation permit was granted to the lessees in 1996, for a term of thirty years, to operate the ski area in the upper Invincible Valley, undertake heli-skiing and guided educational trips and overnight accommodation in existing huts. A recreation permit was granted to the lessees in 1999, for a term of one year, to operate guided free range safari hunting on the property.

## **PART 3 OTHER RELEVANT MATTERS AND PLANS**

### **3.1 CONSULTATION**

An early-warning consultation meeting was held at Alexandra on 24<sup>th</sup> September 2003. Interest group representatives provided these comments about Rees Valley Pastoral Lease:

- The status of the Invincible Mine access easement was queried.
- It is essential that the valley floor remains as open space with the freedom for people to wander at will (Public Access NZ).
- Nobody present supported freehold status for the Invincible Ski Area.
- Vehicle access sought as far as Muddy Creek (Federated Mountain Clubs).
- Presence of white-tailed deer herd noted as a trophy hunting resource.
- Need to secure appropriate status for Twenty Five Mile Hut (Otago Tramping and Mountaineering Club).

A follow-up meeting was held at Alexandra on 12<sup>th</sup> May 2004. Representatives from interest groups provided the following additional comments about the property:

Royal Forest and Bird Protection Society

- There are dotterels on the river bed (Rees Valley).
- There is potential blue duck habitat at the Arthurs Creek junction.
- The road opposite Camp Hill is threatened by encroachment of the river.
- The Invincible Ski Area needs to be identified and covered by a concession.
- Grazing of cattle up the valley is not appropriate.

Public Access NZ

- Concessions should not be exclusive; the public should not be excluded.

Otago Fish and Game Council

- There should be no grazing of cattle up the valley.

Letters received from interest groups in May 2004 provided the following comments about Rees Valley Pastoral Lease:

NZ Deerstalkers' Association (North Otago Branch)

- Members would like access to the property to provide opportunities for hunters' enjoyment and to provide wild animal control.
- Members need vehicle access along existing formed tracks to facilitate access for hunting.
- The Association has public liability insurance of \$5 million.

NZ Deerstalkers' Association (Central Otago Branch)

- Hunters provide benefits to conservation by controlling wild animal populations and access for hunting must be retained.
- Members would like to see formed roads that give reasonable access to the back portion of the property, especially if legal roads or farm tracks are already present.

NZ Deerstalkers' Association

- The property is of considerable interest to hunters and the wild animals are of particular fascination to visitors.
- It is hoped that white-tailed deer will be retained in sufficient numbers to enable the public to see them.

- Recreational hunting provides a relatively low cost option for wild animal control in this area.
- Hunters need vehicle access along existing formed tracks to facilitate access for hunting.
- The Association has public liability insurance of \$5 million.

A submission from Federated Mountain Clubs of NZ (Inc.) (June 2004) recommends that all parts of the property above 1000 to 1100 m be restored to full Crown ownership and control, and that areas on the property below that altitude be restored to full Crown ownership with provision for short-term grazing to permit a transition in land use.

### **3.2 DISTRICT PLANS**

Rees Valley Pastoral Lease is located within the General Rural Zone of the Proposed Queenstown Lakes District Plan. The proposed plan (amended to incorporate Council decisions) requires resource consent for the clearance of areas of indigenous vegetation greater than half a hectare, or for clearance of vegetation containing threatened plants listed in a schedule to the plan. Resource consent is also required for subdivision and subsequent development, buildings, forestry and ski area activities. Forestry is not permitted in areas over an altitude of 1070m.

Parts of the property in the Rees Valley are listed as areas of significant indigenous vegetation in Appendix 5 of the Proposed Queenstown Lakes District Plan (Item 114A, Mt Earnslaw forest and bush remnants). Resource consent is required for clearance of indigenous vegetation, earthworks (beyond specified site standards), exotic tree planting and buildings in these scheduled areas. There are no registered historic sites or protected features on the property listed in the appendices to the plan. The protected landscape provisions of the proposed plan are before the Environment Court. It is likely that part of the property will be an Area of Outstanding Landscape. Landscape protection is limited to the controls set out above.

The part of the property covering the western flank of the Richardson Mountains is subject to the Otago Regional Plan. A rule in that plan requires resource consent for suction dredge mining.

### **3.3 CONSERVATION MANAGEMENT STRATEGIES AND PLANS**

Rees Valley Pastoral Lease lies within the Western Mountains Zone of the Otago Conservation Management Strategy. General objectives for this zone that are relevant to the property are listed as:

- To preserve the essentially unspoilt character of this spectacular area on land administered by the department.
- To preserve and protect the natural ecosystems and as far as possible eradicate introduced plants and animals.
- To ensure the survival as far as practicable in their natural habitats of all significant Western Mountain indigenous species.
- To satisfy public expectations for enjoyment of the natural and historic resources of the area so far as is practicable and possible having regard to the need to protect those resources and maintain the high quality of visitor experiences, and while meeting any obligations under the Ngai Tahu Deed of Settlement.

Rees Valley Pastoral Lease also lies within the Dart-Rees Special Place. The objective for the Dart-Rees Special Place is:

- To protect the high landscape and indigenous biological values of the area and to improve access to valued recreational opportunities through integrated management of the braided riverbeds, the beech forests and the high mountains, and the adjoining national park.

Priorities for the Dart-Rees Special Place are:

- The provision or negotiation of protection for the braided river beds and privately owned red beech forests.

### **3.4 NEW ZEALAND BIODIVERSITY STRATEGY**

The New Zealand Government is a signatory to the Convention on Biological Diversity. In February 2000, Government released the New Zealand Biodiversity Strategy which is a blueprint for managing the country’s diversity of species and habitats and sets a number of goals to achieve this aim. Of particular relevance to tenure review, is goal three which states:

Maintain and restore a full range of remaining natural habitats and ecosystems to a healthy functioning state, enhance critically scarce habitats, and sustain the more modified ecosystems in production and urban environments, and do what is necessary to:

*Maintain and restore viable populations of all indigenous species across their natural range and maintain their genetic diversity.*

The strategy outlines action plans to achieve this goal covering terrestrial and freshwater habitat and ecosystem protection, sympathetic management, pest management, terrestrial and freshwater habitat restoration, and threatened terrestrial and freshwater species management.

## PART 4 ATTACHMENTS

### 4.1 ADDITIONAL INFORMATION

#### 4.1.1 Scientific Names of Species

##### Plant Species

Species names follow the published volumes of New Zealand Flora (Allan, 1961; Moore and Edgar, 1976; Webb, Sykes and Garnock-Jones, 1988; and Edgar and Connor, 1999), Brownsey and Smith-Dodsworth (1989) for ferns, Allison and Child (1971) for mosses, the name changes listed in Connor and Edgar (1987) and recent names (for shrubs) listed in Wilson and Galloway (1993). Maori names are included for taonga species listed in Schedule 97 of the Ngai Tahu Claims Settlement Act 1998. Naturalised species are indicated by an asterisk (\*).

<u>Common name</u>	<u>Scientific name</u>
apple*	<i>Malus x domestica</i>
barberry*	<i>Berberis glaucocarpa</i>
beech/tawhai	<i>Nothofagus</i> spp.
blackberry*	<i>Rubus fruticosus</i>
blue tussock	<i>Poa colensoi</i>
bog rush	<i>Schoenus pauciflorus</i>
bracken	<i>Pteridium esculentum</i>
broadleaf/kapuka	<i>Griselinia littoralis</i>
broad-leaved snow tussock	<i>Chionochloa flavescens</i>
broom*	<i>Cytisus scoparius</i>
browntop*	<i>Agrostis capillaris</i>
cabbage tree/ti rakau	<i>Cordyline australis</i>
Californian thistle*	<i>Cirsium arvense</i>
catsear*	<i>Hypochoeris radicata</i>
comb sedge	<i>Oreobolus pectinatus</i>
crack willow*	<i>Salix fragilis</i>
dodder*	<i>Cuscuta epithymum</i>
Douglas fir*	<i>Pseudotsuga menziesii</i>
elder*	<i>Sambucus nigra</i>
fescue tussock	<i>Festuca novae-zelandiae</i>
grass lily	<i>Herpolirion novae-zelandiae</i>
harebell	<i>Wahlenbergia albomarginata</i>
hawthorn*	<i>Crataegus monogyna</i>
Himalayan honeysuckle*	<i>Leycesteria formosa</i>
horopito	<i>Pseudowintera colorata</i>
inaka	<i>Dracophyllum uniflorum</i>
kohuhu	<i>Pittosporum tenuifolium</i>
koromiko	<i>Hebe salicifolia</i>
lancewood	<i>Pseudopanax crassifolium</i>
macrocarpa*	<i>Cupressus macrocarpa</i>
manuka	<i>Leptospermum scoparium</i>

marbleleaf.....	<i>Carpodetus serratus</i>
marsh arrow-grass.....	<i>Triglochin palustris</i>
matagouri.....	<i>Discaria toumatou</i>
mingimingi.....	<i>Coprosma propinqua</i>
mint*.....	<i>Mentha spicata</i>
mountain beech.....	<i>Nothofagus solandri</i> var. <i>cliffortioides</i>
mountain flax/wharariki.....	<i>Phormium cookianum</i>
mountain toatoa.....	<i>Phyllocladus alpinus</i>
mountain totara.....	<i>Podocarpus hallii</i>
mouse-ear chickweed*.....	<i>Cerastium fontanum</i>
narrow-leaved snow tussock.....	<i>Chionochloa rigida</i>
native broom.....	<i>Carmichaelia</i> sp.
old man's beard*.....	<i>Clematis vitalba</i>
poplar*.....	<i>Populus</i> sp.
porcupine shrub.....	<i>Melicytus alpinus</i>
prickly shield fern.....	<i>Polystichum vestitum</i>
ragwort*.....	<i>Senecio jacobaea</i>
raspberry*.....	<i>Rubus idaeus</i>
rautahi.....	<i>Carex coriacea</i>
red beech.....	<i>Nothofagus fusca</i>
red clover*.....	<i>Trifolium pratense</i>
rowan*.....	<i>Sorbus aucuparia</i>
Russell lupin*.....	<i>Lupinus polyphyllus</i>
Scotch thistle*.....	<i>Cirsium vulgare</i>
scrub pohuehue.....	<i>Muehlenbeckia complexa</i>
sheep's sorrel*.....	<i>Rumex acetosella</i>
short tussock.....	<i>Fescue</i> sp.
silver beech.....	<i>Nothofagus menziesii</i>
silver tussock/wi.....	<i>Poa cita</i>
slender rush*.....	<i>Juncus tenuis</i>
slim snow tussock.....	<i>Chionochloa macra</i>
snowberry.....	<i>Gaultheria depressa</i> var. <i>novae-zelandiae</i>
snow totara.....	<i>Podocarpus nivalis</i>
soft rush*.....	<i>Juncus effusus</i>
South Island edelweiss.....	<i>Leucogenes grandiceps</i>
speargrass/taramea.....	<i>Aciphylla</i> sp.
sphagnum moss.....	<i>Sphagnum</i> sp.
strawberry*.....	<i>Fragaria xananassa</i>
sweet brier*.....	<i>Rosa rubiginosa</i>
sweet vernal*.....	<i>Anthoxanthum odoratum</i>
tall tussock.....	<i>Chionochloa</i> sp.
tangle fern.....	<i>Gleichenia dicarpa</i>
tarweed*.....	<i>Parentucellia viscosa</i>
tauhinu.....	<i>Ozothamnus leptophyllus</i>
thousand-leaved fern.....	<i>Hypolepis millefolium</i>
three finger.....	<i>Pseudopanax colensoi</i>
toad rush*.....	<i>Juncus bufonius</i>
tree fuchsia/kotukutuku.....	<i>Fuchsia excorticata</i>
tree lupin*.....	<i>Lupinus arboreus</i>
tussock hawkweed*.....	<i>Hieracium lepidulum</i>
tutu.....	<i>Coriaria sarmentosa</i>
white clover*.....	<i>Trifolium repens</i>
wineberry.....	<i>Aristotelia serrata</i>
yarrow*.....	<i>Achillea millefolium</i>
Yorkshire fog*.....	<i>Holcus lanatus</i>



## Animal Species

Species names follow King (1990) for mammals, the June 2003 version of the New Zealand Recognized Bird Names list (compiled by C.J.R. Robertson and D.G. Medway for the Ornithological Society of New Zealand Inc.) for birds, Whitaker (1998) for lizards and McDowall (2000) for fish. Maori names are included for taonga species listed in Schedule 97 of the Ngai Tahu Claims Settlement Act 1998. Naturalised species are indicated by an asterisk (\*).

Common name.....Scientific name

Australasian harrier/kahu.....	<i>Circus approximans</i>
banded dotterel .....	<i>Charadrius bicinctus bicinctus</i>
bellbird/korimako .....	<i>Anthornis melanura melanura</i>
black-fronted tern .....	<i>Sterna albobriata</i>
black shag/koau .....	<i>Phalacrocorax carbo novaehollandiae</i>
blue duck/kowhiowhio .....	<i>Hymenolaimus malacorhynchos</i>
boulder copper butterfly .....	<i>Lycaena boldenarum</i>
brown blowfly .....	<i>Calliphora stygia</i>
brown creeper .....	<i>Mohoua novaeseelandiae</i>
brown hare* .....	<i>Lepus europaeus occidentalis</i>
brown trout* .....	<i>Salmo trutta</i>
brushtail possum* .....	<i>Trichosurus vulpecula</i>
chamois* .....	<i>Rupicapra rupicapra rupicapra</i>
common bully .....	<i>Gobiomorphus cotidianus</i>
European rabbit* .....	<i>Oryctolagus cuniculus cuniculus</i>
feral goat* .....	<i>Capra hircus</i>
freshwater crayfish .....	<i>Paranephrops</i> sp.
goat* .....	see feral goat
grey warbler/riroriro .....	<i>Gerygone igata</i>
hare* .....	see brown hare
kea.....	<i>Nestor notabilis</i>
koaro .....	<i>Galaxias brevipinnis</i>
longfin eel.....	<i>Anguilla dieffenbachii</i>
McCann's skink.....	<i>Oligosoma maccanni</i>
New Zealand falcon/karearea .....	<i>Falco novaeseelandiae</i>
New Zealand pipit/pihoihoi .....	<i>Anthus novaeseelandiae novaeseelandiae</i>
paradise shelduck/putakitaki.....	<i>Tadorna variegata</i>
possum* .....	see brushtail possum
rabbit* .....	see European rabbit
rainbow trout* .....	<i>Oncorhynchus mykiss</i>
red deer* .....	<i>Cervus elaphus scoticus</i>
rock wren .....	<i>Xenicus gilviventris</i>
silveryeye.....	<i>Zosterops lateralis lateralis</i>
southern black-backed gull/karoro .....	<i>Larus dominicanus dominicanus</i>
southern blue butterfly .....	<i>Zizina otis oxleyi</i>
South Island fantail/piwakawaka .....	<i>Rhipidura fuliginosa fuliginosa</i>
South Island fernbird/mata .....	<i>Bowdleria punctata punctata</i>
South Island kaka .....	<i>Nestor meridionalis meridionalis</i>
South Island long-tailed bat.....	<i>Chalinolobus tuberculatus</i>
South Island rifleman/titipounamu .....	<i>Acanthisitta chloris chloris</i>
South Island robin/kakaruai .....	<i>Petroica australis australis</i>
South Island tomtit/miromiro .....	<i>Petroica macrocephala macrocephala</i>
spur-winged plover .....	<i>Vanellus miles novaehollandiae</i>
tui.....	<i>Prosthemadera novaeseelandiae novaeseelandiae</i>

white-tailed deer\* ..... *Odocoileus virginianus borealis*  
wrybill..... *Anarhynchus frontalis*  
yellow-crowned parakeet/kakariki..... *Cyanoramphus auriceps auriceps*  
yellowhead/mohua..... *Mohoua ochrocephala*

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### **4.1.3 Appendices**

## **4.2 MAPS**

### **4.2.1 Topographical and Cadastral Boundaries**

### **4.2.2 Landscape Units and Significant Landscape Values**

### **4.2.3 Significant Ecological, Historic and Recreation Resources**

### **4.2.4 Level II Land Environments of New Zealand**

## **4.3 PHOTOGRAPHS**

### **4.4 Federated Mountain Clubs Report on Recreation and Related Inherent Values on Rees Valley Station.**

### **4.5 Forest and Bird Society (Upper Clutha Branch) – early tenure review report.**