Toitu te whenua
Land Information
New Zealand

Crown Pastoral Land Tenure Review

Lease name : CHETWYND

Lease number : PT 099

Conservation Resources Report

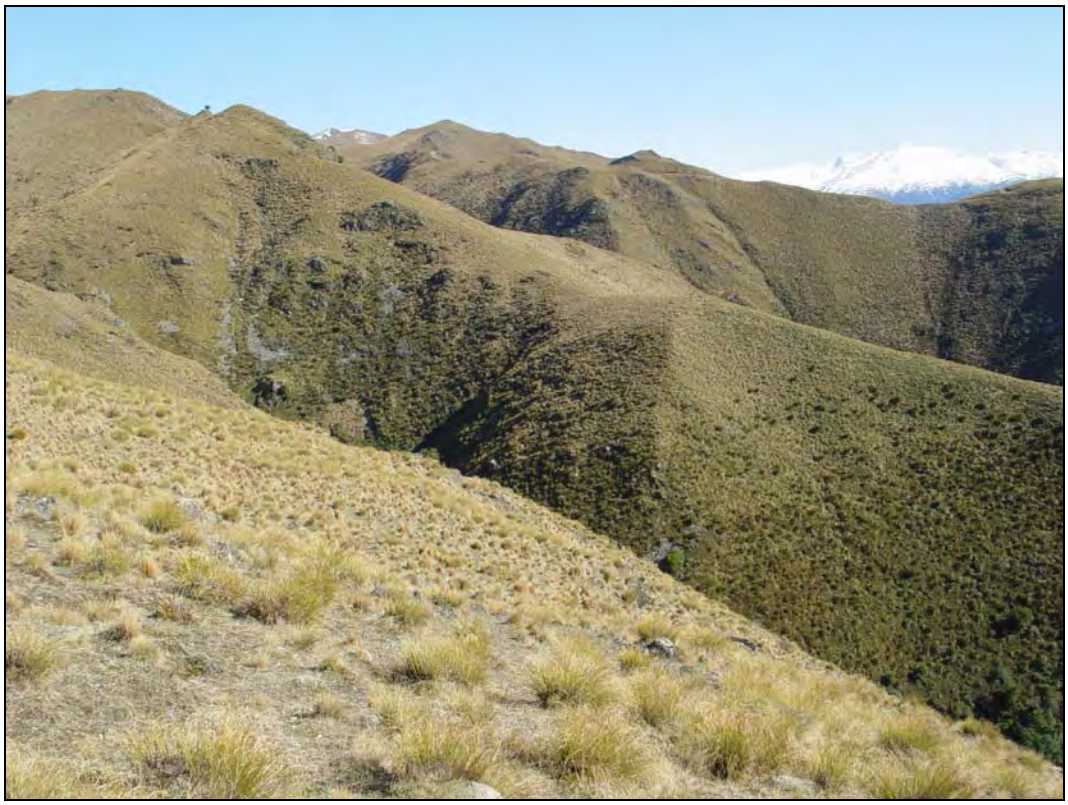
As part of the process of Tenure Review, advice on significant inherent values within the pastoral lease is provided by Department of Conservation officials in the form of a Conservation Resources Report. This report is the result of outdoor survey and inspection. It is a key piece of information for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

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

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

August 06

CHETWYND PASTORAL LEASE



CONSERVATION RESOURCES REPORT

Department of Conservation

August 2006

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PART 1 INTRODUCTION

This report describes the inherent values present on Chetwynd Pastoral Lease. Chetwynd Pastoral Lease covers an area of 791 hectares on the southeast flank of the Albury Range. It is located approximately 10 km southwest of Fairlie in South Canterbury. The property comprises moderately-steep slopes from 500 m altitude at Tramway Stream to 1300 m altitude at the crest of the Albury Range. It is drained by two steeply incised streams: Tramway Stream and Coal Stream.

Access to the property is via unformed legal roads from McLeans and O'Neills Roads on the eastern edge of the property; from an unformed legal road along the Albury Range from Limestone Valley Road to the south; and from an unformed legal road from Duck Stream to the west.

Chetwynd Pastoral Lease lies in the Hunters Ecological District, within Pareora Ecological Region (McEwen, 1987). This ecological district has not been surveyed as part of the Protected Natural Areas Programme.

Chetwynd Pastoral Lease adjoins West Hills Pastoral lease to the north, Manahune Pastoral Lease to the southwest, Silver Hill Pastoral Lease to the south, and privately-owned land to the east and northwest. There is no public conservation land adjacent or near to the property.

The tenure review inspection of the property was undertaken during September, October and November 2003 by a range of specialists. These specialists' reports (listed below) form the basis of this Conservation Resources Report. A revisit in February 2006 noted additional bird species which have been include into the appropriate section.

- Chetwynd Pastoral Lease Landscape Assessment. Alan Petrie, November 2003, 7p + photographs + map.
- Tenure Review Report Chetwynd Vegetation. Mark Davis, December 2003, 9p + photographs + maps.
- Assessment of the Fauna Values (Birds and Lizards) of Chetwynd Pastoral Lease. Jane Sedgeley, Department of Conservation, Christchurch, December 2003, 9p + photographs + maps.
- Chetwynd Pastoral Lease, Report on the Aquatic Fauna Surveys. Scott Bowie, Department of Conservation, Christchurch, December 2003, 10p + photographs + maps.
- Chetwynd Pastoral Lease Tenure Review Invertebrate Survey. Warren G.H. Chinn, December 2003, 10p + maps + appendices.

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

2.1 LANDSCAPE

2.1.1 Landscape Context

The eastern flanks of the Albury Range, upon which Chetwynd Pastoral Lease is located, form the physical and visual boundary between Canterbury's mountains and plains. They also overlook the rolling foothills and flats of the Opihi and Tengawai valleys. The Albury Range has no distinctive landforms or natural features, being moderately dissected with a uniform natural character. The range summit conveys a low relief punctuated occasionally by rounded peaks. It is markedly different from the front ranges further north, which generally have an angulated and deeply eroded appearance.

Chetwynd Pastoral Lease augments the landscape character of the eastern flanks of the Albury Range. The general pattern consists of over-sown and top-dressed lower slopes with a high component of short tussock. Grey scrub and forest are present in the lower valleys and rough gullies, and remnants of broadleaved shrubland and forest still survive on dark faces and around rocky outcrops. Modified short tussock grassland is present on mid slopes, grading to snow tussock at about 750 m altitude.

The upper and mid sections of Chetwynd Pastoral Lease form part of the visual setting to the rural township of Fairlie, as well as being visible from stretches of State Highway 8. The highway is becoming increasingly important as a part of the tourist road network between South Canterbury and the Mackenzie Basin.

2.1.2 Landscape Description

For the purposes of this landscape assessment Chetwynd Pastoral Lease is divided into two landscape units (see attached map), reflecting changes in landform and ground cover. The criteria used to assess and evaluate the landscape values of each unit are based on the following attributes:

1. Naturalness: an expression of the indigenous content of the vegetative cover and the extent of human intervention.
2. Legibility: an expression of the clarity of the formative processes and how striking these processes are.
3. Aesthetic value: the memorability and naturalness of the area, including factors which can make a landscape vivid, such as simplicity in landform, muted colours and fine-textured ground cover.

Visual values, a sub-set of landscape values that relate to the visibility of a particular landscape or natural feature from key viewing points, are also assessed.

Landscape Unit 1, Tramway Stream

This landscape unit comprises the upper and mid sections of Tramway Stream. The unit also incorporates the northern slopes of the lower gorgy section of the stream. The altitude ranges from 1269 m at a low peak on the crest of the Albury Range to approximately 500 m at the base of the slope.

The Tramway Stream catchment is physically contained by rounded ridgelines that project in an easterly direction from the central crest of the Albury Range. The upper part of the catchment features a wide V-shaped profile. At the head of the catchment, Tramway Stream forks into two tributaries that have their sources just below the central crest of the range. The mid section of the catchment becomes more enclosed featuring a series of long, steep slopes often with large rock formations that jut out below the ridgeline. Tramway Stream is contained within a rocky channel, with stretches of white water and short plunge pools. In the mid section the stream winds around a dome-shaped hill before draining out to the lower country by way of a narrow rocky gorge.

The composition of ground cover within the Tramway Stream catchment changes according to altitude, aspect and grazing pressure. However the general vegetation pattern in the upper catchment is typically low-stature snow tussock with the inter-tussock spaces occupied by speargrass, inaka and mats of lichen. On sunny faces ground cover comprises sparse snow tussock with short tussock on the upper drier ridges, and frequently large areas of bare ground. Over these drier slopes there is a wide scattering of wilding pines.

The mid section of the catchment is clad in good-condition snow tussock and a speckling of inaka. Broadleaved species line Tramway Stream and become progressively more dominant once the stream enters the narrow gorge. The steep sides of the gorge are clad in mature lancewood, lemonwood, broadleaf, mountain ribbonwood, koromiko, tree daisy, mountain flax and groves of cabbage tree and kowhai. Enclaves around the margins of the shrublands are occupied by gorse.

Landscape Values

The upper and mid sections (south-facing slopes only) of this landscape unit have moderately high landscape values, principally due to the overall impression of uniformity of the ground cover. This is mainly attributable to the lack of sub-divisional fencing and low stocking rates. These sections of the catchment have a high indigenous component and typify the eastern flanks of the Albury Range. In aesthetic terms the upper and mid sections of the Tramway Stream catchment convey an overall impression of subtle change in vegetation composition resulting in a mixture of textural patterns.

The lower section of the catchment has high landscape and visual values owing to the diversity of the broadleaved shrubland and forest that provide the stream with a natural context. The broadleaved vegetation represents a former woody landscape that has elsewhere been transformed into extensive modified grasslands.

Potential Vulnerability to Change

This unit has the potential to be adversely affected by the following activities and land-use changes:

- Introduction of mono-cultural land-uses (e.g. plantation forestry)
- Further subdivision that would fragment the existing uniformity of the grasslands
- Insensitive track construction, especially zigzag alignments up prominent ridgelines
- Earth disturbance (e.g. bulldozed fence lines)
- Erection of communication facilities at prominent sites
- Decline in the ecological health of the remnant broadleaved vegetation
- Erection of fences that limit the regeneration of woody vegetation over its natural range

Landscape Unit 2, Coal Stream

This landscape unit incorporates the upper and mid sections of the Coal Stream catchment and a portion of the lower catchment. The bottom boundary of this unit (and the property) follows a straight survey-line across the lower slopes. There is an enclave of freehold land at the confluence of the two major tributaries of Coal Stream.

This physical components of this landscape unit are strikingly different from Landscape Unit 1, with the upper section of Coal Stream tapering into a head gully that stems out from the eastern side of the central crest of the Albury Range (at 1323 m altitude). The Coal Stream catchment is principally two sub-catchments that are separated by a narrow craggy spur. Both of the sub-catchments are typified by narrow gullies separated by steep interlocking spurs. The two sub-catchment tributaries join where the craggy central spur dips down to the floor of the valley.

Generally the vegetation within this landscape unit is both intact and in good condition, with the upper sections of both sub-catchments clad in dense snow tussock with an abundance of inaka. The co-dominant species in the lower catchment are snow tussock and mixed shrubland. Some modification of the tussock cover has occurred on the drier slopes, which are presently dominated by short tussock and exotic grasses. Distinctive features are the large number of regenerating cabbage trees and groves of kowhai. The whole catchment is relatively clean of wilding pines, except for infrequent seedlings that have established on the more open ground at higher altitudes.

Landscape Values
This landscape unit has high inherent landscape values owing to the uninterrupted altitudinal sequence of plant communities, which produce a coherent natural pattern. Similar to Landscape Unit 1, a characteristic is the lack of fragmentation between each of the plant communities owing to the absence of internal fencing. In a broader sense the Coal Stream catchment helps to reinforce the recognizable character of the eastern flank of the Albury Range, attributable mainly to the overall impression of coherence and uniformity. The lower section of this unit helps to form the transition between intensive farmland on the valley floor and less-modified plant communities on the range, which is reflected by the gradual merging of native and exotic ground cover.

Potential Vulnerability to Change
This landscape unit has the potential to be adversely affected by the following activities and land-use changes:

- Fragmentation of the existing coherent grassland cover
- Introduction of mono-cultural land uses (e.g. plantation forestry)
- Insensitive track construction and earth disturbance
- Erection of communication facilities at prominent sites

2.1.3 Visual Values

Chetwynd Pastoral Lease possesses significant visual resource values attributable to the fact that a large proportion of the property can be viewed from both State Highway 8 (Albury Fairlie Road) and Highway 79 (Geraldine Fairlie Highway). State Highway 8 is part of a well used road traveling between Timaru and Fairlie (and onwards into the Mackenzie Basin) and Highway 79 is an integral part of the important tourist route between the Canterbury Plains and the Mackenzie Basin (and Aoraki/Mt Cook National Park and the southern lakes). This is particularly important for travellers nearing Fairlie from Geraldine, as the two large bush filled gullies on this eastern flank are a dominant landscape feature although they do not have the same degree of visibility as those on the higher West Hills Pastoral Lease to the north.

Significance of Landscape Values

Chetwynd Pastoral Lease contains no outstanding natural features or conspicuous formative processes that make this property discernible from the surrounding country. However, large portions of both landscape units help reinforce the inherent landscape character of the Albury Range. Chetwynd Pastoral Lease must be considered in a wider context as being inextricably linked to the adjoining properties. The extensive broadleaved shrubland and forest in the lower sections of both Tramway and Coal Stream catchments represent a part of the original character of the district.

The property does not contain any dramatic scenery but makes an important contribution to the wider landscape of the district by forming a natural backdrop to the more intensively farmed valley floor. It also forms a transition between the inland basin and range country and the coastal outwash plains of the region. From an aesthetic viewpoint the strong coherence and compositional harmony between landform and ground cover is a memorable feature of this property.

2.2 GEOLOGY, LANDFORMS AND SOILS

Chetwynd Pastoral Lease covers moderately-steep slopes on the eastern flank of the Albury Range. It encompasses the upper catchment of Coal Stream, a tributary of the Opihi River, and most of the upper catchment of Tramway Stream, a tributary of the Tengawai River. Both streams are deeply incised, dividing the property into two deep valleys. The property ranges in altitude from 500 m at Tramway Stream to 1300 m at the crest of the Albury Range. Gentler slopes are present at the eastern edge of the property on the broad ridge between the two streams, and at the western edge on the crest of the Albury Range.

The Albury Range comprises schistose to non-schistose quartzofeldspathic sandstone (greywacke) interbedded with mudstone (argillite) of Triassic age (Forsyth, 2001; Gair, 1967). Bedrock is exposed on steeper slopes and ridges on the property; gentler slopes comprise colluvial deposits with varying depths of loess. Soils of the property are predominantly Hurunui silt loams of moderate natural fertility and Kaikoura stony loams of low natural fertility.

2.3 CLIMATE

Chetwynd Pastoral Lease has a sub-humid hill country climate with cool to cold winters and mild dry summers. The area experiences low monthly water balance ratios and slight to low annual water deficits (Leathwick *et al*, 2003). Predominant winds are from the northwest with occasional gales. Cool southerlies are relatively common and snow can affect all parts of the property and lie on upper slopes for several weeks in winter. Annual rainfall ranges from 800 to 1200 mm (Tomlinson, 1976).

2.4 LAND ENVIRONMENTS OF NEW ZEALAND (LENZ)

LENZ is, as described by Leathwick *et al.* (2003): "a classification of New Zealand's landscapes using a comprehensive set of climate, landform and soil variables chosen for their role in driving geographic variation in biological patterns." The classification units of LENZ, termed environments by Leathwick *et al.* (2003), aim to: "identify areas of land having similar environmental conditions regardless of where they occur in New Zealand." The consequences of this are that "LENZ provides a framework that allows prediction of a range of biological and environmental attributes. These include the character of natural ecosystems, the vulnerability of environments to human activity, and the potential spread or productivity of new organisms (Leathwick *et al.* 2003)." Leathwick *et al.* (2003) present the LENZ information at four levels of detail, with level I containing 20 environments, level II containing 100 environments, level III containing 200 environments and level

IV containing 500 environments. These LENZ classes are presented nationally to assist use at a range of scales; however, these data should be interpreted with caution, as the predicted extent and suggested vegetation types for each Land Environment (Leathwick *et al.*, 2003) have been extrapolated from limited field data.

In an analysis of the LENZ level IV data, with consideration of the remaining indigenous vegetation cover and the legal protection of these environments, Walker *et al.* (2005) proposed a threat classification for the remaining indigenous biodiversity in New Zealand's environments based on the two components of vulnerability (likelihood of loss): poor legal protection and risk of loss. This threat classification (Table 1) has become the recognised benchmark for the promotion of threatened LENZ conservation.

Table 1 LENZ threat categories and definitions (Walker *et al.* 2005)

Category	Criterion
Acutely Threatened	<10% indigenous cover remaining
Chronically Threatened	10-20% indigenous cover remaining
At Risk	20-30% indigenous cover remaining
Critically Under-protected	>30% indigenous cover remaining <10% legally protected
Under-protected	>30% indigenous cover remaining 10-20% legally protected
No Threat Category	>30% indigenous cover remaining >20% legally protected

Chetwynd Pastoral Lease is comprised of two level IV environments, of which one, comprising about 58% of the pastoral lease and occupying the lower slopes (mainly below the 1000 m contour), is considered threatened with a ranking of "critically under-protected" (see attached map). Leathwick *et al* (2003) described original vegetations for this threatened environment as forest with podocarps (rimu, miro, matai and kahikatea) emergent over a hardwood canopy dominated by broadleaf, pokaka, lemonwood, narrow-leaved lacebark and ribbonwood. The upper slopes are not considered threatened and are described as originally supporting forest dominated by mountain totara and mountain toatoa (Leathwick *et al*, 2003).

Significance of Land Environments

The lower slopes of Chetwynd Pastoral Lease are classified as "critically under-protected", with about 9% of its total areas legally protected.

2.5 VEGETATION

2.5.1 Ecological Context

Chetwynd Pastoral Lease lies in the Hunters Ecological District which is in the Pareora Ecological Region. This ecological district has not been surveyed as part of the Protected Natural Areas Programme.

McEwen (1987) describes the former (pre-European) vegetation of Hunters Ecological District as extensive tussockland with podocarp and podocarp-hardwood forest. Worthy (1997) suggests the Quaternary fossil fauna of South Canterbury indicates the presence of grassland-shrubland mosaics during post-glacial times. McGlone (2001) proposes that the pre-human vegetation of South Canterbury was dominated by grassland and scrub in the intermontane basins and low-stature forest on the range slopes. The extent to which tall tussockland, scrub or forest prevailed in this area prior to human settlement is unclear and probably depended on the extent and frequency of natural fires.

It appears likely that most low-altitude (below 900 m) parts of Chetwynd Pastoral Lease formerly supported podocarp-hardwood forest, with taller podocarp forest present at lower altitudes. Remnants of this type of forest are present in some of the larger valleys of The Hunters Hills to the south of the property. At higher altitudes, mountain totara forest is likely to have been dominant, with mountain toatoa or inaka scrub and tall tussockland nearer the range crest. Tussockland, cushionfield or rock pavement was probably present at exposed high-altitude sites, and a distinct flora present on rock outcrops. The relative extent of each of these vegetation types may have been influenced by natural fires, with tussockland and scrub occupying lower-altitude sites for relatively long periods.

2.5.2 Vegetation and Flora

The original plant communities of Chetwynd Pastoral Lease are depleted, with tongues of mature bush being found only in the gorges and around scree slopes. Most other parts of the property support successional tussock communities, with dracophyllum covering some exposed knobs. Mixed exotic and native grasslands are present throughout most catchments, with lower altitude parts of the property supporting more highly modified plant communities dominated by pasture species. The condition and naturalness of the tussockland generally increases with altitude, though there are some higher-altitude sites where pasture species are dominant. These indigenous plant communities are described below for the two distinct parts of Chetwynd Pastoral Lease: montane (500 to 900 m) and subalpine (900 to 1300 m), with areas of botanical value shown on the attached map.

Montane Communities

Short tussockland

Short tussockland is the main plant community on the easy rolling slopes between the two stream catchments. These slopes have been over-sown and top-dressed. The community consists of silver tussock and fescue tussock, with introduced grasses dominating the inter-tussock spaces. Sweet vernal and browntop are very abundant and other exotic plants present include catsear, mouse-ear hawkweed and white clover. Silver tussock is more common at lower altitude, while fescue tussock is more common at higher altitude. Additional native plants include *Viola cunninghamii*, *Anisotome aromatica*, red woodrush, *Ranunculus multiscapus* and mosses. These grasslands are grazed, and their naturalness is low.

Fescue tussock grassland also occurs on the top and northern side of the central spur between the two tributaries of Coal Stream where the slope angle decreases, with localised patches on north-facing slopes in the lower part of Coal Stream, often as a mosaic with narrow-leaved snow tussock and shrubland. Their naturalness is low-moderate.

Tall tussockland

Narrow-leaved snow tussock covers much of the property, extending almost to the highest points especially on sunny slopes. It is also present on shady slopes, but is replaced at approximately 1000 to 1100 m by slim snow tussock. In addition to narrow-leaved snow tussock, other prominent plants are sweet vernal, browntop and golden speargrass. Other plants include common pennywort, *Blechnum penna-marina*, white clover, mouse-ear hawkweed, *Viola cunninghamii*, catsear, *Ranunculus multiscapus*, *Gaultheria crassa*, patotara, mosses and lichens.

Wilding conifers are scattered throughout these tussocklands, especially in the Tramway Stream catchment. Despite the presence of introduced plants, these communities are in good condition. At one site, naturalness is moderate to moderate-high and total vascular plant cover is 80%. The naturalness and cover of these communities gradually declines with decreasing altitude, though they retain significant natural values.

Inaka shrub-tussockland

Inaka shrub-tussockland is common on south-facing slopes and extends up into the subalpine zone. It is widespread in the steep central tributary of Tramway Stream and in lower Coal Stream, especially the northern tributary. In Tramway Stream, dominant plants include inaka (*Dracophyllum uniflorum* and *D. longifolium*), narrow-leaved snow tussock, *Hebe odora*, *Coprosma* spp., mountain kiokio, prickly shield fern, mountain flax, *Aciphylla colensoi* and *Rubus australis*. Smaller plants beneath the canopy include blue tussock, *Anisotome aromatica*, mosses and lichens. The shrubland is up to 3 m tall, and where it is very dense there is a dense ground cover of litter or mountain kiokio. Forest species are beginning to appear within this community, including broadleaf, three finger, mountain ribbonwood and lancewood. There are scattered wilding conifers in this catchment, some up to 10 m tall. The naturalness of these communities is moderate-high or high, despite extensive tracking and localised damage caused by wallabies.

On sunny slopes, inaka shrub-tussockland is quite widespread. Dominant species are inaka and narrow-leaved snow tussock. Other prominent plants are *Gaultheria crassa*, snowberry, *Pentachondra pumila*, blue tussock, patotara, coral broom, cotton daisy, mouse-ear hawkweed, mosses and lichens. There is quite a high diversity of other herbs in the ground tier. Naturalness is moderate-high, and total vascular plant cover is 60%. A similar community is present on shady aspects, with scattered mountain flax and mountain ribbonwood as additional species.

Mixed shrubland

Mixed shrubland is relatively uncommon on the property and mostly found on sunny slopes and around rock outcrops. Species present include *Coprosma* spp, korokio, broadleaf, cabbage tree, bracken, bush lawyer, prickly shield fern, kowhai, matagouri and weeping mapou. Surprisingly, matagouri is uncommon across much of the property. The condition of these communities varies from moderate to moderate-high, the larger and denser areas being most natural.

Mountain totara rockland

This rare plant community is restricted to several bluffs on the central spur between the two tributaries of Coal Stream, and in the steep central tributary of Tramway Stream. On the Coal Stream bluffs, over 60 mountain totara trees are present. Other plants include *Gaultheria crassa*, *Pentachondra pumila*, narrow-leaved snow tussock, cotton daisy, blue tussock, creeping mapou, inaka, *Exocarpus bidwillii*, patotara, mouse-ear hawkweed, broadleaf, coral broom, mountain toatoa (only 6 were seen), woolly moss and lichens. Naturalness is high. Adjacent boulderfields support regenerating broadleaf, mountain ribbonwood, *Coprosma* shrubs, cabbage tree and kowhai. The

communities are healthy, despite the presence of wallabies in the adjacent tall tussocklands. The totara bluffs in Tramway Stream support patches of totara (up to 8 m tall) and mountain toatoa.

Forest

Second-growth hardwood forest is present in the lower reaches of Tramway Stream and both tributaries of Coal Stream.

The forest canopy in Tramway Stream is dominated by broadleaf, mountain ribbonwood and kohuhu, with lesser amounts of lancewood, five finger and mountain totara. The sub-canopy is dominated by fuchsia, with *Raukaua simplex*, red mapou, yellow-wood, koromiko, weeping mapou, marbleleaf, five finger, mountain totara, supplejack, *Clematis paniculata*, korokio and cabbage tree. The lower tiers support *Olearia bullata*, mingimingi, *Astelia fragrans*, *Astelia nervosa*, mountain kiokio, *Rubus australis*, hound's tongue, prickly shield fern, *Blechnum penna-marina*, mosses, lichens and scattered introduced grasses. Exotic plants are more common adjacent to the stream or on erosion slumps, notably sweet vernal, browntop, king devil hawkweed, Yorkshire fog and catsear. There are wallaby tracks through the forest, and wallaby browsing has caused localised damage. Scattered pines are present in the vicinity. Naturalness is moderate-high.

The shrubby upper margins of the forest support broadleaf, kowhai, bracken, *Coprosma* spp., mountain wineberry, ferns, three finger and inaka. There are also patches of gorse on the upper slopes where the shrubland merges with grassland. Further upstream, the forest is reduced to a riparian shrubland of broadleaf, mountain ribbonwood, mingimingi, *Coprosma rugosa,* sweet broom, *Olearia nummulariifolia*, inaka, tutu, *Gaultheria crassa*, toetoe, narrow-leaved snow tussock and ferns.

In the southern tributary of Coal Stream, the forest is taller with many trees taller than 10 m. Additional canopy trees include ribbonwood, narrow-leaved lacebark and lemonwood. Additional sub-canopy plants include *Coprosma rotundifolia, Coprosma crassifolia*, *Coprosma virescens* and pate. In the lower tiers additional plants recorded included tree nettle, *Helichrysum lanceolatum*, *Clematis foetida*, native jasmine, button fern, thousand-leaved fern, necklace fern and hen and chickens fern. Introduced plants include Himalayan honeysuckle (uncommon), male fern and bittersweet. Naturalness is also moderate-high.

Further up Coal Stream, the woody vegetation is reduced to a riparian shrubland of broadleaf, mountain ribbonwood, mountain akeake, koromiko, mingimingi, fuchsia, narrow-leaved snow tussock, mountain kiokio and mountain flax.

Subalpine Communities

Narrow-leaved snow tussockland

In addition to narrow-leaved snow tussock, other prominent plants include golden speargrass, *Coprosma perpusilla*, fescue tussock, blue tussock, *Blechnum penna-marina*, patotara, *Leucopogon colensoi*, *Pimelea oreophila*, *Raoulia subsericea*, everlasting daisy, *Celmisia angustifolia*, snowberry, *Gentiana* sp., *Anisotome aromatica*, mosses and lichens. Scattered shrubs include *Coprosma* spp. and inaka. The threatened coral broom is scattered irregularly throughout, especially in rocky areas. Introduced sweet vernal, browntop and mouse-ear hawkweed are common. Wilding conifers are found throughout, especially on sunny slopes in the Tramway Stream catchment. The naturalness of these communities varies from moderate to moderate-high, and the total vascular plant cover is 50 to 70%.

Slim snow tussockland

Slim snow tussockland is associated with the highest parts of the property. It extends lower on south-facing slopes, but soon grades to narrow-leaved snow tussock. On sunny slopes there is little slim snow tussock except at the highest altitudes. The plant species present are broadly similar to those in narrow-leaved snow tussockland.

In addition to slim snow tussock, other prominent plants include woolly moss, *Polytrichum juniperinum*, lichens, patotara, blue tussock and browntop. Additional species include *Anisotome aromatica*, snowberry, mountain clubmoss, mouse-ear hawkweed, *Celmisia gracilenta, Ranunculus multiscapus,* sweet vernal, *Pentachondra pumila* and *Celmisia angustifolia*. Naturalness varies from moderate to moderate-high, and vascular plant cover is around 80-90%.

On shady slopes the transition to narrow-leaved snow tussock occurs between 1000 and 1100 m. In these hybrid tussocklands, other prominent plants include browntop, thousand-leaved fern, prickly shield fern, mountain flax, *Hebe buchananii*, *Coprosma rigida* and mosses. Occasional wilding conifers are present.

Wetlands

Wetlands are uncommon and largely restricted to the subalpine zone. In higher basins and gentle gullies, small turf communities support comb sedge, *Anisotome aromatica*, *Abrotanella caespitosa*, *Celmisia gracilenta*, *Plantago novae-zelandiae*, browntop, *Gentiana* sp., *Euchiton mackayi*, *Psychrophila novae-zelandiae* and mosses. These communities are heavily grazed by sheep, wallabies and probably hares, but still have naturalness values of moderate-high. If grazing pressure continues, their condition will deteriorate.

Small seepages occur among slim snow tussockland and hybrid tussockland on shady slopes. They are characterised by sphagnum moss, bog rush, *Anisotome aromatica*, browntop, fescue tussock, sweet vernal, *Blechnum penna-marina*, silver tussock, everlasting daisy, mouse-ear hawkweed, *Carex* sp. and mosses. Naturalness is moderate. These seepages appear to be drying out, but should improve if grazing is removed.

Rockland

Rock outcrops on upper ridges support a community dominated by cryptograms and herbs. Prominent plants include lichens, mosses, *Celmisia angustifolia*, *Anisotome aromatica*, patotara, *Anisotome flexuosa*, blue tussock, *Pentachondra pumila*, slim snow tussock, *Brachyglottis bellidioides*, golden speargrass, *Scleranthus uniflorus*, *Carex breviculmis*, creeping mapou, *Colobanthus acicularis*, *Raoulia subsericea* and mouse-ear hawkweed. Naturalness is moderate-high to high.

2.5.3 Notable Flora

Eight notable plant species were recorded (Table 2). Threat categories are from de Lange *et al* (2004).

In addition to the species listed by de Lange *et al* (2004), other species of note include mountain totara and mountain toatoa. Both these species are components of formerly widespread indigenous plant communities which they once dominated. Also notable is the presence of a number of typically lowland species that are present in the forests in lower Coal and Tramway Streams. These species include narrow-leaved lacebark, ribbonwood, lemonwood, tree nettle and supplejack.

Table 2 Threatened plant species recorded from Chetwynd Pastoral Lease, November 2003.

Plant Species	Threat Status	Distribution on Property
coral broom	Gradual decline.	Scattered throughout tall tussocklands especially around rock outcrops, and more common in Coal Stream.
	Significance	
lemonwood	Not threatened; locally uncommon.	Present in the forests of lower Coal and Tramway streams.
mountain toatoa	Not threatened; representative of the original woody vegetation.	On bluffs of Coal Stream, and in the steep central area of Tramway Stream.
mountain totara	Not threatened; representative of the original woody vegetation.	On bluffs of Coal Stream, and in the steep central area of Tramway Stream.
narrow-leaved lacebark	Not threatened; locally uncommon.	Present in the forests of lower Coal and Tramway streams.
ribbonwood	Not threatened; locally uncommon.	Present in the forests of lower Coal and Tramway streams.
supplejack	Not threatened; locally uncommon.	Present in the forests of lower Coal and Tramway streams.
tree nettle	Not threatened; locally uncommon.	Present in the forests of lower Coal and Tramway streams.

SUMMARY

The predominant vegetative cover on Chetwynd Pastoral Lease is grassland, with tall tussockland on upper slopes and fescue tussockland or silver tussockland on lower slopes. Tall tussocklands are dominated by narrow-leaved snow tussock except at higher altitudes where slim snow tussock becomes prominent. Inaka shrubland is also common at higher altitudes. Hardwood forest is present in the incised lower valleys of Coal and Tramway streams, and is spreading onto other lower altitude slopes that have escaped burning. The presence of typically lowland species (including supplejack, tree nettle, lemonwood, ribbonwood and narrow-leaved lacebark) is a notable feature of these forest remnants. Scattered mountain totara forest is present on rocky slopes and outcrops. Small wetlands and seepages are present throughout but are most natural at higher altitudes. The only threatened plant recorded was scattered coral broom.

2.5.4 Problem Plants

Introduced plants that may have a significant 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 mouse-ear hawkweed and pasture grasses, are not discussed here but are listed in the vegetation descriptions.

Wilding conifers

Self-sown pines and larches are present at several locations on the property, and are most common in the upper Tramway Stream catchment. Pine trees are present in a range of plant communities, including regenerating forest, with some pine trees being very large. Larch trees are mostly confined to tussocklands. Wilding conifers pose a serious threat to low-stature plant communities.

Gorse
Patches of gorse are present at lower altitudes near areas of regenerating forest, notably in lower Tramway Stream. Gorse does not pose a significant threat to forest communities, but does threaten adjoining grasslands and tussocklands.

Himalayan honeysuckle
Himalayan honeysuckle is present in forest in the southern tributary of Coal Stream. This species is unlikely to pose a significant threat to forest communities. Control of these infestations is likely to be difficult.

Bittersweet
Bittersweet is present in forest in the southern tributary of Coal Stream. This species is unlikely to pose a significant threat to forest communities. Control of these infestations, and prevention of re-infestation, is likely to be difficult.

Male fern
Male fern is present in forest in the southern tributary of Coal Stream. This species is unlikely to pose a significant threat to forest communities. Control of these infestations, and prevention of re-infestation, is likely to be difficult.

2.6 FAUNA

2.6.1 Bats

South Canterbury supports the only known populations of the threatened long-tailed bat on the east coast of the South Island. Evidence indicates bat numbers in South Canterbury are slowly declining in response to the loss of tree roosts and feeding habitat, and the presence of introduced predators (Griffiths, 1996; O'Donnell, 2000; Lettink and Armstrong, 2003). The core of this long-tailed bat population is centred on indigenous forest remnants and limestone areas around Hanging Rock, between Geraldine and Fairlie (O'Donnell, 2000). Long-tailed bats have been recorded within a few kilometres of Chetwynd Pastoral Lease, on the Tengawai River (Griffiths, 1996), at Downlands less than 10 km south of the property (Department of Conservation records, 1989), and on the neighbouring Manahune Pastoral Lease (Sedgeley, 2002).

Surveys were conducted for bats in locations on the edge of Tramway Bush. This is the best remnant of indigenous forest on the pastoral lease and considered the most likely location for long-tailed bats to be present; however, no bats were recorded on the property.

2.6.2 Birds

Bird records are generally scarce for the Hunters Ecological District. Species such as South Island rifleman, bellbird, South Island tomtit, South Island fantail, grey warbler, New Zealand pigeon and silvereye persist in the few remaining areas of indigenous forest (Bull *et al*, 1985), and blue duck have been recorded on rivers in the region (Cunningham, 1991). One area of indigenous forest on the property (Tramway Bush) was designated as a Site of Special Wildlife Interest of 'moderate value' in 1982. It was described as one of the few habitats of its type in the area and was considered valuable because of its modest size and its good and improving habitat quality (Graeme Loh, New Zealand Wildlife Service National Habitat Register, 1982).

Birds observed on Chetwynd Pastoral Lease are described for each of the two main habitats surveyed, with areas of value for birds shown on the attached map.

Forest and Shrubland

Two areas of mixed regenerating podocarp-hardwood forest in Coal and Tramway streams, and scattered patches of forest elsewhere, were surveyed. Birds recorded from forest habitats include grey warbler, silvereye, bellbird, South Island tomtit, South Island fantail, welcome swallow and a number of introduced species. Grey warblers were recorded in shrublands throughout the property, and South Island tomtit at two locations outside the forests in Coal and Tramway Streams. New Zealand pigeon were seen flying over Tramway Bush during a visit to the property in February 2006.

Tussockland and Rockland

Small areas of rock, scree and boulderfield are present throughout the extensive tussocklands on the property. Native birds recorded from these habitats include Australasian harrier, spur-winged plover, southern black-backed gull, New Zealand pipit and paradise shelduck.

SUMMARY

A total of 26 bird species have been recorded from the property: 12 indigenous species (Table 3) and 14 introduced species. No threatened bird species were observed on the property.

Table 3 Indigenous bird species recorded from Chetwynd Pastoral Lease.

Bird species	Significance	Known Distribution on Property
Australasian harrier	Not threatened; native species.	Throughout
bellbird	Not threatened; endemic species.	Coal and Tramway streams, forest
grey warbler	Not threatened; endemic species.	Coal and Tramway streams, forest
New Zealand pigeon*	Not threatened; endemic species.	Coal and Tramway streams, forest
New Zealand pipit	Not threatened; endemic species.	Tussocklands
paradise shelduck	Not threatened; endemic species.	Tussocklands
silvereye	Not threatened; native species.	Coal and Tramway streams, forest
South Island fantail	Not threatened; endemic species.	Coal and Tramway streams, forest
South Island tomtit	Not threatened; endemic species.	Coal and Tramway streams, forest
southern black-backed gull	Not threatened; native species.	Tussocklands
spur-winged plover	Not threatened; native species.	Tussocklands
welcome swallow	Not threatened; native species.	Coal and Tramway streams, forest

* Recorded in February 2006

Naturalised bird species observed on the property were Australian magpie, blackbird, California quail, chaffinch, chukor, goldfinch, greenfinch, hedge sparrow, house sparrow, redpoll, skylark, song thrush, starling and yellowhammer.

2.6.3 Lizards

Lizard records are generally scarce from the region. Jewelled gecko has been recorded at Cave, and common gecko "Southern Alps" recorded from Manahune Pastoral Lease and the Opihi Gorge. A New Zealand Wildlife Service survey in 1982 recorded a gecko, presumably common gecko "Southern Alps", in Tramway Bush.

Six common gecko "Southern Alps" were recorded on the property during the field survey, mainly in rocky habitats in the high-altitude tussocklands, and also on the eroded terraces in the upper reaches of Tramway Stream. Only one skink was observed during the field inspection. It was recorded (by the botanist) as either a common skink or a McCann's skink. For the sites of lizard observations, see the attached (previous) map.

SUMMARY

Two lizard species have been recorded from the property (Table 4), neither of which are considered threatened.

Table 4 Lizard species recorded from Chetwynd Pastoral Lease, 2003.

Lizard species	Significance	Known Distribution on Property
common gecko	Not threatened.	Under rocks on outcrops. Previous records are under Boulders in Tramway Bush (Graeme Loh, 1982)
unidentified skink (common or McCann's skink)	Not threatened.	High altitude tussockland

2.6.4 Fish

Chetwynd Pastoral Lease covers the upper tributaries of Coal and Tramway streams. Coal Stream is a tributary of the Opihi River, and Tramway Stream is a tributary of the Tengawai River. A distinguishing feature of these rivers is the lack of dams. This has two major effects on the fish communities. The first is that the fish communities are more likely to have diadromous species present (species with a marine phase in their lifecycle). The second effect is that fish are able to migrate between streams, allowing colonisation of previously dewatered streams.

The New Zealand Freshwater Fish Database has (at 11th December 2003) 77 records from the Opihi catchment and 14 records from the Tengawai catchment (McDowall and Richardson, 1983). Species recorded from the Tengawai River include koaro, banded kokopu, Canterbury galaxias, shortfin eel, longfin eel, common bully and upland bully. Of these, only longfin eel (gradual decline) is listed as threatened by Hitchmough (2002).

Six different freshwater habitats are present on the property. These are classified by water source and the surrounding vegetation types. These habitats are described below.

Tarns and Seepages

Most tarns and seepages are in the upper reaches of Tramway and Coal streams, though some small seepages occur at lower altitudes. Almost all are surrounded by tussocklands. All are accessible to stock, though access is restricted by snow during winter. Generally, these areas are small (<100 m^2). No fish surveys were undertaken in any of the tarns and seepages due to a lack of standing water.

Forest Streams

This habitat is present in the lower-altitude parts of Tramway and Coal streams, near the property boundary. Both streams are accessible to stock. Tramway Stream is mostly greater than three metres wide and 400 mm deep. In contrast, Coal Stream is only about two metres wide and 300 mm deep. Tramway Stream has several waterfalls within the forest, some as high as two metres.

Fish surveys were undertaken at two sites, one in each stream, above the waterfalls in Tramway Stream. No fish were caught. Below the waterfalls in Tramway Stream was not fished due to topography and access constraints; however, this is the most likely place on the property where fish may occur. Species likely to be present, based on nearby records in the New Zealand Freshwater Fish Database include koaro, banded kokopu, Canterbury galaxias, shortfin eel, longfin eel, common bully and upland bully.

Mixed Forest and Tussockland Streams

This habitat is present in both Tramway and Coal Streams, where small patches of forest occur within tussocklands. All areas are accessible to stock, except some of the small gorges. Both streams are approximately three and a half metres wide. Coal Stream has an average depth of only 100 mm; Tramway Stream has a depth of approximately 350 mm. Three sites were surveyed, but no fish were caught.

Tussockland Streams

This is the most extensive habitat type on the property, covering the entire upper reaches of both catchments except for a small forested area in Tramway Stream. This habitat includes the source of water for both catchments, and includes the larger tributaries at lower altitudes. Nearly all parts of this habitat are accessible to stock. The streams are mostly less than two metres wide and have an average depth of 200 mm, with a couple of deeper (500 mm) pools. Two sites were surveyed, but no fish were caught.

Mixed Tussockland and Grassland Streams

The only areas of this habitat are two small streams near the eastern property boundary. The source of these streams is on the main ridge between Coal and Tramway streams. These streams are used heavily by stock, particularly cattle, as they provide the main source of water on the intensively farmed part of the property. Both streams are less than a metre wide and average 80 to 100 mm deep. Two sites were surveyed, but no fish were caught.

Farm Ponds

The only farm pond present is near the yards at the eastern end of the property. This pond is sourced from a couple of small seepages less than 20 metres apart that flow directly out of the hill. Surrounding vegetation is introduced grasses with some reeds around the edge of the seepages. This pond is used heavily by stock, particularly cattle. The pond is about 10 m long and wide and between 500 and 800 mm deep. The pond was not surveyed with an electro-fishing machine, but a thorough search found no fish.

Significance of the Freshwater Fauna

Freshwater fauna communities of six different freshwater habitats were surveyed at 10 sites on Chetwynd Pastoral Lease. No fish were caught. The lack of fish in either catchment is unusual. Some of the waterfalls may exclude diadromous species from migrating into these catchments, but the absence of non-diadromous species such as Canterbury galaxias is more unusual. Three

suggestions seem plausible: this is a locality where fish are not present; some past event has driven former populations to extinction; or fish are present in low numbers and were not recorded during the survey.

Most of the Opihi River is recognised as a 'Type II' in the Waters of National Importance (WONI) documentation (Chadderton *et al*, DOC 2004). 'Type II' implies that the waterway contains special features of national significance. Only sections of 'Type II' catchments are of national importance. This significance is for its nationally significant braided river birds.

2.6.5 Invertebrates

TERRESTRIAL INVERTEBRATES

Terrestrial invertebrate species were collected from 40 sites on Chetwynd Pastoral Lease. Species observed are described below for five distinct parts of the property with areas of terrestrial invertebrate value shown on the attached map.

Lower Front Faces and Lower Tramway Stream

One spider, two Opilione and 16 insect species were collected from this area. The majority of invertebrate species were found in vegetation near Tramway Stream. One species of native cockroach (*Celatoblatta pallidicauda*), an endemic ground beetle (genus *Holcaspis*) and two species of native scarab beetle (genus *Odontria*) were collected from the shrubland-pasture ecotone. The tussock butterfly (*Argyphenga antipodum*) was common and widely distributed. Fly species collected from grasslands include a Bibionid (*Dilophus crinitus*) and a Scirid (root gnat). Beating vegetation in Tramway Stream gully produced species of Plecoptera and Tricoptera, both of which appear restricted to Tramway Stream. *Miturga* hunting spiders were frequent in grasslands, while species of *Orepukia* were found only near Tramway Stream.

The lower Tramway Stream area is in good condition. Native host plants are healthy and the stream gully provides a number of alternative invertebrate habitats (stream, riparian and forest). The vegetation is host to many native insects, and provides a litter habitat for less conspicuous taxa such as predatory Opiliones. The invertebrate diversity of the Tramway Stream area (3 orders from 4 samples) is an inherent value.

Eastern Face and Main Ridge

One giant slug, one millipede, six spider and seven insect species were collected from this area. Most invertebrates were confined to the damper southeast slopes. Numerous spiders were collected by beating mingimingi and broadleaf bushes in a seepage gully on the south side of the main ridge (below point 1113m). Beetles from two families (Cerambicidae and Curculionidae) were beaten from shrubs of *Coprosma sp.*, *Dracophyllum longifolium* and *Gaultheria crassa* above Tramway Stream. One specimen of the large endemic funnel web spider (*Porrhothele antipodiana*) was collected near the ridge crest. Another spider observed was the large hunting or 'nursery web' spider (*Dolomedes minor*). Numerous jumping spiders (Salticidae) were found in native vegetation above the Tramway Stream gully. A notable find was the giant leaf veined slug, a species vulnerable to mammalian predators and is uncommon in this ecological district. Another interesting arthropod observed was an endemic millipede (family Cambalidae). The endemic cockroach *Parellipsidion inaculeatum* was observed, but was patchy in distribution and not abundant.

Spider populations in this area appear large, diverse (5 families were identified) and healthy, suggesting prey is also abundant. Spider diversity was particularly rich on south-facing slopes above Tramway Stream. The ridge top and faces above Tramway Stream are in good overall condition.

The east face below point 1113m is more modified, consisting of pasture and tussock. The taxonomic diversity of invertebrates (e.g. slugs, millipedes, insects and spiders) is an inherent value of this area.

Crest of the Albury Range

Five spider and 17 insect species were collected from this area. Invertebrates of interest found in this area were restricted to tussock tops, rocky outcrops and scree habitats. A number of significant specimens were identified from the area, including both sexes of the giant tree weta amongst rocks at the summit ridge. This tussock-dwelling species is flightless, uncommon in the ecological district, and is threatened by predators and habitat loss. The abdomen of a giant weevil was found on the ridge crest. These flightless endemic beetles are considered endangered on the mainland (Klimaszewski and Watt, 1997), including being uncommon in the ecological district, and are prone to rodent predation.

A large ground beetle, *Megadromus enysi,* was also collected. Five spider species were found, of which three are hunting varieties (*Anoteropsis hilaris*, *Miturga sp.* and *Porrothele antipodiana*). Two species of grasshopper (*Sigaus australis* and *S. campestris*) are present and numerous specimens of the native bee *Lasioglossum sordidum* were found. The endemic ant *Monomorium antarcticum* was abundant.

This area is in good if not excellent condition, particularly at higher elevations. Vegetation and invertebrate diversity suggest that it has not been burnt for many years. Ants, flies and grasshoppers (*Sigaus australis* only) are abundant. Other invertebrate species found were infrequent. The area is an example of a healthy sub-alpine habitat with important endemic invertebrates.

Upper Tramway Stream

One spider and 11 insect species were collected from tussockland and shrubland in this area. A single specimen of what is likely to be *Megadromus* sp. *?temukensis* (a ground beetle) was collected. *Megadromus* sp. *?temukensis* is restricted to mid and south Canterbury including the Mackenzie Basin (Larochelle and Larivière, 2001) and appears to be at its distributional limit on this pastoral lease. Small weevils identified to the tribe Eugnomini were frequent within the tillers of speargrass (*Aciphylla colensoi* var. *maxima*). The grasshopper *Sigaus australis* was abundant in tussockland; lower numbers of *S. campestris* were also present. Butterflies (*Argyphenga antipodum*) were widespread and the cockroach *C. pallidicauda* was abundant in stony country.

Habitats in this area are in good overall condition. Typically, species in upper Tramway Stream follow standard frequency distribution with a few species being abundant while most others are uncommon. Butterflies, grasshoppers and cockroaches were common, while beetles and spiders were less abundant. The area supports an invertebrate fauna typical of healthy tussocklands in a higher-altitude river catchment.

Coal Stream

One flatworm, eight spider and 20 insect species were collected from this area. Flies were diverse and abundant throughout the Coal Stream catchment, and represented by eight families. The flatworm *Dugesia montana* was abundant under stones in Coal Stream. *D. montana* is common in small alpine streams and is a potential ecological indicator species. Grasshoppers (*S. campestris*) and cockroaches (*C. pallidicauda*) were frequent in the higher-altitude tussocklands. Two species of native ant (*Monomorium antarcticum* and *Huberia brouni*) were also widespread. Beetles found include a common ladybug (*Coccinella undecimpuntata*), a Darkling beetle (*Mimopeus elongatus*) and two species of Carabid beetle. The latter species were found in the lower-altitude treelands of Coal Stream gully, one of the genus *Mecodema* (probably *M. huttenense*) and the other *Megadromus*

antarcticus. *Megadromus antarcticus* is a large metallic green and black ground beetle which is generally widespread but is uncommon in this ecological district and is recognised as being susceptible to rodent predation.

The condition of habitats in this area is good, particularly the steeper slopes where grazing access is more restricted. Individual species were common throughout the altitudinal range of Coal Stream. The presence of beetle species (*Megadromus antarcticus* and *Mecodema huttenense*) in the lower gully section of Coal Stream is significant, although only one specimen of each was found despite extensive searches. Coal Stream is a good example of an ecological transition from steep sub-alpine tussocklands down to native (regenerating) treelands within a shady gully. Invertebrate types found in this area reflect this transition.

FRESHWATER INVERTEBRATES

Freshwater invertebrates are described for the two habitats sampled on the property with areas of aquatic invertebrate value shown on the attached (previous) map.

Forest Streams

Streams within forest had good water quality at the time of the survey. Macro-invertebrate species present include mayflies: *Deleatidium lillii*-group, *Deleatidium myzobranchia*-group and *Nesameletus* sp.; caddisflies: as *Aoteapsyche colonica, Hydrobiosis* sp. and *Pycnocentrodes aeris*; stoneflies: *Stenoperla prasina* and *Megaleptoperla grandis*; dobsonfly: *Archichauliodes diversus*; beetles: Elmidae sp.; and flies: *Aphrophila* sp. and *Eriopterini* sp.

Tussockland Streams

Streams within tussockland had good water quality at the time of the survey. Macro-invertebrate species present include mayflies: *Deleatidium lillii*-group, *Deleatidium myzobranchia*-group and *Nesameletus* sp.; stoneflies (*Spaniocercoides cowleyi* and *Stenoperla prasina*); beetles: Elmidae sp.; and flies: *Aphrophila* sp. and *Eriopterini* sp.

SUMMARY

Over 70% of the property is typical of higher-altitude habitats of the eastern South Island. Ecologically, the area is generally healthy. Endemic invertebrates are well represented, though not always numerous, with examples of taxa restricted to the region (South Canterbury), examples of taxa which are uncommon in the ecological district or examples of those that are not well documented. A number of charismatic mega-invertebrates are present (hunting spiders, weta, beetles and slugs).

There remain many gaps in our knowledge regarding the distribution and evolutionary pattern of flightless invertebrates in the eastern South Island high country. Chetwynd Pastoral Lease supports a number of biogeographically significant invertebrates, specifically beetles, weta and cockroaches. The Albury Range divides South Canterbury and the Mackenzie Basin. There is a high probability that interesting biological processes (such as hybridisation) occur across the range, between the two regions. Opportunities to test these phenomena are becoming more restricted as natural habitats and taxa diminish through modification. Areas of inherent value on the property include all those described for terrestrial invertebrates above, except the lower eastern slopes.

The bush-filled gullies in Coal and Tramway streams contain aquatic values as an unusual habitat type in this region. The value is for their aquatic invertebrate communities. The seepages at the head of Tramway Stream are more common, but are a unique habitat type on this pastoral lease, so are also of value for their aquatic invertebrate communities.

2.6.6 Notable Fauna

Notable animal species recorded from the property are listed in Table 5 below. No species listed as threatened by Hitchmough (2002) were recorded on the property.

Table 5 Notable fauna recorded from Chetwynd Pastoral Lease, November 2003.

Animal Species	Significance	Known Distribution on Property
giant leaf veined slug	Uncommon in ecological district.	On the eastern faces and ridge top of the central spur.
giant weevil	Uncommon in ecological district. Considered endangered on mainland (Klimaszewski and Watt, 1997).	Along the summit ridge of the Albury Range.
Megadromus antarcticus	Uncommon in ecological district.	In Coal Stream.
Megadromus sp. *?temukensis*	Endemic to Mid and South Canterbury. Distributional limit.	In the upper section of Tramway Stream.
tree weta	Uncommon in ecological district.	Along the summit ridge of the Albury Range.

2.6.7 Problem Animals

Introduced animals that may have a significant effect on indigenous plant or animal 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 rodents and mustelids), or domesticated animals that are grazed on the property, are not discussed here.

Bennett's wallaby
Bennett's wallaby are common on the property, especially in tussocklands and shrublands in upper Tramway and Coal streams. Wallabies are causing significant damage to plant communities at some locations.

Chamois, red and fallow deer
Chamois, red and fallow deer are present on the property. All three are causing significant damage to plant communities at some locations.

Brushtail possum
Brushtail possum sign (droppings) was observed at lower altitudes on the property, notably in the Coal Stream forest. Possums have an impact on both plant and animal species (especially invertebrates and lizards).

In addition to the species described above, feral pig and feral goat have been recorded from adjoining properties and may be present on the property.

2.7 HISTORIC

Chetwynd Pastoral Lease was originally part of one of South Canterbury's best-known properties, the Levels Run. Land on the Albury Range (Run 416) was divided from the Levels Run in 1855 after surveys showed that the run comprised more land than allowed. The area was further divided in 1867 to form part of the Albury Estate (Andersen, 1916). Leases on the Albury Range were bought by the Bank of New Zealand in 1889 and then parts of the area let by the Crown as small grazing runs in 1894. In 1897, 4276 ha of the Albury Estate was sold as leasehold blocks, the boundaries of which remained unchanged to 1969 (Pinney, 1981).

No sites of historic interest are known from the property.

2.8 PUBLIC RECREATION

2.8.1 Physical Characteristics

The property can be divided into two main recreation settings.

Albury Range Unit

This recreation unit covers the higher-altitude parts of the property, including the broad crest of the Albury Range, the steeper upper slopes and the headwaters of Tramway and Coal streams. Vegetation is predominantly open tussockland with areas of shrubland and scattered low forest in the valleys. The area is open, offering expansive views of the South Canterbury ranges. The relatively gentle terrain on the main slopes provides easy access and can be traversed reasonably easily on foot, though upper slopes are snow-covered during winter months.

Lower Valleys

This recreation unit covers the lower-altitude parts of the Tramway and Coal stream valleys. Vegetation is predominantly regenerating podocarp-hardwood forest and scrub in the valleys, with modified grasslands and pasture on the intervening ridge and slopes. Getting recreation access through the area is difficult, but once achieved, a four wheel drive track up the main ridge line provides access to the upper slopes. Both streams are incised, flowing through small narrow gorges, and the vegetation surrounding the streams is dense and untracked. The streams and the surrounding low-altitude forest and scrub are interesting recreational features. The area is traversed by several vehicle tracks and fences.

2.8.2 Legal Access

A farm track following the legal road line provides legal access to the property from O'Neills Road (off the Albury Fairlie Road (State Highway 8)). This would be the most practical route for public access to the lower-altitude part of the property. A legal road up the central ridge from the property boundary to the crest of the Albury Range could provide foot access to the higher-altitude parts of the property.

It appears that a marginal strip is also located in Tramway Stream; however, this only starts at the lower boundary of this pastoral lease and follows this boundary until the actual lease boundary diverts away from the stream, at which point it stops. This means the marginal strip is isolated and does not currently function as legal access.

2.8.3 Activities

Scenery appreciation is probably the most important existing recreational use of the property, as most of the property is clearly visible from the Albury Fairlie Road. The property provides good opportunities for hunting (wallaby, deer and chamois), walking/tramping, botanizing, photography and nature study. The four-wheel-drive track through the property to the crest of the range and the track along the range crest, provide good opportunities for mountain-biking, horse-trekking and four-wheel-drive vehicle use. Lower-altitude sites in Tramway and Coal streams offer potential for the future development of facilities for walking and picnicking.

PART 3 OTHER RELEVANT MATTERS AND PLANS

3.1 CONSULTATION

Information-gathering meetings were held in Christchurch on 28th October 2003 and in Timaru on 29th October 2003. Issues raised at those meetings are listed below.

- The area appears good for mountain-biking.
- There is not much use of this area by Christchurch-based clubs, as there is no adjoining public conservation land.
- The front country appears easily accessible.
- The protection of the Coal Stream catchment for water yield is important.
- There appear to be some areas of bush on the property.
- Walking and four-wheel-drive access exists along the crest of the Albury Range, along a Catchment Board road from the Tengawai Valley; keen to see future public use of this road formalised.
- Mackenzie District Council has completed a study of significant landscape values of the Fairlie Basin, though it is not known whether the results of this study are published yet.

3.2 DISTRICT PLANS

Chetwynd Pastoral Lease lies within the Rural Zone of the Mackenzie District. One Site of Natural Significance is present on the property:

- 80 Tramway Bush in the lower part of the Tramway Stream Valley

The Mackenzie District Plan contains a number of rules relating to land use activities within sites of natural significance, within riparian areas and in high altitude areas (i.e. areas above 900 m):

3.3 CONSERVATION MANAGEMENT STRATEGIES AND PLANS

Chetwynd Pastoral Lease lies within the Pareora Unit of the Canterbury Conservation Management Strategy (CMS). The key priorities for this unit are listed as:

- To identify the significant indigenous vegetation and threatened plant and animal species of the Pareora Unit.
- To use a range of effective methods to protect the indigenous biodiversity of the Pareora Unit.
- To protect and enhance the viability of priority threatened species populations and their habitats in the Pareora Unit.
- To co-operate with and assist rūnanga and the New Zealand Historic Places Trust in protecting rock art sites.
- To survey, monitor and control wallabies on land managed by the Department to levels that minimise their adverse effects on indigenous vegetation.

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. This strategy is a

blueprint for managing the country's diversity of species and habitats. It sets a number of goals to achieve this aim. Of particular relevance to tenure review is Goal 3, 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 systems 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.

PART 4 ATTACHMENTS

4.1 ADDITIONAL INFORMATION

4.1.1Scientific 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). Naturalised species are indicated by an asterisk (*).

Common name	Scientific name
bittersweet*	*Solanum dulcamara*
blue tussock	*Poa colensoi*
bog-rush	*Schoenus pauciflorus*
bracken	*Pteridium esculentum*
broadleaf	*Griselinia littoralis*
browntop*	*Agrostis capillaris*
bush lawyer	*Rubus* spp.
button fern	*Pellaea rotundifolia*
cabbage tree	*Cordyline australis*
catsear*	*Hypochoeris radicata*
comb sedge	*Oreobolus pectinatus*
common pennywort	*Hydrocotyle novae-zeelandiae*
coral broom	*Carmichaelia crassicaule*
cotton daisy	*Celmisia spectabilis*
creeping mapou	*Myrsine nummularia*
everlasting daisy	*Helichrysum bellidioides*
fescue tussock	*Festuca* sp.
five finger	*Pseudopanax arboreus*
fuchsia	*Fuchsia excorticata*
golden speargrass	*Aciphylla aurea*
gorse*	*Ulex europaeus*
hen and chickens fern	*Asplenium bulbiferum*
Himalayan honeysuckle*	*Leycesteria formosa*
hound's tongue	*Microsorum pustulatum*
inaka	*Dracophyllum* sp.
kahikatea	*Dacrycarpus dacrydioides*
king devil hawkweed*	*Hieracium praealtum*
kohuhu	*Pittosporum tenuifolium*
korokio	*Corokia cotoneaster*
koromiko	*Hebe salicifolia*
kowhai	*Sophora microphylla*
lancewood	*Pseudopanax crassifolius*
larch*	*Larix decidua*

lemonwood ..... *Pittosporum eugenioides*
male fern* ..... *Dryopteris filix-mas*
marbleleaf ..... *Carpodetus serratus*
matagouri ..... *Discaria toumatou*
matai ..... *Prumnopitys taxifolia*
mingimingi ..... *Coprosma propinqua*
miro ..... *Prumnopitys ferruginea*
mountain akeake ..... *Olearia aviceniifolia*
mountain clubmoss ..... *Lycopodium fastigiatum*
mountain flax ..... *Phormium cookianum*
mountain kiokio ..... *Blechnum montanum*
mountain ribbonwood ..... *Hoheria lyallii*
mountain toatoa ..... *Phyllocladus alpinus*
mountain totara ..... *Podocarpus hallii*
mountain wineberry ..... *Aristotelia fruticosa*
mouse-ear hawkweed* ..... *Hieracium pilosella*
narrow-leaved lacebark ..... *Hoheria angustifolia*
narrow-leaved snow-tussock ..... *Chionochloa rigida*
native jasmine ..... *Parsonsia capsularis*
necklace fern ..... *Asplenium flabellifolium*
pate ..... *Schefflera digitata*
patotara ..... *Leucopogon fraseri*
pine* ..... *Pinus* sp.
pokaka ..... *Elaeocarpus hookerianus*
prickly shield fern ..... *Polystichum vestitum*
red mapou ..... *Myrsine australis*
red woodrush ..... *Luzula rufa*
ribbonwood ..... *Plagianthus regius*
rimu ..... *Dacrydium cupressinum*
short tussock ..... *Festuca* sp.
silver tussock ..... *Poa cita*
slim snow tussock ..... *Chionochloa macra*
snowberry ..... *Gaultheria depressa* var. *novae-zelandiae*
snow tussock ..... *Chionochloa* spp.
speargrass ..... *Aciphylla* sp.
sphagnum moss ..... *Sphagnum cristatum*
supplejack ..... *Ripogonum scandens*
sweet broom ..... *Carmichaelia angustata*
sweet vernal* ..... *Anthoxanthum odoratum*
thousand-leaved fern ..... *Hypolepis millefolium*
three finger ..... *Pseudopanax colensoi*
toetoe ..... *Cortaderia richardii*
tree daisy ..... *Olearia* sp.
tree nettle ..... *Urtica ferox*
tutu ..... *Coriaria sarmentosa*
weeping mapou ..... *Myrsine divaricata*
white clover* ..... *Trifolium repens*
woolly moss ..... *Racomitrium pruinosum*
yellow-wood ..... *Coprosma linariifolia*
Yorkshire fog* ..... *Holcus lanatus*

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. Naturalised species are indicated by an asterisk (*).

Common name	Scientific name
Australasian harrier	*Circus approximans*
Australian magpie	*Gymnorhina tibicen*
banded kokopu	*Galaxias fasciatus*
bellbird	*Anthornis melanura melanura*
Bennett's wallaby*	*Macropus rufogriseus rufogriseus*
blackbird	*Turdus merula*
blue duck	*Hymenolaimus malacorhynchos*
brown hare*	*Lepus europaeus occidentalis*
brushtail possum*	*Trichosurus vulpecula*
California quail	*Callipepla californica brunnescens*
Canterbury galaxias	*Galaxias vulgaris*
chaffinch	*Fringilla coelebs*
chamois*	*Rupicapra rupicapra rupicapra*
chukor	*Alectoris chukar*
common bully	*Gobiomorphus cotidianus*
common gecko "Southern Alps"	*Hoplodactylus* aff. *maculatus* "Southern Alps"
common skink	*Oligosoma nigriplantare polychroma*
European rabbit*	*Oryctolagus cuniculus cuniculus*
fallow deer*	*Dama dama dama*
feral goat*	*Capra hircus*
feral pig*	*Sus scrofa*
giant leaf veined slug	*Pseudoneitea* sp.
giant weevil	*Anagotus* sp.
goldfinch	*Carduelis carduelis*
greenfinch	*Carduelis chloris*
grey warbler	*Gerygone igata*
hare*	*see* brown hare
hedge sparrow	*Prunella modularis*
house sparrow	*Passer domesticus*
jewelled gecko	*Naultinus gemmeus*
koaro	*Galaxias brevipinnis*
longfin eel/tuna	*Anguilla dieffenbachii*
long-tailed bat	*Chalinolobus tuberculatus*
McCann's skink	*Oligosoma maccanni*
New Zealand pigeon	*Hemiphaga novaeseelandiae novaeseelandiae*
New Zealand pipit	*Anthus novaeseelandiae novaeseelandiae*
paradise shelduck	*Tadorna variegata*
possum*	*see* brushtail possum
rabbit*	*see* European rabbit
red deer*	*Cervus elaphus scoticus*
redpoll	*Carduelis flammea*
sheep*	*Ovis aries*
shortfin eel	*Anguilla australis*
silvereye	*Zosterops lateralis lateralis*
skylark	*Alauda arvensis*
song thrush	*Turdus philomelos*

South Island fantail.....*Rhipidura fuliginosa fuliginosa*
South Island rifleman .....*Acanthisitta chloris chloris*
South Island tomtit .....*Petroica macrocephala macrocephala*
southern black-backed gull.....*Larus dominicanus dominicanus*
spur-winged plover.....*Vanellus miles novaehollandiae*
starling .....*Sturnus vulgaris*
tree weta .....*Hemideina maori*
upland bully.....*Gobiomorphus breviceps*
wallaby* .....*see* Bennett's wallaby
welcome swallow .....*Hirundo tahitica neoxena*
yellowhammer .....*Emberiza citrinella*

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