Toitu te whenua
Land Information
New Zealand

Crown Pastoral Land Tenure Review

Lease name : OMARAMA

Lease number : PO 369

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 05

OMARAMA PASTORAL LEASE

CONSERVATION RESOURCES REPORT

Department of Conservation

June 2005

CONTENTS

PART 1 INTRODUCTION

This report describes the significant inherent values present on Omarama Pastoral Lease. Omarama Pastoral Lease covers an area of approximately 8781 ha on the St Cuthbert Range and northern Ewe Range, south of Omarama in South Canterbury. Most of the property comprises moderately steep mountainous country, rising from the broad plains of the lower Ahuriri River at approximately 420 m altitude to the summit of the Ewe Range at over 1600 m. It includes the prominent Mt St Cuthbert (1558 m). The property includes small areas of flat to gently-sloping country at lower altitudes in the northwest alongside Omarama Stream and in the northeast alongside the Omarama-Otematata Road (State Highway 83). The property is drained by Cattle Creek and its tributaries in the south and west, Old Man Creek in the north, and Glen Creek and its tributaries in the east.

Omarama Pastoral Lease adjoins Otamatapaio Pastoral Lease to the south and southeast, Berwen Pastoral Lease to the southwest, the Ag-Research farm of Tara Hills to the west and privately-owned land on other boundaries (see attached map).

The majority of Omarama Pastoral Lease lies within the Benmore Ecological District, part of the Mackenzie Ecological Region. The southern part of the property, on the Ewe Range, lies within Hawkdun Ecological District (Waitaki Ecological Region), and a small area at the northwest edge of the property, near Omarama Stream, lies in the Omarama Ecological District, also part of the Mackenzie Ecological Region (McEwen, 1987). These ecological districts have been surveyed as part of the Protected Natural Areas Programme and a number of areas on the property recommended for protection (Espie *et al*, 1984; Grove, 1994). Details of these recommendations are described under Ecological Context (section 2.4.1).

Two areas on the property are protected by Open Space (QEII) covenants. One is centred on Mt St Cuthbert (based on RAP Benmore 3). The other is centred on the Ewe Range at the southern part of the property (based on RAP Hawkdun 1) (see attached map).

This report has been compiled from the following field survey reports:

- Omarama Pastoral Lease Landscape Assessment, Alan Petrie, November 2004, 10p + photographs + map.
- Omarama Station Vegetation Report, Mark Davis, April 2005, 19p + map + appendices.
- Assessment of the Fauna Values of Omarama Pastoral Lease, Jane Sedgeley, April 2005, 15p + photographs + maps.
- Omarama Pastoral Lease, A Report on the Aquatic Fauna Survey, Scott Bowie, April 2005, 18p + map.
- Invertebrate Assessment of the Omarama Pastoral Lease, Warren Chinn, April 2005, 11p + appendices.

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

2.1 LANDSCAPE

2.1.1 Landscape Context

Omarama Pastoral Lease is located on the St Cuthbert and northern Ewe Ranges, which extend north from the more prominent Hawkdun Range. The Hawkdun Range is a very distinctive block-faulted range with an even summit and small cirque basins. To the north, the property extends onto the alluvial outwash plain of the Ahuriri Valley. The property spans an altitude of over 1000m, from 420m close to State Highway 8 to 1600 m on the Ewe Range in the south of the property. Distinctive physical characteristics of the property are the band of rounded foothills that border the St Cuthbert Range, the deeply dissected and scree-covered faces of the upper eastern slopes of the St Cuthbert Range, the more subdued western faces of the range, and the upland plateau of the Ewe Range.

The property forms the southwestern visual edge to the upper Waitaki Basin, which is notable for its overall sense of spaciousness and the unhindered views of the surrounding mountain ranges. The homestead and other farming auxiliary buildings are located adjacent to State Highway 8 close to Omarama. Well-established plantings of both ornamental and shelter trees surround the property's dwellings.

2.1.2 Landscape Description

For the purposes of this landscape assessment Omarama Pastoral Lease is divided into six landscape units (see attached map), principally reflecting changes in slope, aspect 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.

Finally, visual values, which are a sub-set of landscape values and relate to the visibility of a particular landscape or natural feature as seen from key viewing points, are also assessed.

Landscape Unit 1

This landscape unit encompasses the catchment of Old Man Creek. It has a gently rolling topography with rounded ridgelines separated by concave gullies. Above 1000 m the ridgelines narrow and contain craggy rock outcrops. Vegetation reflects the semi-arid climatic conditions. Bare ground is a common feature. Lower and mid slopes are dominated by mats of hawkweed along with a sparse covering of grasses and herbs. Short

tussock is present on the darker faces, tussockland above 1100 m, shrubland around the rock outcrops and screes, and matagouri and sweet brier on lower slopes.

Landscape Values
Lower- and mid-altitude parts of the unit convey only moderate inherent landscape values as they have been modified by pastoral farming. The upper section of Old Man Creek conveys high inherent landscape values attributable to the extensive rock outcrops and uniform tall tussockland typical of the high country.

Visual Values
This unit has moderately high visual resource values as the foothills and adjoining upper slopes form the foreground to the St Cuthbert Range. Some views of the lower country are partially screened from public viewing points by extensive shelter planting.

Potential Vulnerability to Change
Land uses and activities that have the potential to affect this unit include:
- Unsympathetic bulldozed tracking and fence lines, especially on the sunnier northern faces.
- Introduction of any large-scale artificial patterns such as plantation forestry.
- Spread of wilding trees and further spread of sweet brier.

Landscape Unit 2

This landscape unit encompasses the eastern faces that overlook the lower Ahuriri Valley and Lake Benmore. The upper boundary of the unit follows the crest of the St Cuthbert Range, which rises steadily to the south. Highway 83 (Omarama-Otematata Road) and the toe of the slopes (at the property boundary) define the lower boundary.

The low hills at the base of the St Cuthbert Range are convex in form, being shaped by a deep mantle of colluvium. The intervening swale gullies contain ephemeral watercourses. Upslope, long steep gullies penetrate deeply into the flanks of the St Cuthbert Range. The bowl-like head basins of these gullies feature long stable screes, debris chutes, vertical rock outcrops and high altitude shrublands. The mid sections of the gullies contain rock bluffs protruding from the side slopes. Vegetation cover at lower altitudes is modified short tussockland, shadier faces and deeper gullies contain shrubland, and upper slopes support tall tussockland and shrubland.

Landscape Values
The head basins and upper slopes have significant inherent landscape values due to their overall sense of naturalness and the distinctive patterns of scree slides, rock outcrops and tussockland communities. The mid and lower slopes have moderate inherent landscape values, forming the transition between the more modified basin floor and the intact high-altitude country. Although in places the indigenous vegetation within this wide band of country is depleted, it still conveys an overall impression of naturalness.

Visual Values
This unit has high visual resource values principally due to its visibility from the Omarama-Otematata Road, which is an increasingly important tourist route.

Potential Vulnerability to Change
Land uses and activities that have the potential to affect this unit include:
- Introduction of large-scale artificial land use patterns, e.g. plantation forestry.
- Introduction of any structures or buildings on the mid slopes.
- Wilding tree spread.
- Unsympathetic bulldozed tracking and fence lines.

Landscape Unit 3

This landscape unit encompasses the small upland plateau northwest of the summit of Mt St Cuthbert. The landform is unvarying, characterized by subdued topography with a superimposed drainage pattern. The plateau gradually descends towards the north and west where it merges with the head of several large gullies, the largest containing Old Man Creek. The unit also includes the summit of Mt St Cuthbert, which features distinctive boulderfields that radiate out from the summit. Similar to the landform, the vegetative cover of short-stature snow tussock is uniform.

Landscape Values
This unit contains significant inherent landscape values attributable to the simplicity of the tussockland over a subtle landform. In aesthetic terms the unit conveys a strong sense of coherence due to the fine texture and near monochromatic tonal range of the tussockland.

Visual Values
The unit has moderate visual resource values owing to the subdued nature of the topography.

Potential Vulnerability to Change
Land uses and activities that have the potential to affect this unit include:

- Earth disturbance and any depletion of vegetative cover, which would allow opportunist species such as hawkweed to establish.
- Any subdivision fencing that would lead to artificial fragmentation of the existing coherent tussock cover.
- Introduction of buildings or structures.

Landscape Unit 4

This landscape unit includes most of the catchment of Cattle Creek and the alluvial terraces and flats of Omarama Stream on the western side of the property. A low saddle separates the eastern headwaters of Cattle Creek from Glen Creek (Landscape Unit 5). Abutting this low saddle is a long scarp face descending from the ridge crest of Mt St Cuthbert. This even-graded slope features extensive screes and rock outcrops. The lower part of the unit incorporates a complex of small hillocks and short steep slopes that help provide basin-like qualities to the valley floor. Rock buttresses and adjacent talus slopes border the valley floor. Lower Cattle Creek winds across an alluvial terrace before joining Omarama Stream.

Vegetation of the unit varies with altitude, aspect and grazing history. Most of the lower and mid Cattle Creek catchment supports grassland and extensive tracts of sweet brier. The higher-altitude scarp supports tussockland, shrubland and scree. Groups of crack willow line the lower section of Cattle Creek intertwined with the *Carex* wetlands that line most of the valley floor.

Landscape Values
The long scarp face that descends off Mt St Cuthbert has significant inherent landscape values due to the naturalness and intactness of the vegetation. In aesthetic terms, the diversity and coarse texture of the scree contrasts markedly with the subdued colour of the surrounding tussockland. The balance of the unit conveys only moderate inherent landscape values due to modification by pastoral farming.

Visual Values
The unit has only a local visual resource values due to the contained nature of Cattle Creek.

Potential Vulnerability to Change
Land uses and activities that have the potential to affect this unit include:
- Wilding pine spread.
- Loss or further degradation of the *Carex* wetlands on the valley floor.
- Unsympathetic fencing or tracking.

Landscape Unit 5

This landscape unit includes the upper and mid sections of the Glen Creek catchment on the south side of Mt St Cuthbert. Glen Creek forms the boundary with Otamatapaio Pastoral Lease. The catchment is typically a deep V-shaped valley that incorporates long scree slides that descend from Mt St Cuthbert. At the base of these scree slides are large rock outcrops surrounded by deep deposits of talus. The lower sections of the valley merge with the rounded convex landforms that characterize the lower flanks of the St Cuthbert Range. The vegetation is extensively modified, especially along the valley floor where short tussockland has a high component of introduced grasses and herbs. Patches of shrubland often surround the talus slides. A notable feature is the scattering of snow totara on the lower scree faces.

Landscape Values
The long screes contained within this unit mirror the values already described for Landscape Unit 4, while the balance of the unit conveys only moderate inherent landscape values due to the extensive modification of the original vegetation.

Visual Values
This unit has only localized visual resource values due to the contained nature of Glen Creek. Parts of the lower catchment are visible from the Omarama-Otematata Road.

Potential Vulnerability to Change
Land uses and activities that have the potential to affect this unit include:
- Wilding pine spread.
- Unsympathetic bulldozed tracking and fence lines, especially in areas that overlook Lake Benmore.
- Intensive grazing, especially around patches of snow totara.

Landscape Unit 6

This landscape unit incorporates all of the backcountry part of the property. The southern and eastern boundaries follow the straight-line property boundaries on the Ewe Range. The upper shoulders of the slopes that drop down to the Cattle Creek and Glen Creek valleys define the lower boundary of the unit. The watershed between these two creeks is a narrow ridge that straddles the St Cuthbert and Ewe Ranges.

The dominant landform is the undulating upland plateau that features rounded hills, such as Baldy Knob, separated by irregular concave depressions. Etched deep into the plateau are several symmetrical gullies that drain to Cattle Creek and contain large rock bluffs and patches of scree. The main central gully features a spectacular 19-metre waterfall. The vegetation is unvarying, with low-stature snow tussock on the upper and mid sections of the plateau and sparser tussock cover below approximately 1000 m. A feature of the upland plateau is the absence of wilding pines.

Landscape Values
A large proportion of this unit conveys significant inherent landscape values due to the intactness of the tall tussockland and the subdued topography which, with tussocklands on adjoining properties, creates an unending tract of tall tussockland. Even though the original vegetation is modified in lower parts of the unit, it still retains high naturalness values.

Visual Values

This unit has moderate visual resource values owing to the subdued nature of the topography and its distance from vantage points. This helps reinforce the unit's sense of remoteness.

Potential Vulnerability to Change

Land uses and activities that have the potential to affect this unit include:

- Further earth disturbances, e.g. tracking.
- Any subdivision fencing that would lead to fragmentation of tall tussocklands.
- Introduction of buildings or structures that would reduce the existing overall sense of remoteness and solitude.
- Wilding pine spread.

SUMMARY

Omarama Pastoral Lease makes a significant contribution to the eastern South Island high country landscape, principally due to its extensive tussocklands and range of landforms. Landforms include steep rocky gullies, steep dip slopes and upland plateaux. The quality of the tussockland varies, but naturalness values are uniformly high over large parts of the property. The arrangement of landscape elements, the scale of the landscape, texture and colour, level of diversity and the degree of visual amenity all combine to create a memorable landscape. Particularly significant parts of the property are the southern upland plateau (Landscape Unit 6) and the summit plateau and upper slopes of the St Cuthbert Range (Landscape Unit 3 and parts of landscape units 1, 2 and 5).

2.2 LANDFORMS AND GEOLOGY

The majority of Omarama Pastoral Lease comprises moderately steep to steep slopes and summits of the St Cuthbert and Ewe Ranges. These ranges extend north from the Hawkdun Range. The property is characterised by broad tussock-covered summits and plateaux, relatively steep tussock-covered upper slopes, deeply dissected upper stream catchments, gentler rounded lower slopes, and small areas of lower-altitude alluvial plains. Omarama Pastoral Lease includes the prominent summits of Mt St Cuthbert (1558 m) and the Ewe Range (1600 m) including Baldy Knob (1332 m). Rock outcrops, bluffs and scree slopes are common at mid and low altitudes. The property is drained by tributaries of the lower Ahuriri River (upper Waitaki watershed), including Cattle Creek, Old Man Creek, Glen Creek and parts of Omarama Stream.

Basement rocks of the property are mostly Mesozoic greywacke and argillite of the Torlesse Group rocks (McEwen, 1987). The relatively small areas of flat or gently-sloping land at the edges of the property comprise fluvioglacial outwash deposits and till of the Otira Glaciation. The block-faulted greywacke landforms on the property are transitional between those of the Canterbury and Otago regions (Grove, 1994).

2.3 CLIMATE

Omarama Pastoral Lease lies in a semi-arid area characterized by very warm dry summers with frequent strong northwest winds, and cold winters with less frequent southerly storms. Annual rainfall is approximately 500-600 mm at low altitudes (Tomlinson, 1976), though precipitation is significantly greater on higher altitude parts of the property where snow may fall at any time of the year and lies on the ground for several months during winter. The area experiences low annual and winter solar radiation and low rainfall deficits (Leathwick *et al*, 2003).

2.4 VEGETATION

2.4.1 Ecological Context

Omarama Pastoral Lease is located within the Benmore and Hawkdun Ecological Districts, with a small lower-altitude part of the property in Omarama Ecological District. Benmore and Omarama Ecological Districts are in the Mackenzie Ecological Region; Hawkdun Ecological District is in the Waitaki Ecological Region.

McGlone (2001) suggests that the pre-human vegetation of the intermontane basins of Central Otago and South Canterbury was mixed grassland and shrubland, dominated by non-*Chionochloa* grasses and small-leaved shrubs. Low scrub-forest was present on lower slopes with species such as mountain totara, mountain toatoa, bog pine, kowhai, *Coprosma*, *Myrsine* and *Dracophyllum*. Upslope, the scrub-forest graded to snow totara and inaka shrublands, with patches of narrow-leaved snow tussock at rocky sites. The alpine slopes and tops were dominated by slim snow tussockland. Woody plant communities were probably much more widespread than they are today.

The vegetation of adjacent properties to the southeast, south and southwest is contiguous and of similar character. Areas on the property identified for protection by Protected Natural Areas Programme (PNAP) surveys are Benmore 3 and Hawkdun 1. Benmore 3 is centred on Mt St Cuthbert and contains an altitudinal sequence of scabweed, short tussock, *Coprosma-Olearia* scrub, mountain toatoa and slim snow tussock. Hawkdun 1 is centred on the Ewe Range and contains cushionfield, bog, slim snow tussockland, narrow-leaved snow tussockland and limited areas of gully floor shrubland. The relationship between the hummocky micro-topography and vegetation on the range crest was not found elsewhere in the ecological district.

In their analysis of the Level II Land Environments on the property Leathwick *et al* (2003) propose that Land Environment Q1, covering higher-altitude parts of the property (c.32% of the property), and Land Environment Q2, covering mid-altitude slopes (c.30% of the property), originally supported low mountain totara-mountain toatoa forest. Land Environment N4, covering lower-altitude slopes (c.26% of the property), is described as supporting a woodland of kanuka, matagouri, small-leaved species of *Coprosma* and *Olearia*, native broom, kowhai and abundant lianes including *Rubus* and *Muehlenbeckia*. Land Environment N5, covering the gently-sloping toe-slopes at the northeast corner of the property (c. 5%), and Land Environment N6, covering the gently-sloping floodplain of lower Cattle Creek and Omarama Stream (c. 7%), are described as originally supporting grassland of fescue tussock, silver tussock and/or *Elymus* species.

These data should be interpreted with caution, as the predicted extent and suggested vegetation types for each Land Environment have been extrapolated from limited field data. For example, the upper extent of mountain totara-mountain toatoa forest proposed by Leathwick *et al* (2003) (to the higher summits at over 1500 m) is unlikely, and some areas proposed as grassland (along lower Cattle Creek and Omarama Stream are likely to have originally supported wetland vegetation.

Analysis of the extent to which the Land Environments of the property are represented within existing protected natural areas indicates that approximately 25% of Land Environment Q1, 4.5% of Land Environment Q2, 1.6% of Land Environment N4, less than 1% of Land Environment N5 and 2.5% of Land Environment N6 are protected (Department of Conservation, *unpublished data*, 2004).

2.4.2 Plant Communities

Tall tussockland dominates mid and upper slopes on the property, grading to short tussockland on mid to lower slopes. Footslopes and fans support exotic herbfield and sweet brier shrubland, while alluvial flats near Omarama Stream support developed grassland. Grey (matagouri-*Coprosma*) shrubland is widespread in lower valleys and on lower slopes, especially around rocky areas. Rockland communities are present on rock outcrops and talus. Cushion and herbfield communities occur on the broad summit of the Ewe Range. Bogs are common on the Ewe Range, and modified wetlands are found on valley floor floodplains.

Indigenous plant communities are described below for each of the three distinct parts of Omarama Pastoral Lease (see attached map).

Alluvial Flats

The main alluvial flats occur on the west side of the property, adjacent to Omarama Stream and lower Cattle Creek. They are largely developed with some cropping and many subdivided paddocks of exotic grasses, with weedy fans on the western margins. A mosaic of remnant wetlands and exotic grassland occurs near the junction of Omarama Stream and Cattle Creek.

Fans and terraces at the south end support weedy communities dominated by mouse-ear hawkweed, king devil hawkweed, haresfoot trefoil, white clover, tall oat grass, sweet brier, viper's bugloss and Chewings fescue with scattered matagouri, *Coprosma* spp. and *Olearia odorata*. These communities have low naturalness and low representativeness values.

The main discrete wetland lies east of Cattle Creek, above the junction of Omarama Stream. It is confined between the straightened creek and a fan to the east. It is dominated by exotic grasses, lotus and monkey musk, with duckweed on the shallow water surface below this emergent vegetation. Pukio is locally dominant with a cover of up to 70%. Other species associated with pukio are jointed rush, soft rush, bog rush, creeping buttercup, lotus, red clover and Yorkshire fog. A pond at the north end is dominated by retoreto, red pondweed, and lesser amounts of monkey musk, watercress, creeping bent and floating sweet grass. Crack willows are scattered through the wetland, including very large trees at the south end. Dead willows presumably reflect previous control efforts.

The straightened creek has a stony bed and clear water, and its riparian vegetation is dominated by a similar range of exotic plants. Further west, wetland patches occur on low-lying land within a complex of stopbanks and drains. This area is dominated by exotic grasses such as timothy, browntop, cocksfoot and Yorkshire fog, with abundant red clover, lotus and creeping buttercup. Overall the wetland complex has low naturalness values. The naturalness of the discrete wetland east of Cattle Creek varies from low to low-medium, but has medium naturalness values and medium representativeness where pukio is dominant.

St Cuthbert Range

The St Cuthbert Range occupies the northern two-thirds of the property. Gentle summit slopes support slim snow tussockland which grades into narrow-leaved snow tussockland downslope. Scattered rock outcrops, bluffs and talus support rockland plant communities, while grey shrubland is widespread on lower slopes, fans and in gullies. Short tussockland occurs on lower slopes while footslopes and fans support exotic herbfield. Small wetlands are present on the valley floors of Cattle and Glen creeks.

Tall tussockland

Slim snow tussockland is extensive on summit spurs and upper slopes around Mt St Cuthbert. Tussock cover is 50-60%. Other prominent species are lichens, blue tussock, bristle tussock, mouse-ear hawkweed, *Raoulia grandiflora, Raoulia subsericea,* king devil hawkweed, mountain clubmoss, sheep's sorrel, patotara and *Scleranthus uniflorus*. Species diversity is naturally low, especially in the densest tussock (up to 80% cover) near the rolling summit. Sheep grazing has caused local die back of slim snow tussock, especially near the vehicle track and around talus patches where stock access is easier. Grazing impacts also increase as altitude declines on northern slopes. Patches of golden speargrass indicate past burning. Overall these communities are of medium-high naturalness and they are highly representative of original tall tussocklands. The transition to narrow-leaved snow tussock down-slope begins between 1400 and 1450 m.

Exposed shady spurs support low growing herbs and shrubs among patches of slim snow tussock. Typical plants include lichens, blue tussock, fescue tussock, dwarf inaka, mountain clubmoss, *Rytidosperma pumilum,* alpine fescue tussock, snow daisy, dainty daisy, *Scleranthus uniflorus,* little hard fern, *Viola cunninghamii*, *Pimelea oreophila, Kelleria dieffenbachii*, *Anisotome flexuosa, Raoulia grandiflora, R. subsericea* and woodrushes. Naturalness values are medium-high and representativeness values are high.

Extensive narrow-leaved snow tussockland occurs below the slim snow tussockland. Tussock cover at one locality near 1300 m is 30-35%. Other prominent species are king devil hawkweed, blue tussock, fescue tussock, sheep's sorrel, lichens, mountain oat grass, catsear, *Raoulia subsericea,* mouse-ear hawkweed, *Carex breviculmis,* harebell, *Viola cunninghamii*, red woodrush, patotara, and *Scleranthus uniflorus*. On shady slopes snow tussock cover is 50% and other common plants are blue tussock, little hard fern, mouse-ear hawkweed and tussock hawkweed. Additional species are harebell, *Viola cunninghamii*, red woodrush, *Brachyglottis bellidioides*, *Helichrysum bellidioides*, wire moss and lichens. Overall, snow tussock cover can be as low as 10-20% on sunny slopes and up to 50% on shady slopes. It disappears on sunny slopes below 1050 to 1200 m, but can extend down to 900 m on shady slopes. Overall naturalness varies from low-medium to medium-high, while representativeness is low-medium.

Short tussockland

Short tussockland occurs on lower slopes. Fescue tussock cover is approximately 15% and prominent species include matagouri, sweet vernal, mouse-ear hawkweed, blue tussock, sweet brier, golden speargrass, woolly mullein, sheep's sorrel, *Acaena caesiiglauca, Geranium sessiliflorum,* catsear, *Pimelea* spp., harebell, *Carmichaelia monroi, Raoulia* spp., *Carex breviculmis* and native grasses. Threatened and data deficient plants are also present (*Pimelea pseudo-lyallii* and white fuzzweed). Naturalness is medium and representativeness is medium-high on these dry rubbly slopes. The threatened *Convolvulus verecundus* was found on a north-facing rocky slope at approximately 750m. In some communities silver tussock has a similar cover to fescue tussock. Low altitude short tussockland is weedier and has naturalness values of low to low-medium.

Herbfield

Footslopes and fans support exotic herbfield dominated by mouse-ear hawkweed, king devil hawkweed, *Rytidosperma* sp. and Australian sheep's burr. Additional species include tall oat grass, haresfoot trefoil, Chewings fescue, other exotic grasses, viper's bugloss, white clover, *Raoulia* spp., orchids, catsear, sheep's sorrel, willowherbs and fescue tussock. Sweet brier cover is often as high as 20-30%. Scattered matagouri, mingimingi and *Olearia odorata* are often present. Naturalness in these communities is low.

Rockland

Exposed rock outcrops were assessed at various localities. They support mosses, lichens, *Pimelea aridula*, *Coprosma* aff. *cuneata*, *Oreomyrrhis rigida*, *Hebe cheesemanii*, *H. buchananii*, turpentine shrub, *Helichrysum intermedium*, *H. bellidioides* narrow-leaved snow tussock, *Rytidosperma buchananii*, *R. pumilum*, *Celmisia densiflora*, blue tussock, *Craspedia lanata*, *Brachyglottis bellidioides*, *Aciphylla montana*, *Colobanthus acicularis*, *Luzula traversii*, *Viola cunninghamii*, fescue tussock, *Gaultheria crassa*, blue wheatgrass, patotara and the threatened coral broom. Naturalness and representativeness values are high.

Rock outcrops above Glen Creek at around 700 m support *Hebe pinguifolia*, blue tussock, *Helichrysum intermedium*, matagouri, mingimingi, blue wheatgrass, mosses, lichens, lawyer, *Oreomyrrhis rigida*, *Colobanthus acicularis*, bristle tussock and tussock hawkweed. Naturalness and representativeness values are medium-high.

Boulderfield and stonefield

Talus communities are common, mostly near rock outcrops. One talus slope surveyed has a vascular plant cover of 20% dominated by korokio, mingimingi, *Hebe subalpina* and shrub pohuehue. Other plants in the upper tier include *Olearia odorata*, golden speargrass and porcupine shrub. Ground tier plants include white fuzzweed, tussock hawkweed, blue wheatgrass, thousand-leaved fern, little hard fern, rock fern, *Pimelea aridula*, tumble grass, mountain oat grass, silver tussock, fescue tussock, blue tussock and plume grass. The threatened coral broom was also recorded here. Naturalness values are high and representativeness values medium-high. Other plants found on talus include mountain wineberry, narrow-leaved snow tussock, bracken, *Acaena caesiiglauca*, *Urtica aspera* (threatened), sweet brier, viper's bugloss, king devil hawkweed and woolly mullein.

In Glen Creek blocky talus around rock outcrops supports mingimingi, matagouri, mountain wineberry, porcupine shrub, shrub pohuehue, lawyer, *Clematis marata*, korokio, *Olearia odorata*, native jasmine, *Hebe pimeleoides*, scattered sweet brier, threatened coral broom, threatened *Carmichaelia kirkii* and locally uncommon kowhai saplings.

On the south side of Mt St Cuthbert, patchy talus supports snow totara, mountain toatoa, porcupine shrub, mingimingi, *Olearia odorata*, golden speargrass, *Hebe subalpina*, *H. odora*, *Coprosma ciliata*, mountain wineberry, shrub pohuehue, silver tussock and narrow-leaved snow tussock. Common plants in the lower tier are mosses, little hard fern, thousand-leaved fern and wall lettuce. Naturalness is medium-high to high. Talus patches near the top of Mt St Cuthbert support a few vascular plants such as little hard fern, blue tussock, slim snow tussock, fescue tussock, creeping pohuehue, porcupine shrub and golden speargrass.

Shrubland

Shrubland is widespread on lower slopes and in gullies, especially in rocky areas. Common species are matagouri, mingimingi, porcupine shrub, lawyer, shrub pohuehue and sometimes *Olearia odorata* and native jasmine. *Olearia bullata*, *Coprosma virescens* and kowhai are occasionally present, and prostrate kowhai was found in lower Old Man Stream Valley and on lower slopes at the northeast corner of the property.

The upper reaches of Old Man Creek have some of the best shrublands on the property, containing species rarely seen (or not seen) elsewhere. Extensive grey shrubland in this area contains scattered broadleaf. A population of the threatened *Hebe cupressoides* (25 plants) is present below a large waterfall. Plants directly beneath this waterfall include mingimingi, broadleaf, mountain wineberry, *Hebe rakaiensis*, *H. subalpina*, *Olearia odorata*, korokio, weeping matipo, shrub pohuehue, lawyer, little hard fern, mosses, lichens, prickly shield fern, native jasmine, *Asplenium trichomanes*, *Asplenium richardii*, *Senecio wairauensis*,

bristle tussock, *Chionochloa conspicua*, uncommon kowhai and the threatened *Carmichaelia kirkii*. The largest broadleaf is about 6 m tall with a trunk diameter of around 40 cm. Two mountain totara are perched next to the waterfall, and two more are present above the waterfall though they may be hybrids with snow totara. Shrublands are extensive above the waterfall and an estimated 60 plus *Hebe cupressoides* plants were counted through binoculars. Occasional plants of yellowwood were also seen. Overall naturalness varies from medium in accessible areas to high adjacent to the waterfall. Representativeness values are high.

An interesting shrubland occurs on a rocky knob at 520m (2271700-5629500) on the northern edge of the property. It is dominated by matagouri, mingimingi, porcupine shrub and sweet brier. Other plants present are *Scandia geniculata*, native jasmine, *Einadia wallii*, *Pellaea calidirupium*, rock fern, *Asplenium appendiculatum* and *Haloragis erecta*. Prostrate kowhai, threatened *Carmichaelia kirkii* and *Coprosma intertexta* are also present.

Wetlands

A rare seepage is present on south-facing slopes of Mt St Cuthbert. Its margins are characterised by bog rush, while the remainder is dominated by mosses, *Hydrocotyle novae-zeelandiae*, liverworts, *Colobanthus apetalus*, *Euchiton mackayi*, *Psychrophila novae-zelandiae*, threatened *Ranunculus maculatus*, *Leptinella squalida*?, *Juncus novae-zelandiae*, *Carex* sp., *Epilobium* sp., blue tussock and scattered browntop. Naturalness is medium-high to high, and representativeness is high.

Several small wetlands occur on or near the Cattle Creek floodplain. One is about 100 x 40 m and perched above the creek near the gravel pits. It is dominated by monkey musk, with cutty grass, spike sedge, creeping buttercup, jointed rush, soft rush, retoreto, lotus, pukio, exotic grasses, yarrow and *Rumex crispus*. Several patches of the threatened *Carex tenuiculmis* occur here and one toetoe plant is present in the small outlet stream. Naturalness is low-medium to medium, and representativeness is medium. Similar wetlands occur in the active floodplain, but contain crack willow and sweet brier and their naturalness values are lower. The floodplain of Glen Creek has similar wetland communities, though one contains scattered mingimingi. Crack willow is again present and naturalness is similar to those in Cattle Creek.

Ewe Range

The crest of the Ewe Range supports slim snow tussockland, which grades to narrow-leaved snow tussockland with decreasing altitude. Bogs are also common on the range crest and adjacent slopes. Shrubland is extensive in incised valleys and on other rocky slopes, while rockland vegetation is scattered across the area. Short tussock grassland and exotic herbfield are found on middle and lower slopes.

Tall tussockland

Slim snow tussockland occurs on the range crest and adjacent slopes, forming a mosaic with bogs and localised areas of hummocky cushionfield. Lichen is frequently co-dominant with snow tussock. Other prominent species are *Pernettya alpina*, *Phyllachne colensoi*, mountain clubmoss, mouse-ear hawkweed, blue tussock, *Luzula pumila* and alpine fescue tussock. Additional species include *Rytidosperma pumilum*, sheep's sorrel, *Pimelea oreophila*, threatened *Agrostis subulata*, fescue tussock, *Kelleria dieffenbachii*, *K. lyallii*, threatened *Carex muelleri*, *Euphrasia dyeri* and red woodrush. Tussock cover is commonly 15-20%, and occasionally up to 50%. Naturalness and representativeness is high. In other areas alpine fescue tussock and blue tussock are locally dominant. On some spurs and knolls, sheep grazing has resulted in the dominance of short tussock and a cover of mouse-ear hawkweed of more than 25%.

Higher-altitude narrow-leaved snow tussockland has a tussock cover of around 25%. Hybrids with slim snow tussock are common. Other prominent species are king devil hawkweed, blue tussock, mouse-ear hawkweed and fescue tussock. Further species include *Epilobium glabellum*, red woodrush, *Raoulia subsericea*, sheep's sorrel, mountain oat grass, *Scleranthus uniflorus*, *Rytidosperma pumilum*, *Geranium sessiliflorum*, catsear, creeping pohuehue, harebell, *Carex breviculmis* and patotara. Naturalness is low-medium to medium, and representativeness is low-medium.

Mid altitude narrow-leaved snow tussockland (at c.1100 m) typically has a snow tussock cover of 15-20% and naturalness values of low-medium, reflecting the increased cover of exotic plants. Other common plants include lichens, blue tussock, king devil hawkweed, mouse-ear hawkweed, browntop and fescue tussock. Pig rooting is common. Small frost-heave exposures on ridge tops support the tiny grass *Agrostis muscosa* and Lindsay's poa. Mid altitude snow tussockland on broad spurs has snow tussock cover of approximately 20%. Other prominent plants are king devil hawkweed, blue tussock, fescue tussock and mouse-ear hawkweed. Pig rooting is evident and naturalness is low-medium. On shady slopes and in gullies, the snow tussock cover tends to be greater. In contrast, steeper sunny slopes in the southeast catchment of Cattle Creek have a very sparse cover of snow tussock.

Short tussockland

Alpine (c. 1500 m) short tussockland where the original slim snow tussock has been removed by grazing is dominated by mouse-ear hawkweed, fescue tussock, blue tussock, browntop and king devil hawkweed. Additional plants are patotara, threatened *Carex muelleri*, *Acaena caesiiglauca*, *Scleranthus uniflorus*, golden speargrass, sheep's sorrel, red woodrush, *Luzula pumila* and wire moss. Pig rooting is present and naturalness is low-medium. Representativeness is low. On mid to lower slopes, sparse fescue tussock occurs with king devil hawkweed, mouse-ear hawkweed, haresfoot trefoil, sweet vernal, tall oat grass, snow tussock (uncommon), *Olearia odorata*, golden speargrass and matagouri. Silver tussock is prominent on stream terraces and fans.

Herbfield

Exotic herbfields on dry, degraded lower slopes support tall oat grass, scabweed, viper's bugloss, haresfoot trefoil, king devil hawkweed, woolly mullein and sweet brier. Scattered matagouri, mingimingi and *Olearia odorata* are sometimes present, and naturalness and representativeness is low. Where shattered rock needles are abundant, more indigenous plants are present such as blue tussock, creeping pohuehue, *Geranium sessiliflorum*, scabweed, *Scleranthus uniflorus* and *Myosotis* sp. "roundleaf".

Shrubland

Shrubland is widespread in the gorges of upper Cattle Creek, especially in the southern tributary. It occurs along riparian margins, and on rocky substrates such as talus, the edges of bluffs, rock outcrops and in steep side-gullies. It contains matagouri, mingimingi, porcupine shrub, *Olearia odorata*, koromiko, *Hebe* sp., common broom, mountain wineberry, korokio, prickly shield fern, threatened *Urtica aspera*, lawyer, *Clematis marata*, shrub pohuehue, scattered sweet brier and less commonly weeping matipo and *Olearia nummularifolia*. The threatened *Carmichaelia kirkii* is locally abundant, especially along stream margins. Threatened coral broom and *Hebe cupressoides* were seen rarely. The naturalness of these shrublands varies from medium to medium-high, and representativeness is medium-high to high. Open matagouri shrubland at lower altitudes is less natural.

Shrubland also occurs on other side-slopes, such as above the main branch of Cattle Creek. An example on upper slopes supports mingimingi, porcupine shrub, *Hebe rakaiensis*, *H. tetrasticha*, korokio, threatened coral broom, *Coprosma virescens*, narrow-leaved snow tussock, golden speargrass, white fuzzweed, *Carmichaelia monroi*, *Helichrysum intermedium*, threatened *Urtica aspera*, *Asplenium appendiculatum*, *A. flabellifolium*,

thousand-leaved fern, shrub pohuehue, laywer and *Clematis marata.* Analogous shrublands are found on northeast slopes of the ridge north of Cattle Creek.

Rockland, boulderfield and stonefield

Patches of flattened, lichen-covered rocks are found on summit ridges of the Ewe Range. On lower slopes, talus supports shrublands as described above. Rock outcrop plants include mosses, lichens, porcupine shrub, *Helichrysum intermedium, Celmisia densiflora, Hebe pimeleoides,* common broom, threatened coral broom, blue tussock, *Rytidosperma* spp., *Colobanthus acicularis,* blue wheatgrass, patotara and hawkweeds. Naturalness is medium to high, and representativeness is medium-high to high.

Wetlands

Cushion bogs are present on the gentle upper slopes of the Ewe Range. Cushion bogs are typically dominated by comb sedge, bog rush, mosses and *Luzula pumila*. Other species present are *Euchiton mackayi*, *Epilobium komarovianum*, *Euphrasia dyeri*, *Gentiana amabilis,* threatened *Ranunculus maculatus* and *Carex pyrenaica* var. *cephalotes*? Drier mounds within bogs support comb sedge, threatened *Carex muelleri*, *Psychrophila obtusa*, blue tussock, *Kelleria croizatii*, *Pernettya nana*, dainty daisy, bog rush, lichens, red woodrush, *Plantago uniflora*, *Celmisia sessiliflora*, *Phyllachne colensoi* and mouse-ear hawkweed. There is some localised sheep pugging in the wettest parts, but overall naturalness is medium-high to high.

With decreasing altitude, smaller bogs and drier parts of larger bogs become degraded by sheep grazing. Trampling and pugging is common, plants are pulled out and browntop, sweet vernal and mouse-ear hawkweed become prominent. It appears that stock are hastening the transformation of these bogs to dry land.

SUMMARY

- Alpine tall tussockland occurs on the summits of the St Cuthbert and Ewe Ranges and is generally in good condition. It includes original slim snow tussockland and some induced narrow-leaved snow tussockland. Good condition cushion vegetation is present on the summit of the Ewe Range.
- Subalpine narrow-leaved snow tussockland is extensive on both ranges. Its condition varies from good at higher altitudes to poor at lower altitudes. It has mostly been induced, though some areas of tussockland would originally have been present on bluffs and among woodland.
- Short tussockland is common on mid slopes, giving way to exotic grassland on lower slopes and fans. Most is induced and its condition is moderate to poor.
- Rockland supports original shrubland, sparse herbs and grasses in very good or good condition on both ranges. Shrubland is common in gullies and gorges. It represents original communities and contains threatened plants, including good populations of *Carmichaelia kirkii* and *Hebe cupressoides*.
- Small floodplain wetlands in Omarama Stream, Cattle Creek and Glen Creek are modified by the presence of exotic plants. Plant succession is compromised, grazing is widespread and artificial drainage is common along Omarama Stream.
- Alpine cushion bogs are an interesting feature of the Ewe Range. They represent an original community type and are generally in very good condition. Seepages are small and rare on mountain slopes elsewhere on the two ranges.
- There are many altitudinal sequences across the property, although most vegetation on lower slopes is modified.
- The presence of indigenous spring annuals could not be clarified as these tiny plants can only be found in spring and no survey was undertaken at that time. Two acutely threatened species known from similar habitats on adjacent properties, including one site less than a kilometre away may be present on the property.

2.4.3 Notable Flora

Notable plant species recorded from Omarama Pastoral Lease, March 2005, are listed in Table 1 below. Threat categories are those proposed by de Lange *et al* (2004).

Table 1 Notable plant species, Omarama Pastoral Lease.

Plant Species	Known Distribution on Property
Nationally Endangered	
Carmichaelia kirkii	In gully shrubland and around talus/rock outcrops. Most abundant in southern Cattle Creek tributaries.
Nationally Vulnerable	
Hebe cupressoides	Large population in upper Old Man Creek valley, and a few in the southern Cattle Creek tributary.
Gradual Decline	
Carmichaelia crassicaule	Scattered across the property in various habitats and locations.
Sparse	
Carex muelleri	Upper slopes of Ewe Range in tussockland and dry portions of some bogs.
Carex tenuiculmis	In one wetland adjacent to Cattle Creek near the gravel pits.
Convolvulus verecundus	On dry slopes and a rocky knob near northern edge of property.
Coprosma intertexta	On a rocky knob near northern edge of property, on the Boxwood Stream fan and on northern slopes above upper Cattle Creek (north branch).
Pimelea pseudo-lyallii	In short tussock grassland northeast of Mt St Cuthbert.
Ranunculus maculatus	In Ewe Range bog and in St Cuthbert Range seepage.
Urtica aspera	Scattered across the property on talus patches and in open shrubland.
Range Restricted	
Agrostis subulata	In tall tussock and on talus, St Cuthbert Range; and on Ewe Range summit.
Data Deficient	
Vittadinia australis agg.	On shattered bedrock and fine rubble at a number of localities across the property. Most common on sunny aspects.
Not recorded in ecological district during the PNAP survey	
Asplenium appendiculatum	In shrubland above upper Cattle Creek (north branch).
Carex pyrenaica var. cephalotes	In Ewe Range bog.
Coprosma atropurpurea	In Ewe Range bog (on dry mound).
Coprosma virescens	In shrubland above north branch of upper Cattle Creek (also on St Cuthbert Range).
Hebe pimeleoides	On rock outcrops and dry rubbly slopes of the Ewe Range (also on St Cuthbert Range).
Myrsine divaricata	On rock outcrops, dry rubbly slopes and some gully shrublands of the Ewe Range. Also in upper valley of Old Man Creek.

Parsonsia capsularis	In gully shrubland, Ewe Range.
Pernettya alpina	In slim snow tussockland, Ewe Range.
Rare in ecological district	
Agrostis muscosa	In frost-exposed soil among degraded snow tussock on a ridge of the Ewe Range.
Sophora prostrata	In lower valley of Old Man Creek, and rocky knob near northern edge of property.
Original woody species, now much reduced in extent.	
Griselinia littoralis	In upper valley of Old Man Creek.
Phyllocladus alpinus (mountain toatoa)	On talus slopes on the south side of Mt St Cuthbert.
Podocarpus hallii (mountain totara)	In upper Old Man Creek valley near the waterfall.
Sophora microphylla (kowhai)	In lower valley of Old Man Creek, upper Alcove Stream Valley and rocky knob above Glen Creek.

Database records indicate that two threatened plant species (*Convolvulus verecundus* and *Ceratocephala pungens*) are present at low altitude sites adjacent to the property. It is likely that populations of these species are present in similar habitats at low altitudes on Omarama Pastoral Lease. However, because a survey during the months of spring was not carried out, it has not been possible to confirm the presence or absence of these species. Meanwhile, it is prudent to assume that populations of these and perhaps other spring annuals are present on low altitude parts of the property.

2.4.4 Problem Plants

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

Willows

Crack willow is common in the lower Cattle Creek wetland and on the floodplains of Cattle and Glen creeks. Grey willow is present in the southeast branch of Cattle Creek. All willows should be removed to prevent spread and further degradation of natural values downstream.

Elderberry

Several elderberry trees are present near the property boundary on the lower Boxwood Stream fan. These should be removed, as the fruits are readily spread by birds.

Wilding pines

Several isolated wilding pine trees were seen on the property. Other wilding trees are likely to be present. These trees should be removed to prevent further spread, especially in areas where grazing is removed. Ongoing monitoring will be required to detect and remove new infestations.

Broom

Broom is present just outside the property boundary on the Boxwood Stream fan. This infestation poses a threat to areas on the property and should be removed if possible.

Australian sheep's bur
This species is present near the vehicle track on the north slopes of Mt St Cuthbert. This species is unlikely to spread beyond the sunny low-altitude slopes, but the infestation should be monitored.

2.5 FAUNA

2.5.1 Birds

The lack of forest in this part of the Waitaki catchment means the only forest bird species that are common in the vicinity of Omarama Pastoral Lease are South Island fantail, silvereye and grey warbler. Open and upland habitats in the area support Australasian harrier, New Zealand pipit and New Zealand falcon (threat status: gradual decline) (Department of Conservation, *unpublished reports*). Wetland habitats in the wider area are very important. The Ahuriri River Catchment is of outstanding international significance as a habitat for wetland birds (Robertson *et al*, 1983), supporting large and significant populations of braided river and wetland birds. Fifty-five bird species have been recorded on the river, its tributaries and associated wetlands. These include 17 endemic species which breed in the area and five threatened species: black stilt (nationally critical), black-fronted tern (nationally endangered), wrybill (nationally vulnerable) Australasian bittern (nationally endangered) and Marsh Crake (sparse) (Robertson *et al*, 1983).

The portion of Omarama Stream within the property is rated as a Site of Special Wildlife Interest (SSWI) of high value (Jarman, 1987). The high rating reflects its importance to a range of wetland birds, including large numbers of waterfowl and waders. At the time the SSWI was surveyed, it was probably the most important site for pukeko in the upper Waitaki catchment. The nationally endangered black-fronted tern has been recorded breeding on the river. Glen Creek wetland (a *Carex* sedgeland bisected by Glen Creek) is described by Jarman (1987) as an SSWI of potential value to wildlife as paradise shelduck feeding habitat. Tara Hills Pond, on the adjacent property, is an SSWI of outstanding value to wildlife, supporting black stilt, marsh crake (sparse) and black-fronted tern (Jarman, 1987; O'Donnell, 2000). Marsh crake are a threatened endemic subspecies (Hitchmough, 2002). They are considered rare, with only 122 sightings in the South Island published in the ornithological literature between 1944 and 1983 (Robertson *et al*, 1983). Marsh crake is a swamp specialist that dwells in dense vegetation associated with wetlands. Robertson *et al* (1983) found marsh crake to be relatively common in the Ahuriri River catchment, one of the characteristics contributing to the outstanding value of this area for wildlife. Nine marsh crake were found in the Tara Hills wetland, adjacent to the property.

Birds observed on Omarama Pastoral Lease are described below for the ten locations surveyed, and are listed in Table 2 and Table 3 (see attached map).

Omarama Stream wetland

This wetland is located on a tributary of Omarama Stream at the foot of the western slopes on the property. It consists of patches of tall *Carex* sedgeland, an area of willow trees and small areas of open water. Although modified by drainage, the wetland has surface water within the sedgeland, providing cover and nesting and feeding habitat for rails and other waterfowl. Marsh crake were heard calling from the wetland at night. Other wetland birds observed were New Zealand scaup, grey duck (nationally endangered), white-faced heron and black swan roosting and feeding on open water, black-fronted tern feeding over the wetland and black shag (sparse) feeding in the stream. Of concern was the apparent absence of previously common pukeko.

Cattle Creek wetlands

Two small wetlands in this area support patchy *Carex* sedgeland at the bases of small hills in upper Cattle Creek. They are modified and fragmented by grazing on their margins. Only spur-winged plover were observed.

Glen Creek wetland

This wetland is located on the eastern boundary of the property. It comprises patches of *Carex coriacea-Carex secta* sedgeland, with lotus, willow and sweet brier. It is bisected by Glen Creek. No indigenous bird species were recorded.

Glen Creek tussockland, shrubland and rockland

Tussockland interspersed with patches of bare ground, rock outcrops and talus surrounded by indigenous shrubland provides a diverse habitat in upper Glen Creek. A New Zealand falcon was observed chasing an Australasian harrier near a rocky hill. It is possible the falcon was defending nesting territory.

Mt St Cuthbert tussockland

High altitude tussockland interspersed with numerous rock outcrops and talus around the summit of Mt St Cuthbert provides feeding habitat for numerous New Zealand pipit (maximum flock size was 12 birds) and relatively high numbers of New Zealand falcon. These two species are the only indigenous birds expected in habitat of this type. The introduced redpoll was also common.

Baldy Knob tussockland

New Zealand pipit was present in moderate numbers in high-altitude rolling tussockland on the slopes of Baldy Knob on the Ewe Range.

Northeast slopes of Mt St Cuthbert shrubland

Indigenous shrubland dominates the steep, rocky-sided gullies on the eastern slopes of Mt St Cuthbert between 500 and 1000 m altitude. This shrubland provides feeding and breeding habitat for grey warbler, South Island fantail, silvereye, and South Island tomtit. The presence of South Island tomtit is unusual, as this species is rare this far from the forests of the Main Divide. A pair of New Zealand falcon was observed above the shrubland. Introduced birds were abundant.

Old Man Creek shrubland

Dense and extensive indigenous shrubland and scrub on the western slopes of Old Man Creek provide feeding and breeding habitat for grey warbler, South Island fantail, silvereye, and South Island tomtit. These four indigenous species were common and introduced birds were abundant.

Upper Cattle Creek shrubland

Indigenous shrubland in steep rocky gullies and on rock outcrops in upper Cattle Creek provide habitat for grey warbler, South Island fantail, silvereye and Australasian harrier. One New Zealand falcon was observed above the shrublands and introduced birds were abundant.

Exotic grassland throughout the property

Lower-altitude exotic grassland and degraded short tussockland throughout the property appears to support few indigenous birds. Australasian harriers were common in these habitats and southern black-backed gulls were observed. Introduced birds, including little owl, were abundant.

Table 2 Indigenous bird species recorded from Omarama Pastoral Lease, March 2005.

Bird species Common name	Scientific name	**Known Distribution on Property**
Australasian harrier	*Circus approximans*	throughout
black shag	*Phalacrocorax carbo novaehollandiae*	Omarama Stream wetland
black swan	*Cygnus atratus*	Omarama Stream wetland
black-fronted tern	*Sterna albostriata*	Omarama Stream wetland
grey duck	*Anas superciliosa*	Omarama Stream wetland
grey warbler	*Gerygone igata*	shrubland throughout
marsh crake	*Porzana pusilla affinis*	Omarama Stream wetland
New Zealand falcon	*Falco novaeseelandiae "eastern"*	throughout
New Zealand pipit	*Anthus novaeseelandiae novaeseelandiae*	tussockland throughout
New Zealand scaup	*Aythya australis*	Omarama Stream wetland
paradise shelduck	*Tadorna variegata*	Omarama Stream wetland
silvereye	*Zosterops lateralis lateralis*	shrubland throughout
southern black-backed gull	*Larus dominicanus dominicanus*	shrubland throughout
South Island fantail	*Rhipidura fuliginosa fuliginosa*	shrubland throughout
South Island tomtit	*Petroica macrocephala macrocephala*	Omarama Stream wetland
spur-winged plover	*Vanellus miles novaehollandiae*	low altitude pasture
white-faced heron	*Ardea novaehollandiae novaehollandiae*	Omarama Stream wetland

Table 3 Introduced bird species recorded from Omarama Pastoral Lease, March 2005.

Bird species Common name	Scientific name
Australian magpie	*Gymnorhina tibicen*
blackbird	*Turdus merula*
California quail	*Callipepla californica*
chaffinch	*Fringilla coelebs*
chukor	*Alectoris chukar*
dunnock	*Prunella modularis*
goldfinch	*Carduelis carduelis*
greenfinch	*Carduelis chloris*
house sparrow	*Passer domesticus*
little owl	*Athene noctua*
redpoll	*Carduelis flammea*
skylark	*Alauda arvensis*
song thrush	*Turdus philomelos*
starling	*Sturnus vulgaris*
yellowhammer	*Emberiza citrinella*

SUMMARY

Thirty-two bird species were recorded on Omarama Pastoral Lease during this survey: 17 indigenous species (nine endemic and eight native) (Table 2) and 15 introduced species (Table 3). Five threatened bird species were recorded (Table 5): black shag (sparse), New Zealand falcon (gradual decline), black-fronted tern (nationally endangered), grey duck (nationally endangered) and marsh crake (sparse). New Zealand falcon and marsh crake were relatively common. Also notable was the presence of South Island tomtit, which is rare this far from the Southern Alps.

2.5.2 Lizards

Several lizard species have been recorded from the Mackenzie and Waitaki regions. McCann's skink, common skink and Southern Alps gecko are widespread and abundant. Scree skinks (threat status: gradual decline) have been recorded in the Hawkdun Range, St Bathans Range, Benmore Range and on Black Jacks Island in Lake Benmore. Spotted skinks (gradual decline) have been recorded in the Benmore Range and near Twizel. Green skinks have been recorded at several locations in the area (Whitaker, *pers. comm.*). Common skink/McCann's skink and green skink have been previously recorded on or adjacent to Omarama Pastoral Lease and on the neighbouring Berwen Pastoral Lease.

Lizards observed on Omarama Pastoral Lease are described below for the seven locations surveyed, and are listed in Table 4 (see attached map).

Upper Glen Creek

Tussockland interspersed with patches of bare ground, rock outcrops and talus in upper Glen Creek provides good lizard habitat. Southern Alps gecko, common skink and McCann's skink were all present.

Ridges in upper Cattle Creek

Tussockland interspersed with patches of bare ground, rock outcrops and talus is present between 1000 and 1200 m altitude in the head of Cattle Creek. McCann's skinks were abundant in the tussockland, rock outcrop and talus habitats, Southern Alps geckos were found occasionally in rock outcrops and talus, and common skinks were present but uncommon in all habitats.

Mt St Cuthbert tussockland

The high altitude tussockland on the Cuthbert Range provides a variety of lizard habitats. High numbers of Southern Alps geckos were found on rock outcrops and talus on the main ridges between 1000 and 1500 m altitude. McCann's skink was also common, particularly on gently sloping talus. Common skinks were present but uncommon at the edges of talus. Young individuals of all three species were common, indicating the presence of breeding populations. Southern Alps gecko and McCann's skink were also common on the northeast, northwest and southwest ridges between 800 and 1100 m altitude.

Baldy Knob tussockland

High altitude tussockland with occasional rock outcrops and talus on the slopes of Baldy Knob (Ewe Range) supports good numbers of McCann's skinks. Spotted skink (gradual decline) was observed in tussockland. Southern Alps gecko and common skink were rare or

absent. Two large skinks were seen on top of Baldy Knob on gentle talus slopes. Although not identified, their size indicates that they are likely to be of a threatened species.

Northeast slopes of Mt St Cuthbert shrubland

Lizard habitat on the northeast slopes of Mt St Cuthbert comprises steep screes and rock outcrops surrounded by indigenous shrubland. Southern Alps geckos were present at all altitudes. McCann's skinks were common on screes surrounded by shrubland vegetation. Common skinks were present below 800 m and became more numerous with decreasing altitude. Only common skinks were recorded in open degraded tussockland, dry streambeds and bare ground below 500 m altitude.

Old Man Creek shrubland

Rock outcrops and talus amongst dense indigenous shrubland provide the main lizard habitats in Old Man Creek. Southern Alps geckos were common and numerous young geckos were found, indicating a good breeding population. Common skinks were recorded in the more developed and modified parts of the lower valley. One common skink was seen in *Carex* sedgeland on the valley floor. McCann's skinks were present higher up the valley.

Mid Cattle Creek shrubland

Rock outcrops and small scree slopes amongst indigenous shrubland provide the main lizard habitats in Cattle Creek. Southern Alps geckos were common amongst rockland and several young geckos were found, indicating a breeding population. McCann's skinks were common on screes surrounded by shrubland and taller tussockland. Young skinks were numerous.

Common skinks were only common on cobbled terraces just above the active riverbed of Cattle Creek and its tributaries. Approximately 40 were recorded. The habitat is ideal for long-toed skink (sparse) and this species is likely to be present. No lizards were recorded in the open degraded short tussockland.

Artificial Cover Objects and pitfall traps

Two common skinks were found under Artificial Cover Objects at higher altitudes on Mt St Cuthbert, and one common skink and one Southern Alps gecko were caught in pitfall traps in upper Cattle Creek.

Table 4 Lizard species recorded from Omarama Pastoral Lease, March 2005.

Lizard species		**Known Distribution on Property**
Common name	Scientific name	
common skink	*Oligosoma nigriplantare polychroma*	tussockland, rock outcrops, talus and farmland throughout.
McCann's skink	*Oligosoma maccanni*	tussockland, rock outcrops and talus throughout.
Southern Alps gecko	*Hoplodactylus* aff. *maculatus* "Southern Alps"	rock outcrops and talus throughout.
spotted skink	*Oligosoma lineoocellatum*	tussockland, Baldy Knob (Ewe Range).

SUMMARY

Omarama Pastoral Lease supports an abundant lizard fauna. Four endemic lizard species were found during this inspection: common skink, McCann's skink, spotted skink and Southern Alps gecko. Spotted skink (gradual decline) was the only confirmed threatened species observed. Large skinks seen on top of Baldy Knob, although not identified to species, are likely (judging from their size) to be individuals of a threatened species. Eroded terrace and riverbed habitats on the property are ideal for long-toed skink (sparse) and several shrubland habitats may be suitable for jewelled gecko (gradual decline), but none were seen during this survey.

Different assemblages of lizard species occur at different altitudes and habitats on the property, indicating the importance of the protection of habitats over a range of altitudes. McCann's skink was abundant at high altitude, common skink at low altitude and Southern Alps gecko throughout. All lizards are common only where rockland and talus are associated with indigenous shrubland and tall tussockland. Only common skink was present in highly modified grazed sites, and then only in low numbers. The threatened spotted skink (gradual decline) was recorded only in tall tussockland.

2.5.3 Fish

Omarama Pastoral Lease lies in the watershed of the Ahuriri River, in the upper Waitaki River catchment. The property is drained by Omarama Stream and its tributaries (Cattle and Old Man Creeks) in the south and west, small tributaries that flow directly to the Ahuriri River in the north and Glen Creek and its tributaries (including Boxwood Stream) in the east.

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

The New Zealand Freshwater Fish Database contains 714 records (at 13th April 2005) from the Waitaki River catchment (McDowall and Richardson, 1983). Species recorded from streams near the property are Canterbury galaxias, bignose galaxias (threat status: data deficient, though expected to be re-classified as gradual decline), lowland longjaw galaxias (threat status: nationally critical), koaro, common bully, upland bully, brown trout, rainbow trout, sockeye salmon and brook char. Longfin eel (threat status: gradual decline) are also present in the area (Scott Bowie, *personal observation*).

Five freshwater habitats, classified by size and physical character, were observed on the property. These habitats and the fish species recorded are described below (see attached map).

Large Streams

Large streams on the property are Omarama Stream and Old Man, Cattle and Glen Creeks. These flow through a wide range of vegetation types including sedgeland, shrubland, rockland, tussockland and willow trees. All are accessible to stock and wild animals, though access may be restricted to some parts by snow during winter. The large streams are

generally between one and a half and 12 metres wide and between 100 and 500 mm deep with occasional pools up to one and a half metres deep. Stream substrates are predominantly gravel and cobbles, with quite a lot of silt in some areas. One tributary of Omarama Stream has been diverted from its original course into a water-race, although it retains the characteristics of a large stream.

Eight sites of this habitat type were electro-fished. Brown trout were present at all sites, upland bully at five sites, longfin eel at two sites, bignose galaxias at two sites and Canterbury galaxias at one site. The two threatened species, longfin eel and bignose galaxias, were found in the same sites, both in a tributary of Omarama Stream.

Small Streams

Small streams are present in all catchments on the property. They are frequently steep, though some are gentle at lower altitudes. Some small streams flow through gorges with overhanging vegetation, others flow through more open bluff vegetation, and others flow through grassland, tussockland or shrubland. Monkey musk is common on stream margins. All small streams are accessible to stock and wild animals, except where access is restricted by topography or winter snow. Small streams are generally up to one and a half metres wide, though normally smaller, and less than 200 mm deep, although a few have pools up to one metre deep. Stream substrates vary: many have a gravel substrate with a few boulders and cobbles, while silt is common in others.

Four sites were surveyed for fish. Upland bullies were present at two sites and no fish were observed at the other two sites.

Spring-fed Streams

Spring-fed streams were observed at two locations: one in a paddock next to Broken Hut Road and the other in sedgeland near the main track beside Cattle Creek. Both are accessible to stock, but probably unaffected by wild animals. The spring-fed streams are generally between one and two metres wide and between 100 and 500 mm deep. Substrates are mainly silt with some gravel and cobbles, with the exception of the springs which are almost entirely gravel with mud at the edges. The Broken Hut Road stream appears to be semi-natural with the stream in its original position, although parts have been excavated to drain an adjoining wetland.

Three sites were electro-fished, all in the Broken Hut Road Stream. Upland bully and bignose galaxias were present at all three sites. Several galaxiids were seen in the other, sedgeland stream, but were not able to be caught for identificationed. They are likely to be Canterbury galaxias, bignose galaxias or lowland longjaw galaxias. The springs within the Broken Hut Road stream contained much greater numbers of bignose galaxias than in the stream itself, though the stream provides an important link between the springs.

Seepages

Seepages are occasionally present beside higher altitude streams and on some valley floors where stream channels have been blocked. All seepages are accessible to stock and wild animals, though access is restricted at high altitudes by snow during winter. Seepages are mostly up to 50 m^2 in size and occasionally larger, and often flow into streams which form part of the seepage habitat. These streams are less than half a metre wide and about 100 mm deep, with a gravel substrate but with silt present. Two seepage streams were surveyed, but no fish were found.

Wetlands

There are numerous wetlands on the property. Most are associated with Cattle Creek, including the largest wetland near the confluence of the creek and Omarama Stream. Wetlands are also present in the Glen Creek valley and at the base of some of the streams draining north and east from Mt St Cuthbert. Wetland vegetation is dominated by willow, sedges, lotus, toetoe, rushes and introduced grasses, with monkey musk along streams and sweet brier at wetland margins. All wetlands appear accessible to stock and wild animals.

The main Cattle Creek wetland appears larger than 10 hectares and the Glen Creek wetland is three to five hectares. Other wetlands are less than one hectare. Wetlands are generally 100 to 200 mm deep and occasionally much deeper. Substrates are mostly muddy, though in some places gravel is present on top of the mud. Most wetlands appear degraded by weeds, particularly monkey musk, willow and lotus. Only the large Cattle Creek-Omarama Stream wetland has substantial areas of open water. No fish were observed in the wetlands, though fish are present in nearby streams.

SUMMARY

Freshwater fish communities were surveyed at 18 sites on Omarama Pastoral Lease. Five fish species were recorded: Canterbury galaxias, bignose galaxias, longfin eel, upland bully and brown trout. Two threatened species were recorded: longfin eel (threat status: gradual decline) and bignose galaxias (data deficient: though expected to be re-classified as gradual decline). The two new populations (five records) of bignose galaxias recorded on the property are notable, as there are only 40 existing records of this species. The presence of longfin eel is also notable. These eels must be at least 50 years old, as access from this area to the sea for breeding has been prevented since the mid 1900s by the construction of dams on the Waitaki River.

2.5.4 Invertebrates

Previous invertebrate studies conducted in the area include J. H. Lewis's (1901) moth and beetle collections and two surveys by Brian Patrick (Patrick, 1989; Patrick, 1994). The latter has direct relevance to this study, as Patrick (1994) surveyed the Hawkdun Range west from Mt Ida to the Ewe Range (adjoining Omarama Pastoral Lease). Invertebrates of Omarama Pastoral Lease are described below for the five main areas surveyed (see attached map).

Northern slopes of Mt St Cuthbert (800 to 1500 m)

Three visits to this part of the property produced 23 insect, six spider and one millipede species. The majority of invertebrates found are endemic species. Noteworthy insect species include three species of Carabid (ground beetle): *Mecodema lucidum*, *Mecodema* sp. (cf. *M. huttonense*) and *Megadromus alternus*. All specimens are nocturnal and were found beneath stones or pieces of wood. Both *Mecodema* species are South Island endemics, known from mid-Canterbury southwards (Larochelle and Larivière, 2001). *Megadromus alternus* is known only from Central Otago, the Mackenzie Basin and mid-Canterbury. The species is flightless and has been found in remnant beech forest (possibly an original habitat), lake shores, scree and dry montane environments.

Other interesting endemic and flightless species found in this area were the darkling beetles, *Mimopeus impressifrons* and the smaller *Artystona rugiceps.* While *A. rugiceps* is found on both the North and South Islands, *M. impressifrons* is known only from Otago and the Mackenzie Basin (Watt, 1992).

The proportion of introduced species found in this sampling area typically decreased with increased altitude. For example, the common ladybird (*Cocinella leonina*), the magpie moth (*Nyctemera amica*) and three species of adventive orb web spider were noted below 1000 m. Above this altitude, cryptic habitat-specific endemics were more common.

Interesting endemic species found in the sub-alpine habitat of this area include a large (50 mm diameter) prowling spider (*Miturga* sp.), jumping spiders (*Holoplatys* sp.), the cicada *Maoricicada campbelli* and a Lygaeid, *Rhypodes anceps*. The spiders were all found in rock outcrop habitats which have probably provided some protection from grazing and fire.

Western slopes of Mt St Cuthbert (900 to 1200 m)

Fourteen insect and two spider species were collected throughout this area. Two specimens of the threatened grasshopper *Sigaus minutus* were found in the headwaters of Old Man Creek. These small (14 to 16 mm) grasshoppers are known only from Tekapo and Alexandra (Bigelow, 1967; Morris, 2003). This appears to be a new distribution record for the species. It is encouraging that the specimens were found at a low altitude (800 m) in a somewhat modified habitat. Old Man Creek contains a community of indigenous woody plants including broadleaf, mountain totara, weeping mapou and tree daisy, which supports a comparatively rich invertebrate fauna.

Additional species of interest found in the area include two darkling beetles *Artystona rugiceps* and *Mimopeus impressifrons* (both in sympatry and above 1000 m). These beetles occupy an extremely dry, almost barren habitat in which mouse-ear hawkweed, viper's bugloss and silver tussock are dominant. At one site a suite of invertebrates, many of which were only identifiable to family, were sampled from a small community of *Hebe subalpina* and *Olearia odorata*. Taxa from this site included a weevil belonging to Cryptorhynchinae, an Elmid (moss beetle) and Psocids (booklice). Jumping spiders (*Holoplatys* sp. and possibly *Trite* spp.) and tussock moths (*Orocrambus vitellus*) were also common on the shrubs.

Summit of Mt St Cuthbert and southern slopes (1100 to 1558 m)

Twenty-five insect, two spider, one centipede and one millipede species were collected from this area. The sampling area includes the highest point (1558 m) on this part of the property and produced the highest level of endemism (96%). This result is a typical function of relatively low disturbance of the habitat and natural ecological processes.

A significant number of invertebrates of conservation and ecological interest were found in this sampling area. Specimens include the chunky tussock-feeding weevil *Anagotus lewisi*. These weevils are Central Otago endemics, known from the Rock and Pillar Range, Dunstan Range and recorded by Patrick (1994) at c.1600 m on the Hawkdun Range. It is likely the population on Mt St Cuthbert is restricted to this location.

A single specimen of a *Megadromus* ground beetle (probably *M. alternus*), was also collected. *Megadromus* beetles are difficult to fully identify, and this species could be *M. curtulus*, a taxon collected by Patrick (1994) at 1100 m on the Hawkdun Range. These beetles typically display regional endemism. Additional Coleopterans found within the sampling area include three darkling beetles: *Artystona rugiceps*, *Mimopeus impressifrons* and *M. lewisiana*. The latter is a large (12 mm) distinctive red-coloured beetle first noted by Lewis (1901) at Wedderburn, Central Otago. *M. lewisiana* is morphologically very similar to *M. impressifrons* (they are sympatric) and, although easily distinguished by colour, it is possible hybrids occur between the two forms.

Orthoptera (grasshoppers, crickets and weta) were well represented within the sub-alpine habitat by a number of endemic species. The mountain stone weta *Hemideina maori* was found in rocky ground on the summit of Mt St Cuthbert, a habitat shared by the cockroach *Celatoblatta anisoptera* (a Mackenzie Basin and North Otago endemic). The common grasshopper *Sigaus australis* and crickets (*Bobilla sp.*) were abundant throughout the area.

A night of light trapping produced five species of endemic moth (all belonging to the Noctuidae family), previously recorded on the Hawkdun Range by Patrick (1994). The species (in four genera) are all sub-alpine inhabitants. The day-flying moth *Paranotoreas brephosata* was seen occasionally in less modified snow tussock habitats throughout the property. Although not rare, these orange under-winged moths are a distinctive endemic species of the South Island mountains.

North-facing slopes and gullies of Baldy Knob (600 to 1332 m)

Twenty insect species, two spider and two centipede species were collected in this area. The sampling area extends north from Baldy Knob to Cattle Creek and includes a range of habitats. The tops support grazed snow tussockland with abundant mouse-ear hawkweed in which grasshoppers (*S. australis*), crickets and Crambid moths were abundant, and orange under-winged moths noted. No weta or beetles were found in the tussockland. Rocky outcrops situated within the tussockland support a dry-habitat beetle fauna including the darkling beetle *A. rugiceps* and the Carabid *Mecodema huttonense*.

The un-named creek draining point 1611 on the Ewe Range supports a high diversity of invertebrates. These include a number of endemic Mirid (sap bug) species (*Kiwimiris niger* and *Chinamiris zygotes*) and the shield bug *Oncacontias vittatus* (Acanthosomatidae). These bugs tend to be common at the margins of wetter native forests, suggesting they may well be confined to the shrublands in this area. *Oncacontias vittatus* is endemic at genus level and has scientific and ecological value (Larivière, 1995; Larivière and Larochelle, 2004). Endemic aquatic insects were common in the creek: a dragon fly (*Uropetala* sp.) was seen flying in the gorge while many stone flies (Plecoptera: *Spaniocercoides* sp.) and mayflies (*Deleatidium* sp.) were collected. The presence of these species provides an indication of stream health and productivity.

Summit of the Ewe Range (1360 to 1611 m)

Collecting produced 13 insect, three spider and one pseudoscorpion species in this sub-alpine habitat. The area is located in the southwest corner of the property and comprises gentle slopes of snow tussock and snowmelt flushes. All but one species found was endemic, illustrating the biological significance of this area. Weta (*Hemideina maori*) and cockroaches (*Celatoblatta anisoptera*) were common and typically hidden amongst rocky rubble and solifluction debris. The alpine cicada *Maoricicada campbelli* was abundant as were three species of day-flying moths (*Arctesthes catapyrrha, Asaphodes oraria* and *Paranotoreas brephosata*). The snow melt flushes support a diverse invertebrate fauna including diving beetles (*Liodessus plicatus*), Chironimid flies, tussock moths (*Orocrambus vitellus*) and two species of wolf spider: the common *Anoteropsis hilaris* and the less common *A. flavescens* which has not been previously recorded from Omarama. A number of large *Miturga* spiders were noted beneath rocks and stones adjoining the wet areas.

This part of the property appears to be in reasonable biological condition despite continued grazing and historic fires. However, the healthy tussock sward and presence of large flightless invertebrates suggests burning has been infrequent or that the last burn was at least 20 years ago.

Freshwater Habitats

Macro-invertebrates recorded from large stream habitats were *Olinga feredayi*, *Pycnocentria* sp., *Archichauliodes diversus, Deleatidium* spp. and *Coloburiscus humeralis*. Small streams support *Olinga feredayi*, *Pycnocentria* sp., *Nesameletus* sp., *Deleatidium* spp. and *Coloburiscus humeralis*. The spring-fed streams support *Olinga feredayi, Pycnocentria* sp., *Deleatidium* spp., and the large water beetle *Rhantus* sp. Only *Deleatidium* spp. and *Hydrobiosis* sp. were found in seepages. Wetlands were not surveyed for macro-invertebrates. However, several species were noted, including *Sigara* sp., *Anisops* sp., dragonfly (*Anisoptera* spp.), and damselfly larvae (*Zygoptera* spp.).

SUMMARY

Invertebrate habitats at lower elevations on the property have been extensively modified by grazing and over-sowing. However, within higher altitude habitats the assemblages of endemic invertebrates are typically diverse and display levels of endemism above 90%. The property marks the western extent of a faunal transition along the Hawkdun Range from Otago to the Mackenzie Basin. This is reflected by invertebrate species at their northern or southern range limits, for example the darkling beetle *Mimopeus lewisianus*, a weevil *Anagotus lewisi*, the ground beetle *Megadromus alternus*, a spider *Anoteropsis flavescens* and the grasshopper *Sigaus minutus*.

2.5.5 Notable Fauna

Table 5 Notable fauna recorded from Omarama Pastoral Lease, January 2005.

Animal Species		**Known Distribution on Property**
Common name	Scientific name	
Nationally Endangered		
black-fronted tern	*Sterna albostriata*	Omarama Stream wetland.
grey duck	*Anas superciliosa*	Omarama Stream wetland.
Gradual Decline		
grasshopper	*Sigaus minutus*	Headwaters of Old Man Creek
longfin eel	*Anguilla dieffenbachii*	Omarama Stream wetland.
New Zealand falcon	*Falco novaeseelandiae* "eastern"	throughout
spotted skink	*Oligosoma lineoocellatum*	Baldy Knob tussockland.
Sparse		
black shag	*Phalacrocorax carbo novaehollandiae*	Omarama Stream wetland.
marsh crake	*Porzana pusilla affinis*	Omarama Stream wetland.
Data Deficient		
bignose galaxias	*Galaxias macronasus*	Broken Hut Road stream and Omarama Stream wetland.

Several invertebrate species are at their range limits, with the Hawkdun, Ewe and St Cuthbert Ranges marking the biogeographical boundary between species of Otago and Mackenzie Basin origin. These include the darkling beetle (*Mimopeus lewisianus*), grasshopper (*Sigaus minutus*), ground beetle (*Megadromus* sp. (probably *M. alternus*)), mountain stone weta (*Hemideina maori*), snow grass weevil (*Anagotus* sp. cf. *A. lewisi*), spider (*Anoteropsis flavescens*) and shield bug (*Oncacontias vittatus*).

The presence of South Island tomtit this far from the forests of the main divide of the Southern Alps is also notable.

2.5.6 Problem Animals

Introduced animals that may have an important effect on indigenous plant or animal communities on the property, and that can be controlled or contained, are listed and discussed below.

Chamois
Chamois were observed in the upper Cattle Creek area. This species can have a significant impact on indigenous plants. Control of these species may be required to protect conservation values on the property.

Brushtail possum
Brushtail possum sign was observed at a number of locations on the property. Possums are predators of birds and lizards, as well as foliage browsers. Brushtail possum control is likely to be necessary to maintain conservation values.

Feral pig
Feral pig sign was observed at several locations. Feral pig control may be necessary to maintain conservation values.

Rabbit and hare
Rabbits and hares were seen in relatively low numbers on the property. Control of rabbits and hares may be required to protect conservation values on the property and on adjoining farmland.

Feral cat, rats, mice and mustelids

All these animals are present on the property and all pose a significant threat to invertebrate and lizard populations. Control of these species may be required to protect indigenous species on the property.

2.6 HISTORIC

The original Omarama Station covered a large area now occupied by a number of properties (Killermont, Glenburn, Dunstan Downs, Twinburn, Berwen, Otamatapaio, Twin Peaks, Clifton Downs, Dunstan Peaks, Tara Hills and Omarama Station). The property was first taken up for farming in 1858 by Harrie Carr Robison. Frederick Walker and Henry Young bought a half share in the property in 1861 and assumed full ownership in 1863. Walker departed in 1864 or 1865 and in 1866 Frederick Dalgety joined Young in the partnership. The leases for the property expired between 1882 and 1886, and Dalgety retained the Omarama lease. Properties in the area were badly affected by rabbits in the late 1880s and by heavy snow in 1895 and 1903, leading to the depletion of pastures and dramatically reduced stock numbers. The property was further divided in 1915 and the homestead block acquired by Wilfred and Cecil Wardell. In 1975 the property was managed by Wilfred's son Richard (Pinney, 1981). Two buildings constructed in 1861, a woolshed and a store on the freehold part of the property, are of historic interest.

2.7 PUBLIC RECREATION

2.7.1 Physical Characteristics

Omarama Pastoral Lease lies within the 'pastoral' recreation opportunity class in the Recreation Strategy for Canterbury Conservancy (Department of Conservation, 1994). A recent amendment nationally to the ROS classification system puts the pastoral lease predominantly within one ROS class, Backcountry Accessible (Motorized). The area around the homestead is within the Urban Fringe class. The property can be divided into two main recreation settings:

Mountains

This recreation setting covers the higher altitude parts of the property, on the St Cuthbert and Ewe Ranges. The setting is characterized by moderately-steep to steep slopes and broad ridge crests and plateaux. High-altitude areas on this part of the property are dominated by relatively intact indigenous vegetation (mostly tussockland) and provide a setting of high natural value for recreation. Mid-altitude slopes are more modified, but retain a cover of indigenous vegetation and have high naturalness and aesthetic values for recreation. Four-wheel-drive tracks provide access to the range tops, and most ridges and slopes are readily accessible to experienced trampers. High summits, notably Mt St Cuthbert (1558 m), Baldy Knob (1332 m) and the crest of the Ewe Range (1600 m) provide spectacular views across the Waitaki Basin and of surrounding mountain ranges. The range crest and upper slopes are snow-covered in winter.

Valleys

This recreation setting covers the lower-altitude parts of the property in the Ahuriri and Cattle Creek valleys. It is characterized by gentler slopes, low hills and flats. Vegetation is more modified, though large parts of the area remain relatively undeveloped and have some naturalness values. The area provides a setting of moderate natural value for outdoor recreation. The main farm tracks lie within this area, including a well-formed vehicle track up lower Cattle Creek. The northern (Ahuriri Valley-Lake Benmore) part of this area adjoins, or lies close to, State Highway 83 and Omarama township.

2.7.2 Legal Access

Legal public access is available to the northwest and northern boundaries of the property from Broken Hut Road and the Omarama-Otematata Road (State Highway 83). Practical vehicle and foot access to the property is available via farm tracks up Cattle and Glen Creeks. Public foot access to the southern and southeast boundaries of the property is available from public conservation land set aside following the review of Otamatapaio Station.

2.7.3 Activities

The higher altitude parts of the property provide opportunities for walking, tramping, skiing, scenery appreciation, nature study and photography. Lower altitude parts of the property provide opportunities for walking, mountain biking, horse-riding and four-wheel-drive vehicle use. Importantly, the existing vehicle track through the property via Cattle and Glen Creeks provides opportunities for through-trips by mountain-bike or four-wheel-drive vehicle. Access through the property could provide opportunities for longer tramping or winter-skiing trips along the Hawkdun Range to the south.

PART 3 OTHER RELEVANT MATTERS AND PLANS

3.1 CONSULTATION

Information-gathering meetings were held with non-governmental organisations (NGOs) at Renwick on 6th September 2004, Christchurch on 8th September 2004 and at Geraldine on 9th September 2004. Comments made at those meetings are summarised below.

- The property provides a scenic backdrop the town of Omarama.
- There is good game bird shooting (ducks and Canada geese) on the property.
- Foot and mountain bike access up Mt St Cuthbert is needed.
- Mountain bike access up the Ewe Range is needed.
- Mt St Cuthbert is a great walk.

3.2 DISTRICT PLANS

Omarama Pastoral Lease lies within the Rural Scenic Zone of the Waitaki District. There appear to be few constraints on land uses or activities within this zone, unless an area is an environmentally or ecologically sensitive area such as a wetland or waterway.

3.3 CONSERVATION MANAGEMENT STRATEGIES AND PLANS

Omarama Pastoral Lease lies within the Waitaki Place Unit of the Canterbury Conservancy. Relevant priority objectives for this unit are listed in the CMS (Department of Conservation, 2000) as:

- To identify, maintain and seek to enhance the natural landscape values of the Waitaki Unit.
- To identify significant indigenous vegetation and threatened species 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 investigate conservation park status for the areas managed by the Department in the Hawkdun-Oteake area and, if agreed to by the Minister, gazette relevant conservation parks.
- To prevent the loss of natural and landscape values from wilding trees on land managed by the Department.
- To reduce and maintain rabbit and tahr densities to levels that ensure their adverse effects on natural values are minimised.
- To provide new recreational facilities and opportunities by the Department and other organisations and concessionaires where natural and historic values are not compromised.
- To liaise with adjacent landholders to resolve conflicts over access for recreation to land managed by the Department.
- To increase public awareness of the natural, historic and cultural values of the Waitaki.

PART 4 ATTACHMENTS

4.1 ADDITIONAL INFORMATION

4.1.1 Scientific Names of Species

Plant Species

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

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

alpine fescue tussock..... *Festuca matthewsii*
Australian sheep's bur*..... *Acaena agnipila*
blue tussock..... *Poa colensoi*
blue wheatgrass ..... *Elymus solandri*
bog pine..... *Halocarpus bidwillii*
bog rush..... *Schoenus pauciflorus*
bracken ..... *Pteridium esculentum*
bristle tussock..... *Rytidosperma setifolium*
broadleaf/kapuka ..... *Griselinia littoralis*
broom* ..... *Cytisus scoparius*
browntop* ..... *Agrostis capillaris*
Chewings fescue*..... *Festuca rubra*
cocksfoot* ..... *Dactylis glomerata*
comb sedge..... *Oreobolus pectinatus*
common broom ..... *Carmichaelia australis*
common pennywort..... *Hydrocotyle novae-zeelandiae*
coral broom ..... *Carmichaelia crassicaule*
crack willow* ..... *Salix fragilis*
creeping bent* ..... *Agrostis stolonifera*
creeping buttercup* ..... *Ranunculus repens*
creeping pohuehue ..... *Muehlenbeckia axillaris*
cutty grass..... *Carex coriacea*
dainty daisy ..... *Celmisia gracilenta*
duckweed..... *Lemna minor*
dwarf inaka..... *Dracophyllum pronum*
dwarf speargrass..... *Aciphylla montana*
elderberry* ..... *Sambucus nigra*
everlasting daisy..... *Helichrysum bellidioides*
fescue tussock..... *Festuca* sp.
floating sweet grass* ..... *Glyceria fluitans*

golden speargrass/taramea..... *Aciphylla aurea*
grey willow*..... *Salix cinerea*
harebell..... *Wahlenbergia albomarginata*
haresfoot trefoil* ..... *Trifolium arvense*
hawkweed*..... *Hieracium* spp.
inaka ..... *Dracophyllum* spp.
jointed rush*..... *Juncus articulatus*
kanuka ..... *Kunzea ericoides*
king devil hawkweed*..... *Hieracium praealtum*
korokio ..... *Corokia cotoneaster*
koromiko ..... *Hebe salicifolia*
kowhai..... *Sophora microphylla*
lawyer..... *Rubus schmidelioides*
Lindsay's poa ..... *Poa lindsayi*
little hard fern..... *Blechnum penna-marina*
lotus*..... *Lotus pedunculatus*
matagouri..... *Discaria toumatou*
mingimingi ..... *Coprosma propinqua*
monkey musk* ..... *Mimulus guttatus*
mountain clubmoss..... *Lycopodium fastigiatum*
mountain oat grass..... *Deyeuxia avenoides*
mountain toatoa..... *Phyllocladus alpinus*
mountain totara..... *Podocarpus hallii*
mountain wineberry..... *Aristotelia fruticosa*
mouse-ear hawkweed* ..... *Hieracium pilosella*
narrow-leaved lacebark ..... *Hoheria angustifolia*
native jasmine..... *Parsonsia* sp.
patotara..... *Leucopogon fraseri*
penwiper..... *Notothlaspi rosulatum*
plume grass..... *Dichelachne crinita*
porcupine shrub ..... *Melicytus alpinus*
prickly shield fern ..... *Polystichum vestitum*
prostrate kowhai..... *Sophora prostrata*
pukio..... *Carex secta*
red clover*..... *Trifolium pratense*
red pondweed ..... *Potamogeton cheesemanii*
red woodrush..... *Luzula rufa*
retoreto ..... *Azolla filiculoides*
rock fern ..... *Cheilanthes humilis*
scabweed ..... *Raoulia australis*
scrub pohuehue..... *Muehlenbeckia complexa*
sheep's sorrel*..... *Rumex acetosella*
silver tussock/wi..... *Poa cita*
slim snow tussock ..... *Chionochloa macra*
snow daisy..... *Celmisia laricifolia*
snow totara ..... *Podocarpus nivalis*
snow tussock ..... *Chionochloa* sp.
soft rush*..... *Juncus effusus*
spike sedge ..... *Eleocharis acuta*
sweet brier* ..... *Rosa rubiginosa*
sweet vernal*..... *Anthoxanthum odoratum*
tall oat grass*..... *Arrhenatherum elatius*
tall tussock..... *Chionochloa* sp.
thousand-leaved fern ..... *Hypolepis millefolium*
timothy* ..... *Phleum pratense*

toetoe ..... *Cortaderia richardii*
tumble grass ..... *Lachnogrostis filiformis*
turpentine shrub ..... *Dracophyllum uniflorum*
tussock hawkweed* ..... *Hieracium lepidulum*
viper's bugloss* ..... *Echium vulgare*
wall lettuce* ..... *Mycelis muralis*
watercress* ..... *Rorippa* spp.
weeping matipo ..... *Myrsine divaricata*
white clover* ..... *Trifolium repens*
white fuzzweed ..... *Vittadinia australis*
willow* ..... *Salix* sp.
wire moss ..... *Polytrichum juniperinum*
woolly mullein* ..... *Verbascum thapsus*
yarrow* ..... *Achillea millefolium*
yellowwood ..... *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. Maori names are included for taonga species listed in Schedule 97 of the Ngai Tahu Claims Settlement Act 1998. Naturalised species are indicated by an asterisk (*).

Common name ..... Scientific name

Australasian bittern ..... *Botaurus poiciloptilis*
Australasian harrier/kahu ..... *Circus approximans*
bignose galaxias ..... *Galaxias macronasus*
black-fronted tern ..... *Sterna albostriata*
black mountain ringlet ..... *Percnodaimon pluto*
black shag/koau ..... *Phalacrocorax carbo novaehollandiae*
black stilt/kaki ..... *Himantopus novaeseelandiae*
black swan ..... *Cygnus atratus*
brook char* ..... *Salvelinus fontinalis*
brown hare* ..... *Lepus europaeus occidentalis*
brown trout* ..... *Salmo trutta*
brushtail possum* ..... *Trichosurus vulpecula*
Canterbury galaxias ..... *Galaxias vulgaris*
chamois* ..... *Rupicapra rupicapra rupicapra*
common bully ..... *Gobiomorphus cotidianus*
common skink ..... *Oligosoma nigriplantare polychroma*
European rabbit* ..... *Oryctolagus cuniculus cuniculus*
feral cat* (house cat) ..... *Felis catus*
feral pig* ..... *Sus scrofa*
green skink ..... *Oligosoma chloronoton*
great spotted kiwi/roroa ..... *Apteryx haastii*
grey duck/parera ..... *Anas superciliosa superciliosa*
grey teal/tete ..... *Anas gracilis*
hare* ..... *see* brown hare
Himalayan tahr ..... *Hemitragus jemlahicus*
jewelled gecko ..... *Naultinus gemmeus*
koaro ..... *Galaxias brevipinnis*

longfin eel.....*Anguilla dieffenbachii*
long-toed skink.....*Oligosoma longipes*
lowland longjaw galaxias.....*Galaxias cobitinus*
McCann's skink .....*Oligosoma maccanni*
marsh crake .....*Porzana pusilla affinis*
New Zealand falcon/karearea.....*Falco novaeseelandiae*
New Zealand pipit/pihoihoi.....*Anthus novaeseelandiae novaeseelandiae*
New Zealand scaup .....*Aythya novaeseelandiae*
paradise shelduck/putakitaki .....*Tadorna variegata*
possum*.....*see* brushtail possum
pukeko/pakura .....*Porphyrio porphyrio melanotus*
rabbit* .....*see* European rabbit
rainbow trout* .....*Oncorhynchus mykiss*
redpoll* .....*Carduelis flammea*
scree skink.....*Oligosoma waimatense*
silvereye .....*Zosterops lateralis lateralis*
sockeye salmon* .....*Oncorhynchus nerka*
Southern Alps gecko .....*Hoplodactylus* aff. *maculatus* "Southern Alps"
southern black-backed gull/karoro .....*Larus dominicanus dominicanus*
South Island fantail/piwakawaka .....*Rhipidura fuliginosa fuliginosa*
South Island tomtit/miromiro .....*Petroica macrocephala macrocephala*
spotted skink.....*Oligosoma lineoocellatum*
spur-winged plover.....*Vanellus miles novaehollandiae*
tahr.....See Himalayan tahr
upland bully.....*Gobiomorphus breviceps*
white-faced heron.....*Ardea novaehollandiae novaehollandiae*
wrybill .....*Anarhynchus frontalis*

4.1.2 References Cited

Allan, H.H. 1961. *Flora of New Zealand Vol. I.* Government Printer, Wellington. 1085p.

Allison, K.W.; Child, J. 1971. *The Mosses of New Zealand*. University of Otago Press, Dunedin. 155p.

Bigelow, R. S. 1967. *The Grasshoppers of New Zealand. Their taxonomy and distribution.* University of Canterbury Press.

Brownsey, P.J.; Smith-Dodsworth, J.C. 1989. *New Zealand Ferns and Allied Plants.* David Bateman, Auckland. 168p.

Connor, H.E.; Edgar, E. 1987. Name changes in the indigenous New Zealand flora, 1960-1986 and Nomina Nova IV, 1983-1986. *NZ Journal of Botany 25*: 115-170.

de Lange, P.J.; Norton, D.A.; Heenan, P.B.; Courtney, S.P.; Molloy, B.P.J.; Ogle, C.C.; Rance, B.D.; Johnson, P.N.; Hitchmough, R. 2004. Threatened and uncommon plants of New Zealand. *NZ Journal of Botany 42*: 45-76.

Department of Conservation, 1994. Recreation Strategy for Canterbury Conservancy. *Canterbury Conservancy Conservation Management Planning Series No. 7.* Department of Conservation, Christchurch. 102p.

Department of Conservation, 2000. Canterbury Conservation Management Strategy, *Canterbury Conservation Management Planning Series No. 10.* Department of Conservation, Christchurch. 320p.

Edgar, E.; Connor, H.E. 1999. *Flora of New Zealand Volume V Grasses.* Manaaki Whenua Press, Lincoln. 650p.

Espie, P.R.; Hunt, J.E.; Butts, C.A.; Cooper, P.J.; Harrington, W.M.A. 1984. *Mackenzie Ecological Region*. New Zealand Protected Natural Areas Programme. Department of Lands and Survey, Wellington. 91p+appendices.

Grove, P. 1994. *Hawkdun Ecological District: Survey Report for the Protected Natural Areas Programme*. Department of Conservation, Dunedin.

Hitchmough, R. (compiler) 2002. New Zealand threat classification system lists. *Threatened Species Occasional Publication 23.* Department of Conservation, Wellington.

Jarman, L. 1987. Wildlife and sites of special wildlife interest in the upper Waitaki and adjacent areas. *New Zealand Wildlife Service Occasional Publication No. 9*. Department of Internal Affairs, Wellington.

King, C.M. (editor). 1990. *The Handbook of New Zealand Mammals.* Oxford University Press, Auckland. 600p.

Larivière M.C. 1995 *Cydnidae, Acanthosomatidae, and Pentatomidae (Insecta: Heteroptera): Systematics, geographical distribution, and bioecology Fauna of New Zealand Number* 35: 27-30. Manaaki Whenua Press, Lincoln, Canterbury.

Lariviére, M.C.; Larochelle, A. 2004. *Heteroptera (Insecta: Hemiptera). Fauna of New Zealand No. 50.* Manaaki Whenua Press, Lincoln, New Zealand.

Larochelle, A.; Lariviére, M.C. 2001. *Carabidae (Insecta:Coleoptera) Catalogue. Fauna of New Zealand No. 43.* Manaaki Whenua Press, Lincoln, New Zealand.

Leathwick, J.; Wilson, G.; Rutledge, D.; Wardle, P.; Morgan, F.; Johnston, K.; McLeod, M.; Kirkpatrick, R. 2003. *Land Environments of New Zealand.* David Bateman, Auckland. 184p.

Lewis, J.H. 1901. Lepidoptera of Mt Ida. *Transactions and Proceedings of the New Zealand Institute* 33: **186-187.**

McDowall, R.M. 2000. *The Reed Field Guide to New Zealand Freshwater Fish.* Reed Publishing (NZ) Ltd., Auckland.

McDowall, R.M.; Richardson, J. 1983. *The New Zealand Freshwater Fish Survey: a guide to input and output.* New Zealand Ministry of Agriculture and Fisheries. 15p.

McEwen, W.M. (editor) 1987. Ecological regions and districts of New Zealand, third revised edition (Sheet 4). *New Zealand Biological Resources Centre Publication No.5.* Department of Conservation, Wellington, 1987.

McGlone, M.S. 2001. The origin of the indigenous grasslands of south eastern South Island in relation to pre-human woody ecosystems. *NZ Journal of Ecology 25*: 1-15.

Moore, L.B.; Edgar, E. 1976. *Flora of New Zealand Volume II.* Government Printer, Wellington. 354p.

Morris, S.J. 2003. *Distribution and Taxonomic Status of New Zealand Endangered Grasshoppers (Orthoptera: Acrididae).* Department of Conservation, Wellington.

O'Donnell, C.F.J. 2000. The significance of river and open water habitats for indigenous birds in Canterbury, New Zealand. Environment Canterbury *Unpublished report U00/37.* Environment Canterbury, Christchurch.

Patrick, B. 1989. Survey of the Lepidoptera at Tara Hills Research Station. *New Zealand Entomologist* 12: 42-48.

Patrick, B. 1994. Hawkdun Ecological District Invertebrate Survey. *Science & Research Series No. 64.* Department of Conservation, Wellington.

Pinney, R. **1981.** *Early Northern Otago Runs*. William Collins Publishers Ltd.

Robertson, C. J. R.; O'Donnell, C. F. J.; Overmars, F. B. 1983. Habitat requirements of wetland birds in the Ahuriri River catchment, New Zealand. *NZ Wildlife Service Occasional Publication No. 3.* Department of Internal Affairs, Wellington.

Tomlinson, A.I. 1976. In: *New Zealand Atlas* (Ian Wards, Editor). Government Printer, Wellington.

Watt, J.C. 1992. *Tenebrionidae (Insecta: Coleoptera) Fauna of New Zealand No. 26*. DSIR Plant Protection Centre, Auckland, New Zealand.

Webb, C.J.; Sykes, W.R.; Garnock-Jones, P.J. 1988. *Flora of New Zealand Volume IV.* Botany Division, DSIR, Christchurch. 1365p.

Whitaker, T. 1998. Mackenzie Basin lizards: a field key. *Unpublished Report.* Department of Conservation, Twizel. 12p.

Wilson, H.D.; Galloway, T. 1993. *Small-leaved Shrubs of New Zealand.* Manuka Press, Christchurch. 305p.