

Crown Pastoral Land Tenure Review

Lease name : KYEBURN

Lease number : PO 197

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.

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

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

March

06

**DOC CONSERVATION RESOURCES REPORT ON
TENURE REVIEW OF**

KYEBURN PASTORAL LEASE

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PART 1

INTRODUCTION

1.1

Kyeburn was inspected on the 20 -23 November 2001 to compile this **Conservation Resources Report**, as part of the process to review of the pastoral lease (PL) tenure. The tenure review is being undertaken under the provisions of the Crown Pastoral Land Act 1998. A range of specialists have visited the property and have contributed to this report by describing and assessing the significance of the inherent values.

Kyeburn Station totals 6586 ha and is divided into two separate land areas. For the purposes of this report, the lowland area is referred to as the **Spec Gully Block** and the high country area as the **Run Block**.

The Spec Gully Block of 1909ha, is located in the northeast corner of the Maniototo Plain between Naseby and the Kyeburn. It is separated from the Run Block by approximately nine kilometres (nineteen km by road from the Kyeburn homestead).

The Run Block of approximately 4677ha, includes part of the Hawkdun/Ida Range south face (Upper Little Kyeburn catchment), and a large area of the expansive Hawkdun alpine plateau. The Little Kyeburn catchment and the alpine plateau are part of dissected mountainous tussocklands between Central Otago and South Canterbury. The plateau area forms a large and distinct upland landscape entity defined by the St Mary's Range, Mount Kyeburn and the Hawkdun Block Mountain range. The plateau area is incised by a series of northwest flowing tributaries of Guffies Creek, which form part of the upper Otematata catchment. The Little Kyeburn flows south into the Kyeburn and Taieri catchment.

The Run Block is located mostly in the DOC Canterbury Conservancy(for those parts in the Waitaki catchment), the Waitaki Ecological Region and the St Marys Ecological District. No Protected Natural Areas Programme survey report has been completed for this ecological district.

The Spec Gully Block and the Little Kyeburn catchment are in the Otago Conservancy, the Central Otago Ecological Region and the Maniototo Ecological District. A Protected Natural Areas Programme survey report has been completed for this ecological district. There were no areas within this part of the property that were recommended for protection.

PART 2**INHERENT VALUES: DESCRIPTION OF CONSERVATION RESOURCES AND ASSESSMENT OF SIGNIFICANCE****2.1 LANDSCAPE****Methodology:**

The pastoral lease is divided into three landscape units (LUs). For each unit a landscape character description is provided along with a description of the key visual and scenic attributes present. An evaluation summary is then presented using a range of criteria to assess each unit and assist with determining each unit's high inherent values. The criteria include:

1. Intactness: - refers to the condition of the natural vegetation, patterns and processes and the degree of modification present.
2. Legibility: - refers to its expressiveness - how obviously the landscape demonstrates the formative processes leading to it.
3. Aesthetic Factors: - include criteria such as distinctiveness - the quality that makes a particular landscape visually striking. Frequently this occurs when contrasting natural elements combine to form a distinctive and memorable visual pattern. A further criteria assessed under aesthetic factors is coherence. This is based on characteristics including intactness, unity, continuity, and compatibility. Intrusions, alterations, disruptions tend to detract from coherence.
4. Historic Factors - refers to historically valued attributes in the context of a high country landscape
5. Visibility - refers to the visibility from public places such as highways, waterways or local vantage points.
6. Significance - is the significance of the characteristics and features, or combination of characteristics and features within individual units. If they are locally, regionally or nationally significant.
7. Vulnerability - is a measure of each landscape unit's susceptibility to further ecological deterioration, which would impact on landscape values.

Landscape Units:

Kyeburn Station is broken into three landscape units (refer Map 4.2). These include:

LU 1 Spec Gully Block

LU2 Little Kyeburn Catchment

LU3 Buster Plateau

Landscape unit 1 (LU1) –Spec Gully Block:

Character Description:

The Spec Gully Block is within the Maniototo Plain and consists of undulating river flats and terraces. The whole of the Spec Block, apart from some uncultivated areas to the north, is developed farmland. The topography is low ridge and outwash river flats. The flats are very stony with thin soils. Vegetation patterns are dominated by exotic shelterbelts, exotic plantings centred around the station buildings, and exotic pasture, grasses, herbs and legumes. Scattered matagouri shrubland occurs on some terrace faces, and there are remnant areas of snow tussock to the north of the block. These are the only visual remnants of indigenous character.

Spec Gully stream flows through the centre of the block. An airstrip is located on the northwest corner of the block.

Key Visual & Scenic Values:

This unit is typical of farmland within the Naseby/Danseys Pass area of the Maniototo Plain. It forms part of the plains landscape. There are no significant visual or scenic values apart from views out of The Plain and enclosing ranges.

Evaluation Summary:

Table 1

Criteria	Value	Comment
Intactness	Low	Mostly highly modified.
Legibility	Medium	Landform patterns mainly intact.
Aesthetic Factors	Low	Typical plains landscape.
Historic Factors	Medium	Station buildings and plantings have historic value.
Visibility	Medium	North end of block visible from Naseby Kyeburn Diggings Road (Danseys Pass).
Significance	Low	
Vulnerability	Low	

Landscape unit 2 (LU2) – Little Kyeburn:

Character Description:

This unit includes the south end of the Run Block. It is a distinct physical entity below the Hawkdun /Ida ridge and entirely within the Little Kyeburn catchment. The majority has a south facing aspect.

The unit falls into two zones. The lower zone consists of toe slopes, fans and terraces to about 900 metres A.S.L. The fans and terraces are predominantly tussock covered, (short tussock grading into snow tussock). Grey shrubland occurs within gullies, and contrasts with tussock slopes. Old gold workings occur on alluvial terraces near the stream. Musterers huts (both disused and used) are located near the main gate to the lease along with elderberry and

pasture. A band of scattered and scruffy shrubland and tussock occurs on lower slopes above the new hut (relocated Kokonga Railway Station). This is the most modified corner of the unit. A lone wilding pine tree is growing on the alluvial fan on the true left of the Little Kyeburn.

A second zone takes in the remainder of the unit. It is visually contiguous with the lower zone as tussock is the dominant and unifying feature, though short tussock is replaced by tall tussock. It includes the moderately steep to very steep mountain slopes of the upper catchment. Charcoal/grey rock outcrops and bluffs are abundant and contrast with smooth undulating tussock covered slopes. Some rock bluffs are very large and steep with scree slides. Shrubland, including a significant stand of totara occurs within gullies and lower slopes. While the tussock cover in this higher zone is relatively uniform and in remarkably good condition overall, there are sunny ridges, where tussock cover is more modified and depleted.

Key Visual & Scenic Values:

The Little Kyeburn catchment forms part of the range continuum connecting the Hawkdun to the Kakanui Mountains and is a part of the visual backdrop to the Naseby/Danseys Pass area. It is also part of the landscape of Mount Kyeburn, a significant and prominent feature in this corner of the Plain.

Other aspects of visual and scenic values of this unit are associated with visual effects of the dominant tall tussock extending across the folded and faulted landforms. The soft textured flowing tussock and schist rock outcrops personifies visual values associated with Central Otago high country. This landscape is visually very coherent and distinctive.

The lower zone (flats, fans and lower slopes) below approximately 900-1000 metres, while more modified, retains the appearance of reasonably intact tussock grassland. The continuity of tussock and relative intactness from lower fans to the ridgeline is an important aspect of visual values within this unit.

Evaluation Summary:

Table 2

Criteria	Value	Comment
Intactness	Medium to High	Medium within lower zone, high above 1000 metres.
Legibility	High	Landform processes highly legible.
Aesthetic Factors	Medium to high	High degree of coherence due to the level of intactness and unified appearance of the dominant tussock cover.
Historic Factors	Medium	Gold workings on alluvial flats.
Visibility	Medium	Range face visible as backdrop. Incised areas have low visibility.
Significance	Medium to high	Significant as part of wider Hawkdun Range landscape.
Vulnerability	High	Vulnerable to fragmentation from farm development.

Landscape Unit 3 (LU3) – Buster Plateau:

Character description:

The whole of the plateau from the Hawkdun ridge, to the north boundary at Hut Creek (within and outside the lease) is identified as one landscape unit with broadly similar characteristics. To assist with description of this large area, it has been further broken down to three areas:

- North plateau (north of Browns Creek).
- South plateau (roughly south of Browns Creek).
- Guffies Creek.

The plateau is an expansive tussock clad upland plateau defined by the St Mary's Range, and continuing around to Mount Kyeburn and Mount Buster, with Guffies Creek as the western boundary. The Buster Plateau is in reality contiguous with Soldiers Syndicate and the Ida Syndicate with the whole area containing broadly similar characteristics. However for the purposes of this assessment the unit boundary is the lease boundary at Guffies Creek.

The plateau as a whole contains a remote backcountry character. Man made features are limited to access tracks, musterers huts, holding paddocks and old gold workings within the southern plateau area. Expansive views across tussock landforms to the St Mary's Range, Mount Domet, Grayson Peak, Kohurau, Mount Kyeburn and the adjoining high plateau of the Ida and Soldier Syndicates are an important part of the landscape of the Plateau.

- North Plateau:

This subunit (as with the south of Browns Creek) comprises a fairly simple landform of dissected peneplain made up of incised streams, and rounded, gently undulating ridge crests. The ridges are generally tilted to the north. The incised streams are all northwest/southwest trending and include Fraters Creek, and the lower sections of Green Gully and Browns Creek. Isolated and scattered rock outcrops occur on the broad ridges. However rocky bluffs and outcrops are more commonly associated with valley sides and within steep sided gorges. Tussock is the dominant vegetation throughout although snow tussock is scattered and patchy and replaced by short tussock, *Aciphylla*, and bare ground. Inter tussock native plant associations remain part of the mix and hawkweed (mouse ear) is widespread.

Tussock cover is very depleted on sunny north facing aspects and on the valley floors within tributaries. Hawkweed has taken over as the dominant cover in these locations.

The eastern end of Green Gully forms a narrow alluvial flat with a meandering watercourse. Downstream it becomes more entrenched and forms a steep sided gorge before joining Guffies Creek. The gorge supports scattered grey shrubland and very depleted tussock cover and hawkweed. Rock bluffs and outcrops, slips, eroded scarps and scree areas are notable features of the lower section of Green Gully. Browns Gully is smaller by comparison with a much-reduced catchment area and narrow incised watercourse along the full length. Valley sides are not as steep. Vegetation patterns are similar to the rest of the unit. North faces are very depleted snow tussock, hawkweed and bare ground.

- South Plateau:

This area includes south of Browns Creek. It includes the ridge between Browns Creek and Robertson's Creek catchment. The southern end of the plateau retains essentially the same characteristics as in the north. The landform consists of rounded and undulating ridges, and incised gullies. Robertson Creek also trends northeast/southwest and joins Guffies Creek. The eastern end of the catchment rises to 1450 A.S.L., the highest point within the lease.

Vegetation is also similar, although overall is less modified. *Chionochloa* spp. is the dominant cover with short tussock and inter-tussock native species and hawkweed as other components. Wetland and bogs are significant features. A greater level of modification to tall tussock occurs on sunny north faces along access tracks and stock camp areas.

The Buster Gold Diggings are a distinctive and major landscape feature of the southern end of the plateau and represent an important example of early high altitude gold mining. White exposed quartz gravels are a dominant visual feature. Time has softened the effect of the scars and the stark contrast of the exposed quartz gravels set within a vast upland tussock plateau creates a somewhat surreal and distinctive effect. A network of disused dams water-races, pipes, and huts are scattered over the plateau contribute to the human history overlay associated with the mining activity.

- Guffies Creek:

Guffies Creek forms the western boundary of the lease and is deeply incised into the plateau landscape. The creek meanders across the narrow valley floor. The floor contains alluvial material forming outwash flats and low terraces. White quartz gravels are also exposed within the valley floor. The valley sides are steep to moderately steep. Rock bluffs and outcrops, steep eroding slopes and scarps are characteristics features.

Native vegetation cover is very depleted and patchy within Guffies Creek. This is probably the most modified area of the plateau. Some remnant shrubland is associated with outcrops and bluffs. Downstream of the confluence with Robertson's Creek, a tall rock spire consisting of shattered greywacke is a feature.

Key Visual & Scenic Values:

The Buster Plateau is part of the large and visually impressive Hawkdun/Ida Range plateau. Notwithstanding areas of very depleted and degraded tall tussock, it has high visual values. These visual values are derived from the following characteristics:

- The scale, openness and expansiveness of the landscape.
- The distinctive undulating plateau landform.
- The unifying and distinctive colour and texture of the dominant tussock cover.
- The spectacular and impressive views to the St Mary's Range and adjacent peaks and ranges across continuous and uninterrupted views of tussocked landforms.
- The visual effects and stark contrast provided by the exposed quartz gravel gold diggings set within a spectacular upland plateau.
- The visual values associated with seasonal change, weather and light.

Evaluation Summary (Buster Plateau):

Table 3

Criteria	Value	Comment
Intactness	Medium	Varies considerably. Low within Guffies Creek and on sunny ridges. High in other areas. Natural characteristics overall remain intact.
Legibility	High	Landform patterns and processes very legible.
Aesthetic Factors	High	Visually very coherent despite areas of depleted tall tussock. Very distinctive, highly memorable, and visually impressive high country landscape. Buster Diggings are visually impressive and, to some highly scenic.
Historic Factors	High	Buster diggings –important example of high alpine early mining, set within an intact tussock landscape.
Visibility	Low	
Significance	High	Part of a large and nationally significant upland plateau where indigenous characteristics are intact.
Vulnerability	High	Fragile alpine area. Vulnerable to any landuse changes that would further impact on indigenous character.

Significance of Landscape:

Little Kyeburn Catchment:

The Little Kyeburn catchment contains high inherent landscape values. The integrity of this high country tussock landscape is intact and includes lower fans and terraces, gorge, and lower and upper mountain slopes. Tall tussock and herbfield communities are relatively uniform and in good condition. Impressive rocky bluffs, outcrops and shrublands also contribute to its indigenous character. The area forms the backdrop to the Naseby/Danseys Pass area and is part of the landscape of Mount Kyeburn area, which collectively sustains the special natural quality, and integrity of the high country. A small corner of the unit around the hut is more modified.

Buster Plateau:

The Buster Plateau represents an area of major landscape significance. Its significance is derived from a wide range of characteristics and values that contribute to it being quite unlike anywhere else in nationally. These include:

- It is part of a large and remote upland tussock plateau that extends beyond the property boundary.

- The scale, openness and expansiveness of the landscape.
- The undulating plateau landforms and incised gullies combined with the dominant and unifying tussock cover.
- Spectacular views to surrounding ranges across uninterrupted tussock landforms.

Importantly it is part of a large upland tussock landscape where indigenous characteristics are intact. While areas are depleted and in some areas degraded, the whole area retains its natural character and the appearance of an expansive tussock landscape. It is visually very coherent and distinctive. The Buster plateau (within Kyeburn Station) is integral to, and part of the wider Hawkdun/Ida plateau landscape. Fragmentation of any part of the plateau would diminish the value and significance of the whole area.

The Buster Diggings represent an important historic /cultural overlay on the Buster Plateau. The tussock and remote backcountry setting provides the context for appreciation of the Buster Diggings. The Diggings and their setting are visually very interesting and impressive, and to some highly scenic.

2.2 LANDFORMS & GEOLOGY

The basement rocks of the Central Otago region were derived from sedimentary rocks originally deposited in the New Zealand geosyncline during or before the Jurassic period. In the Rangitata Orogeny these sedimentary rocks were uplifted and metamorphosed to form four textural grades within the so-called 'Haast Schist' Group and low grade metagreywackes of the Torlesse Group, with a predominantly north-west trending fold axis.

Following this uplift there was a long period of relative tectonic stability when the landmass was deeply eroded to form a peneplain (ie: a broad terrane of low relief). The peneplain surface gradually subsided and was deeply buried under a variety of sediments. Fine grained sediments known as the Manuherikia Group are thought to have been deposited during the Miocene in a lake basin that covered much of Central Otago.

Disruption of the late Cretaceous - early Tertiary peneplain commenced during the Kaikoura Orogeny when the fault-block mountains of Central Otago started to rise. This process resulted in the formation of distinct physiographic provinces in the Otago Region, each containing a segment of the former peneplain. East of the Hawkdun Ecological District, the St Marys Range rises from the lowlands of the Waitaki Valley. South-west of the St Marys Range the headwaters of the Otematata River are entrenched in the Hawkdun Plateau, a well-preserved peneplain remnant.

The Run Block is in a transitional area between the mountain ranges of Canterbury and Central Otago, both in terms of physical location, and geology and landforms. The northern part of the run lies in the head of the Otematata catchment which feeds the Waitaki River.

Parent material on the Run Block is schist (Chlorite II) with higher grade schist to the east and south adjacent to Mt Domet and Mt Kyeburn. Remnant deposits of gold bearing quartz gravel are located on plateau areas near to the Mt Buster saddle and extending north east toward Hut Creek. This is a fossil beach deposit dating to the uplift in the tertiary period.

The Spec Gully Block is made up of mixed greywacke piedmont gravel's and sand along with remnants of successive tills and outwash fans associated with penultimate and earlier glaciations.

Significance of Landforms and Geology:

Geologically this area is distinctive as it is close to the boarder of the Schist of Otago and the Greywacke of Canterbury. The geology is responsible for the rich diversity of vegetation and insects which are a mix of species of those normally found in both Otago and Canterbury.

The exposed quartz gravels are a special feature that has seen considerable past gold mining activity. The resulting terrain has little vegetation and a bright, white appearance. The formations remaining from the sluicing processes provide an unusual and distinctive landscape.

2.3 CLIMATE

Mean annual precipitation is estimated at 760 mm at the foot of the Buster Road, with a rise to an estimated 1000mm on areas above 1200m and reducing to 900 mm on lower parts to the north. Rainfall at the Spec Gully Block is around 450 mm. The run area is subject to frequent fogs that come from the east and south. Most winters, snow lies up to a metre deep on the higher parts of the peneplain area. Summer days are hot and dry, with little shelter from desiccating north-westerly winds. The growing season is short with frosts about seven months of the year.

2.4 VEGETATION

Five land units have been identified for the purpose of describing the vegetation. These are: **Spec Gully Block** (Lower Kyeburn Catchment); **Little Kyeburn Catchment**; **Buster Plateau**; **Alpine Zone** South of Mount Kyeburn; **Incised Valleys** (Guffies Creek and Catchments).

Spec Gully Block:

This block is in two distinct parts. Land west of Spec Gully is comprised of gently rolling parallel hills formed from the large tilted outwash fan beneath the Ida Range, and dissected by many small tributaries of the Kyeburn River. Land east of Spec Gully is an alluvial valley and terrace system.

The southern end of the block is the most developed for farming with many cultivated and cropped paddocks which retain no significant botanical values. Further north scattered scrub occur on the slopes of the ridges and spurs, particularly those facing northeast. This is dominated by matagouri (*Discaria toumatou*) with occasional *Carmichaelia petriei* and *Melicytus alpinus*. Groundcover is mostly exotic but occasional native species include silver tussock (*Poa cita*), hard tussock (*Festuca novae-zelandiae*), *Leucopogon fraseri*, *Oxalis exilis*, *Coprosma petriei* and *Carmichaelia corrugata*.

The northern third of the block displays a progressively more natural character with shrublands forming near continuous ribbons along northeast facing slopes and mixed short tussock/exotic grasslands dominating the interfluves. Amongst these short tussocklands are moderately dense concentrations of generally heavily browsed narrow-leaved snow tussock (*Chionochloa rigida*). These become more dominant on the wetter southwesterly faces and along the margins of stream channels. Occasional coral broom (*Carmichaelia crassicaule*) is also present in the tussocklands.

The dry hillslopes facing Spec Gully support tall shrubland on relatively stable substrates and dwarf shrubland/herbfield on actively eroding slopes with much bare ground. Tall shrubland is comprised of matagouri and *Carmichaelia petriei* often in conjunction with the sprawling liane *Muehlenbeckia complexa*. Some grassy clearings amongst shrubland have the dwarf broom *Carmichaelia corrugata*. The dwarf shrubland/herbfield contains *Carmichaelia nana*, *C. nana* x *C. petriei* hybrids, *Melicactus alpinus*, occasional *C. vexillata*, *Muehlenbeckia axillaris*, *Oxalis exilis*, *Leucopogon fraseri*, *Dichondra brevifolia*, and *Carex resectans*. Mouse-ear hawkweed is a common weed of this community. Native grasses present include hard tussock, silver tussock, plume grass (*Dichelachne crinita*) and *Elymus* sp.

Wetlands are represented by the numerous streams that dissect the block. Of particular note is the meandering course of Spec Gully which is subject to periodic flood events. A small range of wetlands have developed on damp depressions on the flood plain and at the back of meander bends. These are dominated by exotic *Juncus* species and native *Carex coriacea* with rapid invasion of disturbed sites by introduced broom (*Cytisus scoparius*). A further small wetland is present where an unnamed stream passes through the Kyeburn terrace scarp just prior to its confluence with the Kye Burn. This has slow-moving channels filled with watercress (*Rorippa microphylla*), *Azolla filiculoides*, red pondweed (*Potamogeton cheesemanii*) and margins of *Carex secta*, *C. coriacea*, *C. kaloides* and *Juncus* spp.

Little Kyeburn Catchment:

The Little Kyeburn catchment exhibits a more diverse and intact flora than the balance of the property, reflecting this area's higher rainfall, cool southerly aspect and generally steep nature with numerous bluffs and shallow gorges which appear to have precluded intensive grazing, burning or pasture development.

Southerly aspects in the vicinity of the Buster Plateau support dense slim snow tussock (*Chionochloa macra*) grasslands interspersed with comb sedge (*Oreobolus pectinatus*) bogs with *Ranunculus gracilipes*; *Plantago novae-zelandiae*, *Euphrasia zelandica* and a variety of other native alpine wetland species. Very wet areas have *Sphagnum* moss interspersed with wet tolerant species such as *Dolichoglottis lyallii* and Maori onion (*Bulbinella angustifolia*) present.

Easterly aspects in the upper part of the catchment are clothed in an intact dense cover of tall tussock. Red tussock (*Chionochloa rubra*) dominates areas with impeded drainage while narrow leaved snow tussock occurs on better drained sites.

Red tussocks typically average 75 cm in height. Typical species composition amongst dense tussock cover includes *Ranunculus gracilipes*, Maori onion, *Anistome aromatica*, *Celmisia gracilentia* and *Coprosma perpusilla*. Common exotics include sweet vernal (*Anthoxanthum odoratum*) and the ubiquitous mouse ear hawkweed (*Hieracium pilosella*).

In more open red tussock areas the grass Chewings fescue (*Festuca rubra*) forms a thick sward on damp sites whilst on drier sites with some rocky material *Gaultheria depressa*, *Raoulia subsericea*, *Pimelea traversii* dominate groundcover.

Narrow-leaved snow tussocklands are present on lower altitude easterly aspects on the west side of Little Kyeburn and a broad altitudinal zone on the east side of the catchment above a ribbon of shrubland. Tussock cover is largely dense and intact with the exception of a band of open tussockland on the eastern side of the Little Kyeburn where mouse ear hawkweed and sweet vernal have colonised open areas. The orchid *Prasophyllum colensoi* is scattered throughout.

A series of rocky bluffs and boulder fields dominate the mid altitude zone (900 –1100 metres) on the western side of the catchment. They provide habitat for a diverse range of species not found or uncommon on the balance of the property. Common species include the giant Spaniard (*Aciphylla scott-thomsonii*), prickly shield fern (*Polystichum vestitum*), and snow groundsel (*Dolichoglottis lyallii*). In this zone there is also a significant woody component including snow totara (*Podocarpus nivalis*), *Gaultheria crassa*, *Dracophyllum longifolium*, *Dracophyllum pronum*, *Hebe rakaiensis*, *Olearia odorata*, *Myrsine nummularia* and *Olearia cymbifolia*. A single *Senecio dunedinensis* (a rare native groundsel) plant was found growing under a rock ledge at GR NZMS 260 I41 92958 82186 .

With decreasing altitude snow totara hybridises with Hall's totara (*Podocarpus hallii*) forming large shrub-like woody mats over boulder fields. The mid to lower reaches of the Little Kyeburn are flanked by a scattering of mature Hall's totara with some 40 trees present.

In the upper to mid reaches of the Little Kyeburn valley floor, small dry stony alluvial terraces subject to periodic flooding are vegetated by low growing mat plants including *Muehlenbeckia axillaris*, *Leucopogon fraseri*, *Lycopodium fastigiatum*, and *Acaena inermis*. The more extensive alluvial terraces support patches of shrubland containing *Discaria toumatou*, *Coprosma ciliata*, *Olearia odorata*, *Olearia bullata* and golden spaniard (*Aciphylla aurea*).

In the lower 2km of the Little Kyeburn within the lease boundary lower slopes on the eastern bank support grey scrub and scattered Hall's totara trees. These shrublands are dominated by *Hebe rakaiensis*. Other species include matagouri, *Coprosma rugosa*, *Coprosma species "t"*, *Aristotelia fruticosa*, *Coprosma propinqua*, *Carmichaelia petriei*, *Aciphylla scott-thomsonii*, golden speargrass, *Corokia cotoneaster* (on dry sunny locations), *Olearia odorata* and *Rubus schmidelioides*. A further five plants of *Senecio dunedinensis* were located under a rock overhang adjacent to the Little Kyeburn at 920 m.a.s.l at GR NZMS 260 I41 938 822 growing amongst *Poa colensoi*, mouse ear hawkweed, sweet vernal, matagouri, *Carmichaelia petriei* and scattered narrow-leaved snow tussock.

Three fern species, *Asplenium appendiculatum* subsp. *appendiculatum*, *Hymenophyllum multifidum* and *Hypolepis millefolium* inhabit sheltered damp sites in the river gorge.

Shrublands and grasslands in the lower most corner of the Little Kyeburn, whilst retaining much of their natural character, are somewhat more modified. As the valley opens the shrubland composition changes with manuka (*Leptospermum scoparium*) and toitoi (*Cortaderia richardi*) becoming prevalent. Some gorse is present in this area along with a variety of exotic grasses and herbs.

Buster Plateau:

An extensive plateau (being part of the much larger Hawkdun Plateau area) at 900 – 1300 metres, rises from east to west towards the crest of the Saint Mary's Range in the north, and the summit of Mount Kyeburn to the south. Much of this plateau supports an extensive tall tussockland which is in turn part of a massive tussock landscape covering much of the Saint Mary's Range to the south, and the Hawkdun and Ida Ranges to the north. In general, the condition of tussocklands on Kyeburn pastoral lease improves with altitude, although composition and density are also heavily influenced by aspect and local drainage patterns. Drainage patterns at many sites have been affected by historic gold mining activity. Throughout this landscape unit, significant damage has occurred due to pig rooting. Disturbance of soil and vegetation by pigs appears to be a common means by which hawkweed invasion is occurring. In the vicinity of 900m on more shady and neutral aspects and to closer to 1100 – 1200 metres on sunny aspects tussock cover mostly comprises narrow-leaved snow tussock which typically forms a ground cover of 30–40%. Mouse ear hawkweed is very common, typically forming 10% ground cover with king devil (*Hieracium praealtum*) also prevalent. Other species present include hard tussock, *Raoulia subsericea*, golden spaniard, *Pimelea traversii*, Maori onion, tussock hawkweed, *Acaena caesiiglauca*, *Poa imbecilla*, *Gaultheria depressa* and scattered *Ozothamnus vauvilliersii* shrubs.

Much of the toe-slope zone of the Saint Marys Range (typically 1200 – 1300 m a.s.l.) is a poorly drained seepage area. Here native vegetation cover is more intact (with less hawkweed) and tussock stature is taller. Tussock cover is dominated by red/copper tussock with narrow-leaved snow tussock occurring at drier sites and some hybridisation occurring between the two species. Species which find a niche amongst the thick tussock sward include *Gaultheria depressa*, *Luzula rufa*, *Coprosma petriei*, *Coprosma pumila*, *Celmisia gracilentia*, *Gaultheria parvula*, *Uncinia* spp, *Carex* sp, *Viola cunninghamii*, *Anisotome flexuosa*, *Leucopogon fraseri*, *Plantago triandra*, *Leucopogon colensoi* and *Scleranthus uniflorus*. The wettest sites support an inter tussock cover of *Sphagnum* moss with scattered cushion plants and herbs including comb sedge, *Kelleria villosa*, *Geranium microphyllum*, *Hydrocotyle novae-zelandiae* and *Acaena* spp. Wet areas are most extensive on the northern part of the plateau in the vicinity of the Mount Buster Diggings.

Slim snow tussock is present on the upper toe-slopes on shady aspects. Hybridisation occurs between narrow-leaved snow tussock and slim snow tussock.

Alpine Zone (South of Mount Kyeburn):

Only a small area covering some 200 hectares extends above the 1300m contour to the crest of a ridge at 1500m to the south of Mount Kyeburn. A band of slim snow tussockland between 1300 and 1400 m comprises some of the best tall tussock cover on the property. Tussock density and stature generally improves with altitude, although parts of the upper margins of this belt have been subject to heavy grazing. Here slim snow tussock typically forms over half the ground cover with a lesser component of red tussock, especially at seepage sites. Hawkweed is less common than on the Buster plateau area with mouse-ear hawkweed typically forming a 10% ground cover. King devil and tussock hawkweed are common but form little cover. Native inter tussock species include *Celmisia lyallii* (notably absent from much of the plateau area), *Raoulia subsericea*, *Luzula rufa*, *Lycopodium scariosum*, *Gaultheria depressa*, *Ozothamnus vauvilliersii*, *Schoenus pauciflorus* and *Poa colensoi*.

In the uppermost corner of the property south of Mount Kyeburn above 1400 metres, slim snow tussock dominance yields to cushionfield and stone pavement with scattered tall tussock. Cover in these open areas is dominated by *Dracophyllum muscoides*, *Anisotome flexuosa*, *Kelleria villosa*, *Gaultheria depressa*, *Chionohebe thomsonii*, *Colobanthus strictus*, *Celmisia sessiliflora*, *Phyllachne colensoi*, *Leptinella pectinata* subsp. *villosa*, and *Celmisia laricifolia*. Also present is *Ranunculus crithmifolius*, a somewhat unusual and cryptic buttercup.

Guffies Creek and Tributaries:

Within the Guffies Creek Catchment the Buster plateau has been cut into by a series of tributaries (Robertson Creek, Browns Creek, Green Gully, Fraters Creek and Hut Creek). Typically these incised valleys rise steeply up to 1100 m.a.s.l where they meet the Buster plateau. The steep valley sides support a markedly different vegetation cover to the plateau where tall tussock dominates.

Vegetation cover has been much degraded by grazing of domestic stock and on sunny aspects at low altitude appears to have been damaged by high rabbit numbers at various times in the past. Fire in pre-European times and during the pastoral era may have also played a role in removing native vegetation cover. Tall tussock cover has disappeared from all but the most shaded and protected sites. For the purposes of describing vegetation cover this zone can be broken into three landscape components:

- (a) **Open Sunny Faces:** Scree areas typically comprise 50% gravel with a significant component of hawkweed cover ie. 10% cover of mouse-ear hawkweed and king devil with a lesser component of tussock hawkweed. A scattering of native species are present, including *Raoulia subsericea*, matagouri, blue tussock, *Epilobium melanocaulon*, golden speargrass, *Wahlenbergia albomarginata* *Rytidosperma setifolium* and *Blechnum penna-marina*.

Elsewhere sunny faces are of a semi-arid nature and appear to have been severely depleted by overgrazing by rabbits and stock. In these areas mouse-ear hawkweed cover averages 40-50% and bare ground around 40%. Numerous stumps of dead blue tussock plants are present. The only shrubby component in these areas is a scattering of matagouri.

The lower reaches of these catchments support a narrow fringe of shrublands dominated by *Olearia odorata* and matagouri with *Hebe buchananii* also common. Hard tussocks and the native grass *Rytidosperma setifolium* are present in more open areas.

With increasing altitude towards the crest of the Buster plateau, especially on shady aspects degraded vegetation grades into a sparse cover of narrow-leaved snow tussock and hard tussock whilst mouse-ear hawkweed still comprises up to 60% of ground cover.

- (b) **Boulderfields, Bluffs and Rock Tors:** Boulderfields are extensive in lower Guffies Creek and lower Hut Creek and cover smaller areas in the lower reaches of most other sub catchments of Guffies Creek. Due to their irregular and barren nature these areas have acted as a barrier to fire and grazing and as a refuge to a diverse range of native woody and herbaceous vegetation. Common shrubby species are *Melicytus alpinus*, *Coprosma*

propinqua, *Coprosma rugosa* and *Pimelea traversii*. *Muehlenbeckia complexa* vines creep over boulders and shrubs.

Occasional prickly shield ferns occupy sheltered sites, whilst *Blechnum penna-marina* is common. *Asplenium flabellifolium* and *Asplenium richardii* find home in deep crevices. Native herbs and grasses include *Cardamine bilobata*, golden speargrass, *Anisotome flexuosa*, *Muehlenbeckia complexa*, *Luzula rufa*, *Brachyglottis haastii*, *Anisotome brevistylis*, *Elymus rectisetus* and blue tussock. Of particular note is the presence of the threatened native cress *Ischnocarpus novae-zelandiae*, growing amongst large boulders at GR NZMS 260 I41 2293304 5590706.

- (c) **Rock Tors:** Rock tors scattered around the lower valley floors, especially in Guffies and Hut Creeks support their own distinctive vegetation. As with boulderfields these areas have been largely protected from grazing and fire. In the upper catchments above 900 metres, non-bluffy areas within tor complexes support subalpine vegetation which is likely to have been widespread at this altitude prior to the advent of burning and grazing.

Rock tors support the distinctive *Anisotome brevistylis*, the daisy *Celmisia angustifolia* and the attractive *Helichrysum intermedium*.

Protected non bluffy areas support tall tussock grassland similar to that on the Buster plateau; however inter tussock cover is more diverse. Species observed include *Geum cockaynei*, *Coprosma perpusilla*, *Gaultheria parvula*, *Anisotome flexuosa* and *Leucopogon fraseri*.

Significance of Vegetation:

Spec Gully Block: While superficially similar to narrow-leaved snow tussock communities on the surrounding colluvial hillslopes, the alluvial terrace tussock grassland is a distinctly separate ecological unit (sensu Myers et al. 1987). It occurs in a separate ecological district to that of the bordering hillslopes (Maniototo Ecological District as opposed to Hawkdun Ecological District) and occupies a distinctly different landform. Maniototo Ecological District is largely devoid of remnant indigenous vegetation on its basin floors and lower terraces (Grove 1994). The preservation of terraces still containing snow tussock in this ecological district context is remarkable. As well, the matagouri-hard tussock complex is a prime example of early European Maniototo valley vegetation highlighted in Hubbard and Wilson (1988). Spec Gully terrace landscapes are therefore of high conservation value because of their representativeness as a remnant of Maniototo terrace native grasslands and shrublands, albeit, in a slightly higher rainfall zone.

Evidence of lack of protection in this environmental envelope (determined by abiotic factors) is provided by the recent research on the woody biomes of Central Otago (Walker et. al. 2002). This area falls within an environmental domain (domain 3 – Maniototo Basin) of which just 0.4% is administered by DOC. It has significance both for existing plant communities, and for future vegetation states following restoration of its potential woody biome.

A distinctive feature of the flora is the predominance of brooms, particularly dwarf brooms. Five species and one hybrid are present. Two species (*C. vexillata* and *C. crassicaule*) are

ranked as nationally threatened and a further two (*C. nana* and *C. corrugata*) are of very restricted distribution in Otago.

A small wetland near the confluence of an unnamed stream with the Kye Burn is in reasonable condition and supports a range of indigenous species with specialised wetland habitat requirements.

Little Kyeburn Catchment: This small catchment contains an intact sequence of indigenous vegetation from its lower reaches to the crest of the Buster Plateau. In addition to the sequence retaining a high degree of naturalness, species composition includes a rare species of groundsel (*Senecio dunedinensis*), species at or near their distributional limit: the giant Spaniard (*Aciphylla scott-thomsonii*), snow totara (*Podocarpus nivalis*), and inaka (*Dracophyllum longifolium*). Groves of Hall's totara (*Podocarpus hallii*) in the mid to lower reaches of the catchment are an important relict of what may have once been a dominant plant community in this part of Central Otago. Areas of red tussock (*Chionochloa rubra*) are of conservation importance as this vegetation type has a much reduced in cover throughout the South Island due to pastoral and agricultural practices. Red tussocklands are poorly represented in the protected natural area network.

Buster Plateau: Vegetation in this land unit which is part of the much larger Hawkdun Plateau area, forms part of one of the largest remaining tall tussockland landscapes in New Zealand. Red tussocklands/narrow leaved tussocklands (*Chionochloa rigida*) at similar altitudes elsewhere in the South Island have largely yielded to hawkweed dominance.

Alpine Zone: Tussocklands in this land unit grade into those present on the Buster Plateau land unit and form part of the same landscape. Slim tussocklands present in the upper part of the zone once formed part of a continuous belt between narrow leaved tussocklands and alpine herbfields/cushion fields throughout Otago. Distribution is now mainly limited to snowy south aspects and cover is often depleted and discontinuous.

Guffies Creek and Tributaries: Much of this land unit is modified and in many instances degraded (primarily sunny faces); however areas protected from grazing and fire retain some significant botanical values. The presence of *Senecio dunedinensis* on at least one rock tor is of note as it is listed by Hitchmough (in press) as having a sparse distribution and is considered to be at risk of extinction. The rare native cress *Ischnocarpus novae-zelandiae* represents a significant find as there are limited records for this species in Otago. *Ischnocarpus novae-zelandiae* is listed as being a rare species in gradual decline in the latest threat classification (Hitchmough, R.[compiler] in press). Native vegetation remnants on rock tors, bluffs and shady aspects at some sites form part of a intact or partially intact altitudinal sequences running from valley floor to the Buster Plateau and beyond into the alpine zone.

Problem Plants:

In terms of threat to high inherent values the following problem plants were noted.

Spec Gully: Broom, gorse, briar and mouse-eared hawkweed are common weeds, with broom in the vicinity of Spec Gully itself having the potential to disrupt native shrub regeneration.

Little Kyeburn Catchment: Broom is present in the vicinity of the Mount Buster Road and probably represents the most serious threat in terms of future spread and cost of control. The lowermost section of the catchment supports a variety of exotic vegetation including gorse and broom.

Buster Plateau : Hawkweed presents a threat to natural values in this landscape unit; however at most sites tussock cover is sufficiently intact that with conservative management hawkweed species could be suppressed or eliminated. Hawkweed species observed were mouse-ear hawkweed, tussock hawkweed and king devil. On sunny aspects on the lower crest of the plateau hawkweed cover is dominant and is unlikely to be displaced under any foreseeable management regime.

Alpine Zone South of Mount Kyeburn: There are no plants in this zone which pose a threat to inherent values.

Incised Valleys – Guffies Creek and Catchments: All hawkweed species described as being present on the Buster Plateau are present in this landscape (and form a higher percentage of the ground cover). Hawkweed has degraded the natural character of the area and poses a major problem in terms of possible future rehabilitation. Briar is common.

2.5 FAUNA

2.5.1 Invertebrate Fauna:

Invertebrates were collected in the following areas:

Spec Gully Block:

Invertebrates recorded were the diurnal moth of open areas *Arctesthes catapyrrha*, the black field cricket *Teleogryllus commodus*, the grasshopper *Phylacridium marginale*, and the grass moth *Orocrambus cyclopicus* which is distinctive of short tussock grasslands and is an autumn emerging species, the endemic bluebottle fly *Calliphora quadrimaculata* and a native Tachnid fly which is known to be parasitoid of moths.

Fraters Creek, Hut Creek Catchment/Sergeant Garveys Cairn Area:

Three species of moth were found in this area. Two of the three are common in grasslands. The third *Hierodoris frigida* is common but local to Central Otago, and found around rock faces.

Four species of beetle were found, three are predatory carabids and one tenebrionid. The tenebrionid is an *Artystona* sp. These are beetles that have restricted distributions. The three carabid species include the widespread *Metaglymma tibiale*, a *Holcaspis* sp. which is indicative of good quality habitat, and a *Mecodema* sp.

Also found were the common montane/alpine grasshopper *Sigaus australis*, and the Otago alpine cockroach *Celatoblatta quinquemaculata*.

At least six species of fly were present. The therevid or stiletto flies, have predaceous larvae, with the adults usually secretive. They are often associated with riverbeds. The larvae of the tachinid fly are endoparasitic on other arthropods. The Muscidae are a large and variable family.

Green Gully Catchment:

Thirteen species of moth or butterfly, covering seven families, were collected in this area. Twelve of these are considered common, occurring in open grasslands, damp grasslands, or rocky areas. The remaining moth *Wiseana mimica*, can be locally common in wetter areas.

Seven species of beetle were collected. The most notable is the rarely collected flightless chafer beetle *Prodontria patricki*. Little is known about this beetle, but it may have a highly restricted distribution, and prior to this collection had only been found at a few sites.

Four species of carabid beetle were collected. The four carabid species include the widespread *Metaglymma tibiale* and *Oregus aereus*, a *Holcaspis* sp. which may be indicative of good quality habitat, and one other undetermined carabid sp. There were two species of tenebrionid collected, an *Artystona* sp and a *Pheloneis* sp. Both of these are beetles have restricted distributions.

Two species of Orthoptera were collected. The common alpine grasshopper, *Sigauss australis* and the ground weta *Hemiandrus focalis*. The ground weta *H. focalis* is a widespread species.

The local clapping cicada *Amphisalta strepitans* was found here. A common bug species (Hemiptera) and two species of stonefly, *Zelandoperla fenestrata* and *Z. decorata* were also found. The presence of stoneflies is an indication of a quality unpolluted stream habitat, as their larvae live in streams and are sensitive to pollution.

Two species of ichneumonid wasp and a native bee were also found.

At least 12 species of Diptera were collected in this area. The tipulid crane flies are part of a large family. Larvae are found in varied, but usually moist, habitats. Syrphid (hover fly) and stratiomyid (soldier fly) adults are often found visiting flowers. Syrphid larvae vary in habitat, with some living in decaying vegetation, some scavengers, and others predatory. Bibionid march flies are poor fliers often found feeding on flowers. The larvae of the tachinid fly are endoparasitic on other arthropods

Area between Browns Creek and Robertson Creek Catchments:

Four species of moth were found from four different families. Three of these are common found in open to montane, rocky areas and grasslands. A larva of *Metacrias huttoni* was found which may be indicative of semi-natural grasslands.

Six species of beetle were found from two different families. Two species of *Anagotus* weevil were collected including *Anagotus lewisi* which is indicative of tall tussock grassland. The weevil *Zenagrathus metallescens* was also collected and this is a local high-alpine specialist.

Three species of carabid beetle were collected. They are the widespread grassland carabid *Oregus aereus*, a *Megadromus* sp., and a widespread *Bembidion* sp.

Two widespread species of *Sigauss* grasshopper were collected, as was the widespread Otago alpine cockroach *Celatoblatta quinquemaculata*. At least nine species of Diptera were collected including members of the following families: Muscidae, a large and variable

family; Tachinidae flies, whose larvae are endoparasitic on other arthropods; and Bibionidae March flies, poor fliers often found feeding on flowers.

Little Kye Burn catchment:

Ten species of Lepidoptera from six families were collected. These include three common *Wiseana porina* moths of grassland and wetlands, and three common *Eudonia* crambid moths. Also collected were the common tussock butterfly and eastern tiger moth, the leaf litter noctuid, *Rhapha scotoscialis*, and the widespread *Caloptilia elaeas* whose larvae feed on *Coriaria*.

Five species of beetle were collected. The carabid *Mecodema sculpturatum* is a widespread species but indicative of reasonable natural values. Also collected were a common ladybug, a chafer beetle and two species of click beetle.

The mountain stone weta *Hemideina maori* was present.

Two species of Diptera were collected including the hover fly *Melangyna novaezealandiae*. Syrphid hover flies are usually found visiting flowers. Their larvae vary in habitat, with some living in decaying vegetation, some scavengers, and others predatory. The widespread mayfly *Delatidium lillii* and a widespread *Degithina* ichneumon wasp were also collected.

Significance of Invertebrate Fauna:

Spec Gully Block:

This site had a range of functional groups present.

Fraters Creek, Hut Creek Catchment/Sergeant Garveys Cairn area:

This site has a wide range of functional groups present; predatory carabid beetles and flies, herbivorous moths, scavenging cockroaches and flies, parasitic flies, and pollinating moths and flies. Carabids are the top predators in the invertebrate food chain.

Green Gully Catchment:

This site has a comprehensive range of functional groups present: predatory carabid beetles; herbivorous moths, grasshoppers, cicadas, and beetles (*Prodontria*); detritivorous beetles (tenebrionids) and flies (tipulids); omnivorous weta; sap sucking bugs; parasitic flies (tachinids) and wasps (ichneumonids); and pollinating moths, native bees, and flies. Carabids are the top predators in the invertebrate food chain.

Wiseana mimica is an early season moth found from wet coastal pasture to low alpine wetlands. It can be locally common, and around Mt Kyeburn is associated with moss and sedge bogs. It is found to the east of Fiordland and the Southern Alps. It is a member of an endemic family of limited abundance throughout the country, although adequately represented in one ecological region, but whose habitat is at some risk.

Prodontria patricki is an endemic species which may have a very restricted distribution which has been classified by Hitchmough (in prep) as Data Deficient.

Amphisalts strepitans is a very localised Otago endemic cicada. It may be at its distributional limit on Kyeburn.

Area between Browns Creek and Robertson Creek Catchment:

This site has a comprehensive range of functional groups present: predatory carabid beetles; herbivorous moths, grasshoppers, and weevils; scavenging cockroaches; parasitic flies (tachinids); and pollinating moths and flies. Carabids are the top predators in the invertebrate food chain.

Little Kye Burn catchment:

This site has a comprehensive range of functional groups present: predatory carabid beetles and ladybugs; herbivorous moths, chafer beetles and click-beetles; omnivorous weta; parasitic wasps (ichneumonids); and pollinating moths and flies. The moths collected indicate a tussock grassland community.

2.5.2 Herpetofauna:

Common geckos (*Hoplodactylus sp.*) were recorded under rocks near the Kokonga Huts. Common skinks (*Oligosoma polychroma*) were present through out the property in suitable habitat.

2.5.3 Avifauna:

The following birds have been previously recorded as present on the property (Bull, Gaze et al. 1985):

Spec Gully Block; white faced heron, paradise shelduck, harrier hawk, SI pied oystercatcher, spur-winged plover, southern black-backed gull, black billed gull, pipit, grey warbler and silvereye.

Run Block; harrier hawk, SI pied oystercatcher, spur-winger plover and pipit.

In addition during the current inspection the following were recorded:

Spec Gully Block; paradise shelduck.

Run Block; grey warbler and black shag. In the middle Guffies Creek, a breeding pair of New Zealand falcon were present.

Significance of Avifauna:

New Zealand Falcon are an endemic threatened species (Heather and Robertson 1996). Hitchmough (in press) classifies the 'Eastern' race of NZ falcon as 'gradual decline'. Fox (1977) studied falcon and described a home range for nesting pairs of 15km². The birds recorded in the middle Guffies Creek can be expected as part of their daily foraging to cover much of the Kyeburn run block.

2.5.4 Aquatic Fauna:

The streams on this property drain into the catchments of the Waitaki and Taieri Rivers. Streams on the western slopes of the St Mary Range drain to the Waitaki catchment and are typically small with steep gradient and cobble-boulder bottomed. Streams fished appeared to be permanent water with good flows at the time of survey and there are no upstream abstractions of water.

The streams draining into the Taieri catchment are both steep gradient streams in their head waters with slow flowing gravel-cobble bottomed watercourses where they cross the Maniototo Plain to join the Taieri River.

Twenty one sites on the property were surveyed for freshwater fish using a Kaianga backpack electric fishing machine. The NIWA National FWF Database was searched for records of freshwater fauna (see Appendix 2).

Of the 21 sites fished 16 had fish present and 5 had none. Four species were recorded. Two were native; common river galaxias (*Galaxias vulgaris*) & roundhead galaxias (*Galaxias anomalus*) and two introduced; brown trout (*Salmo trutta*) & rainbow trout (*Oncorhynchus mykiss*). The identification of the galaxiid species is made on key diagnostic features and known distribution, samples have been sent to Otago University for genetic analysis to confirm this.

The 37 existing records on the NIWA National Freshwater Database on this property record 3 species of fish; brown trout, roundhead galaxias and the native longfinned eel (*Anguilla dieffenbachii*). These fish were abundant at all the sites fished where they were present and there is extensive habitat for them in the streams on this property.

The common river galaxias is found almost exclusively east of the Southern Alps, from the Wairau in the north to tributaries of the Waiau and Oreti rivers in the south (McDowall 1990). Recent work which describes a complex of species once thought to be *G vulgaris* is likely to reduce this range considerably especially in Otago and Southland. (Allibone 1997, Wallis 2002).

The common river galaxias is a fish of moderately swiftly flowing waters, usually gravelly or bouldery streams. The fish are solitary and cryptic in habit. The entire life cycle of this fish is spent in freshwater where they feed on the diverse invertebrate fauna (McDowall 1990).

The longfinned eel is found throughout New Zealand from sea level upstream in any waters it can reach, including some that have no connection with running water. Penetration inland is very strong (McDowall 1990). The longfinned eel is widely distributed in Otago and occurs in all the major river systems and many smaller streams. Distribution of the longfinned eel in Otago is limited by migrational barriers, the Roxburgh and Clyde Dams and as a result is uncommon in the Upper Clutha (Allibone 1997). In the Taieri Catchment longfinned eels have likely undergone significant reduction in numbers as a result in falling water quality and quantity as result of land development and water abstraction from many small streams and also as a direct result of commercial fishing.

The roundhead galaxias (*Galaxias anomalus*) was found in Spec Gully. It occurs only in the Taieri River system and the Manuherikia River. The species is locally common but has undergone some range reduction, and fragmentation of populations has occurred due to water

abstraction and brown trout invasion (Townsend 1996). The Kye Burn and its tributaries contain the largest roundhead galaxias population known today. Other populations are known from only twelve other streams. Historically roundheads would have been common in low gradient streams throughout the Maniototo and Manuherikia valleys of Otago (Barrier in prep).

The water quality of the steep gradient upland streams on the property was high, with good riparian vegetation along most stream margins and the typical invertebrates present with mayfly (*Coloburiscus*, *Deleatidium*), caddis (*Olinga*, *Pycnocentroides*), and stonefly (*Zealandobius*, *Zelandoperla*.) species all common. Streams of this quality are not uncommon locally but are declining as land development continues.

Spec Gully is a lowland low gradient stream and has reasonable water quality.

Significance of Aquatic Fauna:

The common river galaxias is not considered threatened (Hitchmough in prep) and does not require any independent protection initiatives. Having said this, any measures that maintain the native riparian and catchments vegetation will benefit these fish. The maintenance of the native vegetation will support the full range of invertebrate species, help maintain the current high water quality, provide good in stream habitat cover and shading.

The roundhead galaxias and longfinned eel are ranked as chronically threatened species in gradual decline (Hitchmough in prep.) Farming impacts such as poor riparian management and water abstraction are key issues affecting most non-migratory galaxiid species. A coordinated action to address these threats is required for nationally threatened species, particularly those with a highly restricted geographic range (Barrier in prep).

Spec Gully is identified as a key site requiring protection for roundhead galaxias (New Zealand non-migratory galaxiid recovery plan 2003 -2013).

2.5.5 Problem Animals:

Wild pigs are present in low to moderate numbers and may need some control. They have caused significant damage in localised areas. Low numbers of red deer and low to moderate numbers of rabbits, hares and possums are also present.

2.6 HISTORIC

There are no recorded Maori sites on the Kyeburn pastoral lease. What is now Kyeburn Station was part of the land taken up by Borton and McMaster in 1858. Their run stretched from the Waitaki over the ranges to the Maniototo and totaled a quarter of a million acres (100,000 ha). Borton and McMaster sold the Kyeburn part of their run in the late 1860s and in 1875 it was sold to Rich, Stewart and Scobie McKenzie. The Kyeburn lease is still owned by the McKenzie family.

Gold was discovered in the Naseby area in May 1863. As the rush developed groups of miners prospected the surrounding area and in July 1863 gold was discovered on the saddle between the Little Kyeburn and the headwaters of the Otematata River by Clarke and party. This field became known as Clarke's or the Buster diggings. The gold was contained within a fossil beach deposit of quartz gravels dating to the tertiary period which were uplifted in the subsequent formation of the Central Otago block mountains. Long water races had to be brought in from the north east and west to provide sufficient water for sluicing. Because of the high altitude mining could only be carried out for part of the year – usually October to May. Mining continued at the Buster until the World War One (Cowan 1948, Williams 1965).

The main Buster diggings are located on the run block of Kyeburn immediately to the east of the Mt Buster road at an altitude of 1200 metres. The main workings cover an area of about a square kilometre. Originally the area would have had a gently rolling appearance dissected by small streams. A combination of extensive hydraulic sluicing and the quartz gravels has produced a landscape that is unique in Otago. Huge areas of the white - cream gravel have been sluiced away leaving remnant pinnacles and outcrops rising out of the outwash plain of tailings. The overall effect is reminiscent of a desert or moonscape.

An extensive system of water races and dams was constructed to provide water for the sluicing. Two major races come into the workings from the west and another two from the north-east. Networks of minor races run from storage dams to sluice faces. Major tail races run into Guffies Creek but minor tail races also discharged tailings into the Little Kyeburn.

Evidence of the early workings from the 1860s and 70s has largely been obliterated by the subsequent hydraulic sluicing but part of the original mining settlement is still visible between the road and the main workings. The huts seem to have been constructed of sod with either canvas or corrugated iron roofs. What remains are the low outlines of the walls and the broken bottles and tin cans that the miners discarded. Unfortunately these sites have been subjected to fossicking by bottle hunters in the past. At least some of the occupants were Chinese as a fragment of an opium pipe bowl was picked up during the survey.

A second area of gold workings is present approximately 3 km directly north of the main diggings. These workings are on the same geological formation as the main diggings but on a much smaller scale. These workings are divided into two discrete areas. One at grid reference H40- 946 870 and the second at 938 875. The former is an area of very shallow workings where a thin veneer of quartz gravels has been sluiced off to reveal a brightly coloured orange and red subsurface. The other area of workings is similar to the main workings but on a much reduced scale. An old hut constructed from sections of pipe beaten flat has been constructed in the middle of these workings.

There is also an area of small scale sluicing in the southern corner of the lease at approximately grid reference H40-922 797 in the valley of the Little Kyeburn. These are typical of sluicing sites over much of Otago.

Located in Hut Creek, near its confluence with Guffies Creek, is a cairn which remembers Sergeant Edward John Garvey, who perished in a snow storm, just after the Naseby and Mt Buster gold rushes in 1863. He was a member of the mounted constabulary from Naseby.

Significance of Historic:

All three of these gold mining sites are older than 1900 and are therefore protected under the provisions of the Historic Places Act which makes it an offence to destroy or modify such sites without an authority from the Historic Places Trust. The low altitude workings on the Little Kyeburn are not of sufficient significance to merit further protection beyond that already conveyed by the Historic Places Act.

The high altitude sites are nationally significant. They are among the highest large scale alluvial mining sites in the country. The tertiary quartz gravel deposits are also an interesting geological feature. The hydraulic sluicing of these gravels has produced a cultural landscape without parallel anywhere else in New Zealand.

2.7 PUBLIC RECREATION

2.7.1 Physical Characteristics:

The main access route to the run is via the Mt Buster road. The gate at the bottom of the track below Mt Buster is locked, having a permanent sign restricting public access due to extreme fire danger. Public vehicle access is reportedly available at most times by request to the runholders (Lessees and Licensees who have an interest in the various properties up the track) who hold a key. The track, although in part on legal road line, is maintained by runholders.

Within the run there is an access route to the Buster Diggings and from there on it heads down Guffies Creek. Tracks branch to the neighbouring Soldiers Syndicate and others head east to various parts of the property.

The Spec Gully Block is bounded by legal roads for most of its boundary. These include Ridge Road, Naseby-Kyeburn Road and White Road. The Lower to Upper Kyeburn Road bisects the eastern side of the property. The main homestead access is the Kyeburn Station Road, which runs through a freehold portion of the property.

2.7.2 Legal Access:

The Mt Buster road being the only practical access to the run is off line in places.

A legal road forms the western boundary of the run which is sited along a ridge running down to Guffies Creek and is an extension of the Mt Buster road. A formed track approximates this route and is only partly on the legal line. Further work would be required to determine the legality or otherwise of the track.

The Spec Gully Block has legal access from all the roads that bound it as noted above.

Within the run there is an existing marginal strip on Guffies Creek. Others may be laid off parts of any larger streams as a result of this review (on any qualifying margins that are not to be conservation land). The Spec Gully Block has an existing marginal strip on the eastern side where it bounds the Kye Burn (River).

2.7.3 Activities:

Most public use is by hunters, 4WD enthusiasts and those wishing to view the unique Buster Diggings. The annual Otago Cavalcade (large organized horse trek) has on occasion traversed the property. The property is also occasionally used for tramping, cross country skiing and mountain biking.

Recreational hunting of wild pig and chukar are the most popular activities. Pigs are widespread throughout the area and provide regular sport, mainly for residents of the Maniototo. Red deer are seen occasionally.

PART 3

OTHER RELEVANT MATTERS & PLANS

3.1 CONSULTATION

An NGO early warning meeting was held on the 8/10/01 with interested groups. The following views were expressed:

-Considered relevant that most Kyeburn is class VIIe or VIII land. No reason why whole of back block should not go to DOC.

-Land locked area of conservation land next door.

-Mt Buster road is legal and DOC should ensure remains open. Relatively dry and snow free. Need for through access to Waitaki down Otematata River – practical vehicle access (down Guffies Creek). Popular horse and mountain bike track but winter use may be dangerous.

-Good historic values including an historic cairn.

-Some pig and deer hunting.

-Uninterrupted tussock landscape. Lower part fairly degraded and modified (hawkweeds?). Very good moth collecting area. F&G completed electric fishing in Spec Gully.

Exciting mix of historic, recreation, and vegetation.

3.2 REGIONAL POLICY STATEMENTS AND PLANS

The northern two-thirds of the property is located within the Rural Scenic zone of Waitaki District Plan and within Canterbury Region. The southern third of the main northern block, and the smaller block south of the Naseby - Kyeburn Diggings Road is located within the Rural Resource zone of the Central Otago District Plan and the Otago Region.

The northern part of the property, which is in Canterbury is subject to the Canterbury Regional Land Plan (Vegetation Burning), under which any burning would be subject to performance standards relating to topdressing and spelling from grazing. The burning of wetland vegetation is not permitted.

The parts of the property in Otago are subject to the Otago Regional Plan: Water rule which requires resource consent for suction dredge mining.

3.3 DISTRICT PLANS

The proposed Central Otago District Plan (amended to incorporate Council decisions) does not, in general, act as a trigger for the protection of tussock grasslands and smaller wetlands and forest areas. Resource consent is required for excavations or tree planting within specified distances of a water race or irrigation pipeline, and for development work within 10m of any water body. Resource consent is also required for tree planting of evergreen species with wilding spread capabilities. The northern part of the block adjacent to the Central Otago District boundary is within the area of Outstanding Landscape. The southern block is not within this landscape area. Development and tree planting requires resource consent in the area of Outstanding Landscape, but not clearance of vegetation. There are no registered historic sites, or areas of significant indigenous vegetation and habitats of significant indigenous fauna and wetlands as set out in the schedules of the plan. Protection is limited to the controls set out above.

In general, the proposed Waitaki District Plan (amended to incorporate Council decisions) does not act as a trigger for the protection of tussock grasslands and smaller wetlands and forest areas. No indigenous vegetation clearance or exotic tree planting is allowed within 20m of a water body or in any wetland. There are effectively no provisions that protect scenic values. There are no registered archaeological sites, or areas of significant conservation value as set out in the appendices of the plan. Protection is limited to the controls set out above.

3.4 CONSERVATION MANAGEMENT STRATEGIES AND PLANS

Kyeburn PL run block from the Ida Range crest north, lies within the Canterbury Conservancy of DOC and covered by the Canterbury Conservation Management Strategy (CMS).

The CMS has specific objectives for the Waitaki area as follows:

- To identify, maintain and seek to enhance the natural landscapes and natural landscape values of the Waitaki unit.
- To use a range of effective methods to protect the indigenous biodiversity of the Waitaki unit.
- To protect and enhance the viability of priority threatened species' populations and their habitats in the Waitaki unit.
- To provide new recreational facilities and opportunities by the Department and other organizations and concessionaires where natural and historic resources and cultural values are not compromised.
- To negotiate with Crown pastoral leaseholders, directly or through tenure review, to protect natural values.

The Otago CMS recognises the entire run portion of the property as being part of one of the 41 special places of Otago – even though part is in the Canterbury area.

The St Bathans – Hawkdun – Ida area is listed as special place no 17.

The objective for this area is - *To protect on an extensive scale, the high altitude landscape, nature conservation and historic resources of the area, principally by acquiring adjoining lands of high natural, historic and recreational value, through pastoral lease or occupation licence tenure reviews, to link existing areas of land administered by the department thus providing for more recreational opportunities, better protection of values and efficient integrated management of those values.*

The Spec Gully Block is located within the Otago CMS area. The CMS has a number of objectives for Central Otago including an objective regarding ecosystems as follows:

To recognise the distinctive contribution the ecosystems of Central Otago make to the diversity of New Zealand's flora, fauna and ecological communities and processes and to retain representative examples through protection at lower altitudes and more extensive protection at higher altitudes.

3.5 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 habits 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, threatened terrestrial and freshwater species management, etc.

PART 4

MAPS ETC.

4.1 Additional information

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4.2 ILLUSTRATIVE MAPS

Topo/Cadastral

Landscape Units and Significant Features

Areas of significant ecological value

4.3 APPENDICIES

Appendix 1: Invertebrate Species List.

Appendix 2: Freshwater fish records.

Appendix 3: Historical Information.

Appendix 4: Photos

APPENDIX 1: INVERTEBRATE SPECIES LIST FOR KYEBURN PASTORAL LEASE.

ORDER/Family	Species	Fraters/ Hut Creeks	Green Gully	Browns/ Robertson Creeks	Little Kyeburn
<u>LEPIDOPTERA</u> Oecophoridae	<i>Hierodoris frigida</i>	✓			
Crambidae	<i>Eudonia chalara</i>	✓	✓		✓
	<i>Eudonia sabulosella</i>	✓	✓	✓	✓
	<i>Eudonia leptalea</i>		✓		✓
	<i>Orocrambus aethonellus</i>		✓		
	<i>Orocrambus cyclopicus</i>				
	<i>Scoparia exilis</i>		✓		
Noctuidae	<i>Rictonis comma</i>		✓		
	<i>Rhapsa scotoscialis</i>				✓
Hepialidae	<i>Wiseana mimica</i>		✓		
	<i>Wiseana copularis</i>				✓
	<i>Wiseana jocose</i>				✓
	<i>Wiseana cervinata</i>		✓		
	<i>Wiseana umbraculata</i>		✓		✓
<u>Arctiidae</u>	<i>Metacrias huttoni</i>		✓	✓	✓
Nymphalidae	<i>Argyrophenga antipodum</i>		✓		✓
<u>Lycaenidae</u>	<i>Lycaenid sp.</i>		✓	✓	
<u>Tortricidae</u>	<i>Capua semiferana</i>		✓	✓	
Geometridae	<i>Arctesthes catapyrrha</i>				
Gracillariidae	<i>Caloptilia elaeas</i>				✓
<u>COLEOPTERA</u> Carabidae	<i>Metaglymma tibiale</i>	✓	✓		
	<i>Holcaspis sp.</i>	✓			
	<i>Mecodema sp.</i>		✓		
	<i>Mecodema sculpturatum</i>				✓
ORDER/Family	Species	Fraters/H ut Creeks	Green Gully	Browns/ Robertson Creeks	Little Kyeburn
	<i>Oregus aereus</i>		✓	✓	
	<i>Holcaspis sp.</i>		✓		
	<i>Megadromus sp.</i>			✓	
	<i>Bembibium sp.</i>			✓	
	Carabid sp.				
	Carabid sp.	✓			

Tenebrionidae	<i>Artystona</i> sp.	✓			
	<i>Pheloneis</i> sp.		✓		
	Tenebrionid sp.		✓		
Scarabaei dae	<i>Prodontria patricki</i>		✓		
	<i>Odontria rufescens</i>				✓
	<i>Odontria striata</i>				✓
<u>Curculionidae</u>	<i>Anagotus lewisi</i>			✓	
	<i>Zenagraphus metallescens</i>			✓	
	<i>Anagotus</i> sp.			✓	
<u>Coccinellidae</u>	<i>Coccinella leonina</i>				✓
<u>Elateridae</u>	<i>Conoderus exsul</i>				✓
	Elaterid sp.				✓
<u>ORTHOPTERA</u> Acrididae	<i>Sigaus australis</i>	✓	✓	✓	
	<i>Sigaus campestris</i>			✓	
	<i>Phylacridium marginale</i>				
	<i>Hemideina maori</i>				✓
<u>Gryllidae</u>	<i>Teleogryllus commodus</i>				
DIPTERA Therevidae	(<i>Anabarhynchus</i> sp.)	✓			
Tipulidae			✓		
Syrphidae	<i>Melangyna?</i> sp.		✓		
ORDER/Family	Species	Fraters/H ut Creeks	Green Gully	Browns/ Robertson Creeks	Little Kyeburn
	<i>Melangyna novaezealandiae</i>				✓
Calliphoridae	<i>Calliphora quadrimaculata</i>				✓
Bibionidae			✓	✓	
Stratiomyidae		✓	✓		
Tachinidae		✓	✓	✓	
Muscidae		✓		✓	
BLATTODEA Blattidae	<i>Celatoblatta quinque maculata</i>	✓		✓	
<u>TRICHOPTERA</u> Conoesucidae	<i>Beraeoptera roria</i>	✓			
HEMIPTERA Cicadidae	<i>Amphisalta strepitans</i>		✓		
Lygaeidae	<i>Nysius huttoni</i>		✓		

<u>HYMENOPTER</u> A Colletidae	Colletid sp.		✓		
Ichneumonidae	Ichneumonid sp. A		✓		
	Ichneumonid sp. B		✓		
	<i>Degithina?</i> sp.				✓
<u>PLECOPTERA</u> Gripopterygidae	<i>Zelandoperla fenestrata</i>		✓		
	<i>Zelandoperla decorata</i>		✓		
<u>EPHEMEROPTERA</u> Leptophlebiidae	<i>Deleatidium lillii</i>				✓

APPENDIX 2. FRESHWATER FISH RECORDS FOR KYEBURN PASTORAL LEASE.

d	m	y	Catchment	locality	Source	metmap	meteast	metnorth	Species
	12	1992	Taieri R	Little Kye Burn	otfg	i41	22921	55795	galano
	12	1992	Taieri R	Little Kye Burn	otfg	i41	22921	55795	saltru
	4	1992	Taieri R	Little Kye Burn	uoo	i41	22921	55795	galano
	4	1992	Taieri R	Little Kye Burn	uoo	i41	22921	55795	saltru
	3	1992	Taieri R	Spec Gully	uoo	i41	22904	55708	galano
	3	1992	Taieri R	Spec Gully	uoo	i41	22931	55657	galano
*	3	1997	Taieri R	Kye Burn	uoo	i41	22932	55656	angdie
*	3	1997	Taieri R	Kye Burn	uoo	i41	22932	55656	saltru
	9	1992	Taieri R	Spec Gully	uoo	i41	22930	55658	galano
	9	1992	Taieri R	Spec Gully	uoo	i41	22930	55658	saltru
	6	1992	Taieri R	Spec Gully	uoo	i41	22930	55658	galano
	12	1992	Taieri R	Spec Gully	uoo	i41	22930	55658	galano
	12	1992	Taieri R	Spec Gully	uoo	i41	22930	55658	saltru
	3	1993	Taieri R	Spec Gully	uoo	i41	22930	55658	galano
	3	1993	Taieri R	Spec Gully	uoo	i41	22930	55658	saltru
	5	1993	Taieri R	Spec Gully	uoo	i41	22930	55658	galano
	5	1993	Taieri R	Spec Gully	uoo	i41	22930	55658	saltru
	9	1993	Taieri R	Spec Gully	uoo	i41	22930	55658	galano
	11	1993	Taieri R	Spec Gully	uoo	i41	22930	55658	galano
	11	1993	Taieri R	Spec Gully	uoo	i41	22930	55658	angdie
	1	1994	Taieri R	Spec Gully	uoo	i41	22930	55658	galano
	1	1994	Taieri R	Spec Gully	uoo	i41	22930	55658	saltru
	4	1994	Taieri R	Spec Gully	uoo	i41	22930	55658	galano
	4	1994	Taieri R	Spec Gully	uoo	i41	22930	55658	saltru
	4	1994	Taieri R	Spec Gully	uoo	i41	22930	55658	angdie
	3	1992	Taieri R	Spec Gully	uoo	i41	22903	55709	galano
	6	1992	Taieri R	Spec Gully	uoo	i41	22903	55709	galano
	9	1992	Taieri R	Spec Gully	uoo	i41	22903	55709	galano
	12	1992	Taieri R	Spec Gully	uoo	i41	22903	55709	galano
	3	1993	Taieri R	Spec Gully	uoo	i41	22903	55709	galano
	5	1993	Taieri R	Spec Gully	uoo	i41	22903	55709	galano
	9	1993	Taieri R	Spec Gully	uoo	i41	22903	55709	galano
	11	1993	Taieri R	Spec Gully	uoo	i41	22903	55709	galano
	1	1994	Taieri R	Spec Gully	uoo	i41	22903	55709	galano
	4	1994	Taieri R	Spec Gully	uoo	i41	22903	55709	saltru
	4	1994	Taieri R	Spec Gully	uoo	i41	22903	55709	galano
	12	1994	Taieri R	Spec Gully	uoo	i41	22903	55709	galano
19	11	1	Taieri	Kyeburn River tributary	doc otago	I41	22922	55700	nospec

19	11	1	Taieri	Spec Gully	doc otago	I41	22903	55709	galano
19	11	1	Taieri	Little Kyeburn	doc otago	I41	22920	55795	saltru
19	11	1	Taieri	Little Kyeburn tributary	doc otago	I41	22923	55806	saltru
19	11	1	Taieri	Little Kyeburn	doc otago	I41	22931	55810	nospec
20	11	1	Waitaki R	Clarks Gully	doc otago	I41	22930	55848	nospec
20	11	1	Waitaki R	Guffies Creek	doc otago	I41	22920	55875	galvul
20	11	1	Waitaki R	Fraters Creek	doc otago	I40	22942	55925	saltru
20	11	1	Waitaki R	Hut Creek	doc otago	I40	22949	55936	galvul
21	11	1	Waitaki R	Fraters Creek	doc otago	I40	22962	55905	oncmyk
21	11	1	Waitaki R	Green Gully	doc otago	I41	22954	55896	galvul
21	11	1	Waitaki R	Fraters Creek	doc otago	I40	22965	55918	saltru
21	11	1	Waitaki R	Fraters Creek	doc otago	I40	22965	55918	galvul
21	11	1	Waitaki R	Browns Creek	doc otago	I41	22960	55873	nospec
21	11	1	Waitaki R	Browns Creek	doc otago	I41	22960	55871	galvul
20	11	1	Waitaki R	Guffies Creek tributary	doc otago	I41	22912	55890	galvul
20	11	1	Waitaki R	Blue Duck Creek	doc otago	H41	22891	55884	galvul
20	11	1	Waitaki R	Boundary Creek	doc otago	H41	22874	55891	galvul
20	11	1	Waitaki R	Guffies Creek tributary	doc otago	I41	22914	55863	galvul
20	11	1	Waitaki R	Robertson Creek	doc otago	I41	22948	55862	galvul
20	11	1	Taieri	Little Kyeburn	doc otago	I41	22947	55835	nospec

Galvul = *Galaxias vulgaris*; **Galano** = *Galaxias anomulus*; **Angdie** = *Anguilla dieffenbachii*; **Saltru** = *Salmo trutta*; **Oncmyr** = *Oncorhynchus mykiss*
 * Location slightly outside property but same watercourse.