

Crown Pastoral Land Tenure Review

Lease name : BAUCHOPS HILL

Lease number : PT 085

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.

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BAUCHOPS HILL PASTORAL LEASE



CONSERVATION RESOURCES REPORT

DEPARTMENT OF CONSERVATION

JUNE 2006

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PART 1 INTRODUCTION

Bauchops Hill Pastoral Lease is located on the Rollesby Range, between the Mackenzie Basin and the Opihi River catchment north of Mackenzie Pass in South Canterbury. It covers moderately-steep east and south facing slopes on the southeast end of the Rollesby Range, and a small area of gentler country on the valley floor between the Rollesby and Single Hill ranges. The property ranges in altitude from 520 m at its southeast corner beside Avalanche and Hayter streams to 1377 m on the Rollesby Range. It is drained by Avalanche Stream and its tributaries in the east, Hayter Stream in the south and a headwater tributary of the Mackenzie River in the southwest. Avalanche and Hayter streams flow into the Tengawai River, a tributary of the Opihi River. Mackenzie River flows into Grays River, a tributary of the Tekapo River in the Waitaki Catchment.

Access to the property is from the Fairlie Tekapo Road (State Highway 8) via Rollesby Valley Road and unformed legal roads in the northeast, and via Mackenzie Pass Road in the south.

Bauchops Hill Pastoral Lease lies in the Grampians Ecological District, within Mackenzie Ecological Region (McEwen, 1987). This ecological district was been surveyed in the early 1980s as part of the Protected Natural Areas Programme. One small area along the range crest, containing a good example of rock tors and abundant *Helichrysum plumbeum*, was recommended for protection (Espie *et al.*, 1984).

The property adjoins Rollesby Pastoral Lease to the north, Glenrock Pastoral Lease to the west, Mt Dalgety Pastoral Lease to the south, Hayter Stream Marginal Strip (Conservation Land Unit I38010) to the southeast and freehold land to the east. No parts of the lease are currently subject to protection for conservation purposes.

The tenure review inspection of the property was undertaken during September and December 2005 by a range of specialists. These specialists' reports (listed below) form the basis of this Conservation Resources Report.

- Bauchops Hill Pastoral Lease Landscape Assessment, Alan Petrie, October 2005, 6p + photos + map.
- Bauchops Hill Vegetation Report, Mark Davis, February 2006, 14p + maps.
- Assessment of the Fauna Values of Bauchops Hill Pastoral Lease, Jane Sedgeley, February 2006, 11p + photos + maps.
- Bauchops Hill Pastoral Lease, A Report on the Aquatic Fauna Surveys, Scott Bowie, February 2006, 13p including photos + maps.
- Bauchops Hill Pastoral Lease Tenure Review Invertebrate Survey, Warren Chinn, January 2006, 12p including maps.

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

2.1 LANDSCAPE

2.1.1 Landscape Context

Bauchops Hill Pastoral Lease occupies the eastern and southern flanks of the Rollesby Range in South Canterbury. This range and the Dalgety Range to the south form the low mountains that separate the hills and downs of South Canterbury from the intermontane Mackenzie Basin.

The Rollesby Range has an undulating ridge crest that is periodically studded with large rock outcrops. The slopes of the range are rounded in form and covered in a deep mantle of colluvium, though frequently incised by streams. The property also includes part of the gently-sloping valley floor of Avalanche Stream and at the southwest corner a bowl-shaped valley of an upper tributary of the Mackenzie River.

The Rollesby Range was identified along with the adjoining Dalgety Range as a regionally significant landscape in the Canterbury Regional Landscape Study (Boffa Miskell and Lucas Associates, 1993), as it is representative of the semi-arid mountain ranges that are a distinctive feature of inland Canterbury.

2.1.2 Landscape Description

For the purposes of this landscape assessment Bauchops Hill Pastoral Lease is divided into three landscape units, principally based on aspect and landform (see map, page 9). The criteria used to assess and evaluate the landscape values of each unit are based on the following attributes:

- Naturalness: an expression of the indigenous content of the vegetative cover and the extent of human intervention.
- Legibility: an expression of the clarity of the formative processes and how striking these processes are.
- Aesthetic value: the memorability and naturalness of the area, including factors which can make a landscape vivid, such as simplicity in landform, muted colours and fine-textured ground cover.
- Visual values: a sub-set of landscape values which relate to the visibility of a particular landscape or natural feature as seen from public vantage points.

Unit 1, Eastern Rollesby Range

This large unit comprises the east-facing slopes of the Rollesby Range. It also includes the gently-sloping valley floor of Avalanche Stream, extending out to Rollesby Valley Road. The upper boundary of the unit follows the crest of the Rollesby Range, on the western property boundary. The ridge has undulating relief, extensive stonefields and sizable rock outcrops, the largest of which is a distinctive natural feature visible from many points on the valley floor that is known as Timaru Rock. Dominating the slopes is a series of round-crested spurs which are typically steeper in the upper and lower sections. Separating the spurs are wide V-shaped gullies that feature both

permanent and ephemeral watercourses. The central and largest of these gullies contains the headwaters of Avalanche Stream, a tributary of the Tengawai River.

The ground cover varies depending on aspect, altitude and grazing pressure. Above approximately 850 m the vegetation is dominated by narrow-leaved snow-tussock, with fescue tussock and golden speargrass. Darker slopes have tussock in good condition, while on the sunnier slopes the tussock cover is generally more depleted. The ridge crest is sparsely covered in mossfield, stonefield, rockland, tussockland and small pockets of inaka shrubland. Below 850 m, modified short tussockland becomes co-dominant with introduced pasture grasses. Across the lower slopes matagouri/*Coprosma* shrubland is increasingly common, particularly along the margins of watercourses and on darker slopes. There is a wide scattering of wilding pines across the upper slopes. The lower gently-sloping country is subdivided into smaller paddocks, cultivated and sown in pasture.

The homestead and farm buildings of the property are sited just off Rollesby Valley Road and contained within well-maintained shelter belts of exotic trees. There are two communication installations located on the crest of the range, serviced by a vehicle track from Mackenzie Pass. Other vehicle tracks are present on the main spurs.

Landscape Values

The upper section of the landscape unit (above 850 m altitude) possesses moderately high landscape values attributable to the overall sense of uniformity and naturalness. The degree of change to the original vegetation is less obvious in this semi-arid low-mountain context. The balance of the unit has moderate landscape values due to the extent to which the original vegetation has been modified.

Potential Vulnerability to Change

Land uses that have the potential to adversely affect this unit are:

- Further subdivision and intensification of land use that would adversely affect the existing homogenous character of the unit.
- Further spread of wilding pines.
- Tree planting on the lower slopes.
- Unsympathetic siting, colour and exterior finish of communication installations on the ridge crest.

Unit 2, Mackenzie River

This unit covers the bowl-shaped catchment of the Mackenzie River tributary at the southwest corner of the property. The northern, eastern and southern boundaries of the unit are the main ridge of the Rollesby Range; the western boundary is the property boundary. In the lower southwest corner, the valley tapers and becomes more enclosed.

The slopes encircling the upper section of the valley are even-graded and lightly indented by ephemeral watercourses. The middle section of the valley features rocky bluffs, stable screes and over-steep slopes where the stream winds around a sequence of low interlocking spurs. In its lower section the stream is contained within a V-shaped gully.

The vegetative cover is primarily narrow-leaved snow-tussock. The density and condition of the snow tussock is dictated by aspect. On darker faces tussock cover is relatively consistent while on the drier, sunnier slopes the tussock cover is generally sparser with the inter-tussock spaces occupied by fescue tussock and to a lesser extent silver tussock. Close to the ridge, small patches of inaka shrubland, mossfield and stonefield are common. Coral broom is widely distributed over the upper slopes. Within the protection of the rocky gorge, especially on the darker slopes, mixed shrubland is present. Occasional wilding pines mark the mid and upper slopes.

Landscape Values

This unit conveys moderately high landscape values principally due to the presence of the gorge featuring rocky bluffs, shrubland and over-steepened topography. The wild and scenic characteristics of the gorge section contrast markedly with the smoother colluvial slopes that dominate much of the catchment. To a degree the overall sense of isolation has been compromised by the vehicle track that sidles around the upper eastern slopes.

Potential Vulnerability to Change

Land uses that have the potential to adversely affect this unit are:

- Activities that may restrict the natural spread of shrubland (e.g. burning).
- Further spread of wilding pines.

Unit 3, Southern Rollesby Range

This unit covers the southern slopes of the Rollesby Range, overlooking Mackenzie Pass Road. The unit is triangular in shape with the high point of 1161 m at its northern apex. Hayter Stream and Mackenzie Pass Road descend along the southern boundary of the unit (and property) from Mackenzie Pass to the confluence of Hayter and Avalanche streams. The Dalgety Range lies south of the unit.

Dominating the unit is a series of moderately steep, rounded spurs and small straight gullies draining to Hayter Stream. The toes of the spurs are frequently undercut, creating over-steepened slopes that pitch into the stream. A high voltage transmission line traverses the toe of the slope for approximately one kilometre across the property.

The vegetation on the lower slopes is principally modified tall tussockland with a co-dominance of short tussock and introduced grasses. Matagouri shrubland is widely distributed on the steeper slopes bordering Hayter Stream. Plantings of poplar and willow line the stream. Indigenous vegetation, notably matagouri shrubland, becomes increasingly prevalent nearer Mackenzie Pass. Above approximately 800 m, shrubland grades to tall tussockland.

Landscape Values

This unit, near Mackenzie Pass, has high landscape values that are attributable to the enclosed nature of the topography, the rapid change in elevation and the overall sense of naturalness in the vegetation. This area is a transition zone between regional landscape types, from the enclosed hills and downs of South Canterbury to the more subdued physical relief and spaciousness of the Mackenzie Basin.

Mackenzie Pass has heritage landscape values, due to the combination of significant natural and cultural values. The pass is closely associated with local folklore, being the route that the Scottish drover, James McKenzie, used for sheep rustling during the 1850s. A monument to McKenzie is sited two kilometres west of the Pass.

Potential Vulnerability to Change

Land uses that have the potential to adversely affect this unit are:

- Further structures that will compromise the natural landscape and heritage values.
- Burning that will impede natural regeneration shrubland.
- Tree planting.

2.1.3 Visual Values

The Rollesby Range is an important visual element in defining the edges of the Mackenzie Basin (Boffa Miskell and Lucas Associates, 1993). However, unlike the western flanks of the range, the eastern flanks within Bauchops Hill Pastoral Lease are visible only from local roads including Rollesby Valley Road and Mackenzie Pass Road. From these secondary roads the property helps create a sense of enclosure, with directional views in contrast to the expansive views of the Mackenzie Basin. In a wider context, the importance of the Rollesby Range is that, when combined with the other semi-arid low mountains in the district, it forms a distinguishable landscape type that is different to other parts of the eastern South Island high country.

Significance of Landscape Values

The western section of Landscape Unit 3 on the southern slopes of the Rollesby Range has high significant inherent landscape values. It is an integral part of the Mackenzie Pass landscape, has high naturalness values and has an historic context. Mackenzie Pass is the transition point between two distinct regional landscape types

Landscape Unit 2, in the southwest corner of the property and the upper part of Landscape Unit 1, on the upper eastern slopes of the Rollesby Range make substantial contributions to the recognizable character of the Rollesby Range, particularly the coherent qualities of the tall tussocklands. The mid section of the Mackenzie River tributary has distinctive wild and scenic characteristics.

2.2 GEOLOGY, LANDFORMS AND SOILS

2.2.1 Geology

The basement rocks of the Rollesby Range are moderately-indurated greywacke and argillite of the Torlesse Group (Chlorite Subzone I). Hill slopes are mantled with deposits of loess (wind-deposited sediments). The main valley floor along Avalanche Stream has deposits of till and outwash gravels of the Burnham Formation, and a smaller area of marine greensand and siltstone of the Arnold Series at the southeast corner of the property. A concealed fault traverses the Avalanche Stream valley between the Rollesby and Single Hill ranges, just east of the property boundary (Gair, 1967).

2.2.2 Landforms

Two distinct landforms are present on Bauchops Hill Pastoral Lease: the moderately-steep slopes of the Rollesby Range comprising most of the property and the gentler slopes and flats in the lower Avalanche Stream valley at the eastern side of the property. The slopes of the Rollesby Range comprise rounded spurs and prominent incised gullies. The main ridge crest is relatively gentle, with rounded summits and numerous rock outcrops and tors. The Rollesby Range is similar in form to the Albury Range to the east and the Dalgety Range to the south. These mountain ranges are transitional in character between the mountain ranges of Canterbury and Otago.

2.2.3 Soils

Higher altitude parts of the property on the Rollesby Range have Kaikoura steepland soils along the range summit, Tengawai steepland soils on the upper eastern slopes and Omarama steepland soils on the upper southwest slopes. Mid-altitude slopes have Tengawai hill soils. Gentler slopes on the valley floor at the eastern edge of the property have Glenroy silt loams and Kakahu silt loams.

Significance of Geology, Landforms and Soils

The Rollesby Range, upon which the property is located, is similar in form to the surrounding mountain ranges and is transitional in character between the mountain ranges of Canterbury and Otago. There are no geopreservation sites listed for the property.

2.3 CLIMATE

Bauchops Hill Pastoral Lease has a sub-humid hill country climate with cool to cold winters and mild dry summers. Predominant winds are from the northwest, with occasional gales. Cool southerlies are common in winter. Snow can affect all parts of the property and lie at higher altitudes for several weeks in winter. Average annual precipitation is approximately 800 mm (Tomlinson, 1976). The climate of the area is strongly influenced by the sheltering effects of the Southern Alps, resulting in drier conditions than occur in most of New Zealand's other mountain environments (Leathwick *et al*, 2003).

2.4 LAND ENVIRONMENTS OF NEW ZEALAND (LENZ)

Leathwick *et al* (2003) propose that higher altitude parts of the property near the crest of the Rollesby Range (covering c.14% of the property) lie within Level IV land environments P1.2d and Q1.1d. Mid-altitude parts of the property covering the eastern and southern flanks of the Rollesby

Range (c.77%) lie within land environments Q2.1a and Q2.1b. Gentler lower altitude slopes along Avalanche Stream (c.9%) lie within land environments E3.1a, E4.1b and N3.1a. Refer to map.

Land Environments P1.2d and Q1.1d (higher-altitude areas) are described by Leathwick *et al* (2003) as originally supporting mountain totara-mountain toatoa low-forest and scrub at higher altitudes. Land Environments Q2.1a and Q2.1b (mid-altitude flanks of the range) are described as originally supporting mixed podocarp-hardwood forest (matai, totara and kahikatea over a hardwood canopy) at lower-altitudes and mountain totara-mountain toatoa low-forest and scrub at higher altitudes. Land Environments E3.1a, E4.1b and N3.1a (valleys floors) are described as originally supporting podocarp-hardwood forest with minor areas of scrub or tussockland on rocky or recently-deposited substrates. However, these data should be interpreted with caution, as the predicted extent and suggested vegetation types for each Land Environment (Leathwick *et al*, 2003) have been extrapolated from limited field data.

The approximate extents to which the Level IV land environments of the property are legally protected are: P1.2d, 49%; Q1.1d, 35%; Q2.1a, 9%; Q2.1b, 4%; E3.1a, 3%; E4.1b, 4%; and N3.1a, 1% (Department of Conservation, *unpublished data*, January 2006). Gentle low-altitude sites along Avalanche Stream (N3.1a) are “acutely-threatened”. Other low-altitude sites along the eastern property boundary (E3.1a) are “chronically threatened” or “at risk” (E4.1b). Most other parts of the property (Q2.1a and Q2.1b) are “critically under-protected”. Acutely-threatened land environments are those in which less than 10% of the original indigenous vegetation remains. Chronically-threatened land environments are those in which between 10% and 20% of the original indigenous vegetation remains. At risk land environments are those in which between 20% and 30% of the original vegetation remains. Critically under-protected land environments are those in which more than 30% of the original indigenous vegetation remains and less than 10% is legally protected.

Significance of Land Environments

Gentler lower-altitude parts of Bauchops Hill Pastoral Lease (9% of the property) are classified as “much reduced” (acutely- or chronically-threatened) land environments. These land environments (E3.1a and N3.1a) have 3% or less of their total area legally protected. Most of the remaining parts of the property (77%) are classified as “critically under-protected” land environments (Q2.1a and Q2.1b), with less than 10% of their total areas legally protected. See attached map.

2.5 VEGETATION

2.5.1 Ecological Context

Bauchops Hill Pastoral Lease is in Grampians Ecological District, within the Mackenzie Ecological Region. Part of one Recommended Area for Protection (Grampians 2) on the crest of the Rollesby Range was identified on the property by Espie *et al* (1984) in the Mackenzie Protected Natural Areas Programme survey report. It represents rock tors and fellfield plants, including the threatened *Helichrysum plumeum* on the tors. Refer to the Botanical values map (page 18).

The vegetation pattern on the property is similar to that immediately north and west on the Rollesby Range, and south on the Dalgety Range. The latter is higher at around 1600 m and consequently has more extensive fellfield communities. In other respects the vegetation pattern is similar with slim snow-tussock at higher altitudes, grading into narrow-leaved snow-tussock and short tussock at lower altitudes. Very limited areas of shrubland are present in lower-altitude valleys.

It is likely, based on the assessment of McGlone (2001), 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 appeared on lower slopes with species such as mountain totara, mountain toatoa, bog pine, kowhai, *Coprosma*, *Myrsine* and *Dracophyllum* shrubs. Upslope, the scrub-forest gave way to snow totara and inaka shrublands, with patches of narrow-leaved snow-tussock on rocky habitats. The alpine slopes and tops were dominated by slim snow-tussockland.

2.5.2 Vegetation and Flora

Tall tussockland dominates upper and mid slopes on the property, giving way to highly modified short tussock grassland on mid to lower slopes. Rockland communities are associated with rock tors on upper and mid slopes, while limited grey shrublands are found on footslopes and in lower gullies, especially around rock outcrops and talus patches. Exotic grasslands dominate lower slopes and fans. Wetlands are rare; the only one observed is on a creek floodplain in the northeast corner of the property. The vegetation is described below for the two distinct parts of the property.

Eastern Rollesby Range

The area comprises the east facing-facing slopes of the Rollesby Range from the crest of the Rollesby Range to the northern and eastern boundaries of the lease. The area includes the gentle sloping valley floor of Avalanche Stream to the Rollesby Valley Road.

On exposed summit ridges woolly moss has a cover of up to 50%, while slim snow-tussock cover is approximately 40%. Other plants include inaka, lichens, dainty daisy, *Raoulia subsericea*, snowberry, red woodrush, *Anisotome flexuosa*, patotara, blue tussock, *Kelleria dieffenbachii*, mountain clubmoss, tauhinu, *Hebe lycopodioides* and *Pimelea pseudolyallii*. Exotic plants include mouse-ear hawkweed, king devil hawkweed and catsear. Seedling snow tussocks are common, indicating good regeneration. Some wallaby dung was present. Naturalness is medium-high to high. This community is representative of the original slim snow-tussocklands.

On upper eastern slopes slim snow-tussockland has a cover of 25-40% and a similar species composition to those on the summit ridge, but with less woolly moss. Additional species include *Anisotome aromatica*, *Gonocarpus montanus*, *Craspedia* cf. *incana* and the threatened coral broom on exposed rocky areas. Scattered wilding conifers are present and mouse-ear hawkweed is locally common, reducing naturalness to medium. The transition to narrow-leaved snow-tussock occurs at around 1200 m.

The cover of narrow-leaved snow-tussock varies from 20-60%, depending on the locality and degree of exposure. Other species in this community include matagouri, golden speargrass, inaka, blue tussock, fescue tussock, snowberry, *Gonocarpus montanus*, *Raoulia subsericea*, patotara, onion-leaved orchid, *Thelymitra longifolia*, dainty daisy, *Ranunculus multiscapus*, *Pimelea oreophila*, *Carmichaelia monroi* and *Scleranthus uniflorus*. Common exotics are mouse-ear hawkweed, browntop, catsear, sheep's sorrel and king devil hawkweed. The threatened plants *Pterostylis tristis* or *P. tanypoda* and *Pimelea pseudolyallii* were found in this area. Patches of gorse and broom are also present. Downslope, white clover appears at c.1000 m. Naturalness varies from medium to low-medium with decreasing altitude. This community represents elements of the original snow tussocklands, though they have largely been induced. Wilding conifers are sparsely scattered through the area, predominantly Corsican pine and occasional larch.

Summit tors support *Rytidosperma buchananii*, blue tussock, woolly moss, lichens, *Brachyglottis haastii*, *B. bellidioides*, edelweiss, patotara, *Anisotome flexuosa*, *Hebe pinguifolia*, *H. cheesemanii*, *Helichrysum intermedium*, *H. intermedium* x *H. plumeum*, *Colobanthus acicularis*, little hard fern, everlasting daisy, *Coprosma* aff. *parviflora*, *Celmisia densiflora*, red woodrush, creeping mapou, mouse-ear hawkweed, king devil hawkweed and sheep's sorrel. Naturalness is medium-high to high, and this community is highly representative of original rockland communities.

Mid altitude rock outcrop plants include *Helichrysum intermedium*, *H. intermedium* x *H. plumeum*, *Scleranthus uniflorus*, *Raoulia glabra*, *Leucopogon colensoi*, threatened coral broom, blue tussock, porcupine shrub, *Coprosma propinqua*, matagouri, creeping mapou, lichens, mosses, *Colobanthus acicularis*, *Brachyglottis bellidioides*, *Anisotome flexuosa*, red woodrush, patotara, *Senecio glaucophyllus* ssp. *discoideus*, narrow-leaved snow-tussock, mouse-ear hawkweed, sheep's sorrel and sweet vernal. Naturalness is medium to medium-high and this community is again largely representative of original rockland communities.

Mid altitude talus supports *Hebe subalpina*, mountain wineberry, *Coprosma propinqua*, scrub pohuehue, porcupine shrub, matagouri, giant speargrass, lawyer, native jasmine, mosses, lichens, thousand-leaved fern, little hard fern, blue tussock, *Cardamine debilis*, cleavers, sweet vernal, mouse-ear hawkweed and mouse-ear chickweed. Naturalness is medium to medium-high, although the margins are less natural due to widespread exotic grasses. Talus communities represent original boulderfield communities, but are significantly affected by exotic species and some components are likely to be missing.

Below c.900 m short tussock grassland becomes common. Silver tussock and fescue tussock are both present but exotic grasses are dominant. These communities are very modified with fertiliser-induced matagouri, clovers and a diversity of exotic grasses. Other prominent plants include *Coprosma propinqua*, porcupine shrub, scrub pohuehue, Scotch thistle, Californian thistle and nodding thistle. In a number of areas shrubs have been sprayed or burnt. Naturalness and representativeness is low as these communities are largely induced and are dominated by exotic plants. Most of the gentle fans have been cultivated.

The lower stream gullies of the larger catchments, such as Avalanche Stream, usually support remnant shrublands. These shrublands are often little more than narrow riparian ribbons, except where they occur on stable talus. They support matagouri, *Coprosma propinqua*, koromiko, native broom, *Carmichaelia angustata*, tutu, *Olearia virgata* and rarely mountain ribbonwood. Several kowhai trees were seen on northern slopes above Avalanche Stream. Other plants include giant speargrass, golden speargrass, scrub pohuehue, lawyer, prickly shield fern, bracken, little hard fern, *Asplenium richardii*, thousand-leaved fern, narrow-leaved snow-tussock, abundant exotic grasses and clovers. Mountain flax is present on shady aspects. Elderberry is sometimes present, and Russell lupin and several crack willow trees were seen in Avalanche Stream. Some of these shrublands have been burnt or sprayed. Their naturalness is low to low-medium but they contain

elements of the original woody communities. Limited patches of inaka and mountain flax occur on some shady slopes among tall tussockland, and inaka is also found around rock tors.

The only significant wetland is located in the northeast corner of the property on a floodplain between two creek terraces. It is about 600 m long by 40-60 m wide and supports two main wetland communities. The western end is muddy with shallow water. Its sedge community is dominated by rautahi, oval sedge and patches of pukio. Soft rush is also common and spike sedge is locally common. Exotic grasses such as sweet vernal, Yorkshire fog, cocksfoot, orange foxtail and Chewings fescue are widespread. Other common exotics include water forget-me-not, monkey musk, mouse-ear chickweed, stitchwort, creeping buttercup, watercress and clovers. Dry stony patches support grasses, clovers and silver tussock. The eastern end supports scattered red tussock and bog rush among exotic grasses, with rautahi, pukio, *Carex sinclairii*, little hard fern and duckweed in still or gently moving water. This water collects via a small creek where floating sweet grass is common. Matagouri is scattered through the wetland, especially near its margins, and Scotch thistle and nodding thistle are locally common. Overall naturalness is low-medium, but the wetland contains representative elements of the wetlands originally present in lower valleys and on gentle fans.

Southern Rollesby Range

This area comprises the upper Mackenzie River valley, and the mid to lower mountain slopes above Mackenzie Pass Road. The Mackenzie River valley is the only catchment on the property draining west into the Mackenzie Basin; it contains the best tall tussock communities and is minimally affected by over-sowing and top-dressing. The adjacent southeast slopes are more modified, especially at lower altitudes.

The vegetation on exposed upper spurs is dominated by woolly moss, which has a cover of up to 75%. Slim snow-tussock has a cover of up to 25%, while other plants include inaka, *Phyllachne colensoi*, blue tussock, mountain clubmoss, *Kelleria dieffenbachii*, snowberry, *Brachyscome* spp, red woodrush, *Luzula pumila*, mosses and lichens. Many small or seedling snow tussocks are present indicating a recovery from past depletion. Mouse-ear hawkweed and king devil hawkweed are present at minor levels, and wallaby dung is also present. Naturalness is medium-high and this community is representative of original summit mossfields and tussocklands.

Slim snow-tussockland dominates upper shady slopes in the Mackenzie Valley until narrow-leaved snow-tussock appears at about 1100 m. Slim snow-tussock has a cover of 50-75%, with other prominent species being inaka, *Gaultheria crassa*, woolly moss, wire moss, lichens, snowberry, *Kelleria dieffenbachii*, mountain clubmoss, *Anisotome* spp. and mouse-ear hawkweed. Hybrid *Chionochloa macra* x *C. rigida* and narrow-leaved snow-tussock are also rarely present. Wallaby dung is again present and naturalness is medium-high. This community is representative of the original slim snow-tussocklands (though its extent may have expanded). Very sparsely scattered wilding conifers are present here.

The mid slopes of Mackenzie Valley are dominated by narrow-leaved snow-tussock. On southwest slopes, snow tussock cover is typically at least 75%. Other prominent species include *Gaultheria crassa*, inaka, mountain flax, creeping mapou, matagouri, golden speargrass, snowberry, little hard fern, native violet, patotara, *Luzula* sp, false speargrass, everlasting daisy, mouse-ear hawkweed, white clover, catsear and browntop. Naturalness is medium or medium-high, depending on the locality. This community represents elements of the original narrow-leaved snow-tussocklands, though it has largely been induced. On sunny aspects, the tussockland is more open and additional species include *Raoulia subsericea*, *Forstera sedifolia*, blue tussock, native broom and threatened coral broom. Wilding conifers are rare in these tussocklands. Small open patches of inaka occur locally, their species composition being similar to that of the tussocklands in which they occur.

Small rock outcrops on upper slopes support plants such as inaka, woolly moss, *Celmisia densiflora*, false speargrass, slim snow-tussock, patotara, blue tussock, *Anisotome flexuosa*, *Anisotome aromatica*, *Cardamine bilobata*, *Colobanthus acicularis*, mosses and lichens. *Coprosma cheesemani* sometimes occurs on talus patches around rock outcrops. The naturalness of these communities is medium-high, and they are very representative of original communities. Mid-slope talus patches support porcupine shrub, giant speargrass, golden speargrass, blue tussock, little hard fern, thousand-leaved fern, mosses, lichens, *Hebe subalpina*, *Coprosma propinqua*, mountain wineberry, scrub pohuehue, *Anisotome filifolia*, harebell, sweet vernal, tussock hawkweed and Chewings fescue. Naturalness is medium-high, and they are representative of original communities though some components are likely to be missing. A piece of gnarled wood in one talus patch appears to be mountain totara.

Mid-altitude stream sides support narrow-leaved snow-tussock, little hard fern, prickly shield fern, *Astelia nervosa*, *Celmisia densiflora*, giant speargrass, *Gaultheria crassa*, thousand-leaved fern, mountain flax, inaka, *Hebe subalpina*, *Carmichaelia angustata*, tutu, *Olearia virgata*, mountain kiokio and everlasting daisy.

The lower entrance of the Mackenzie Valley supports modified short tussockland analogous to that on lower slopes above the Mackenzie Pass Road. Fescue tussock has a cover of 10-15%, and remnant narrow-leaved snow-tussock is less than 5%. Other species include matagouri, red woodrush, mosses, *Anisotome aromatica*, everlasting daisy and a diversity of exotic species such as mouse-ear hawkweed, Chewings fescue, catsear, browntop, sweet vernal, yarrow and white clover. Naturalness is low, and the community is minimally representative of the original short tussocklands.

On upper slopes above Mackenzie Pass Road, slim snow-tussockland has a cover of 60-90%. Other species include narrow-leaved snow-tussock, *Geum parviflorum*, *Geranium microphyllum*, red woodrush, *Anisotome aromatica*, *Acaena caesiiglauca*, *Ranunculus multiscapus*, mosses, patotara, everlasting daisy, *Epilobium glabellum*, *Lobelia linnaeoides* and *Brachyglottis bellidioides*. Occasional erosion hollows support *Ranunculus crithmifolius*. Exotic plants are more common than in the Mackenzie Valley with mouse-ear hawkweed, catsear, browntop and sweet vernal all being prominent. Wallaby dung and tracks are also present. Naturalness is medium, reflecting the likely influence of fertiliser and the increased presence of exotics. The community is representative of the original slim snow-tussocklands, though its extent may have expanded. Narrow-leaved snow-tussock replaces slim snow-tussock by about 850 m altitude. The tussockland becomes more open and grassy below this altitude and white clover becomes prominent. This merges into short tussockland dominated by exotic grasses and clover, with low matagouri and some *Coprosma propinqua*.

Weedy shrublands occur on some terrace risers of Hayter Stream and in adjacent gullies. They contain *Coprosma propinqua*, matagouri, *Coprosma rugosa*, *Olearia virgata*, *O. bullata*, pohuehue, lawyer, porcupine shrub, native jasmine, koromiko, *Hebe rakaiensis* or *H. traversii*, thousand-leaved fern, little hard fern and prickly shield fern. Exotic plants include widespread grasses, male fern, cherry plum, elderberry and bittersweet. Naturalness is low-medium, though the shrublands represent elements of the original woody communities.

The stony floodplain of Hayter Stream is dominated by exotic grasses, clovers, monkey musk, sheep's sorrel, Californian thistle and a variety of other herbs. Indigenous plants are present scattered silver tussock, *Epilobium melanocaulon*, creeping pohuehue and rare *Raoulia tenuicaulis*. Naturalness is low, and the community is minimally representative of the original riverbed communities as few indigenous plants are present and succession is dominated by exotic plants.

Notable Flora

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

Table 1 Notable plant species, Bauchops Hill Pastoral Lease, December 2005.

Plant Species	Threat Status	Distribution on Property
<i>Cardamine bilobata</i>	Data deficient.	Rock outcrop, upper Mackenzie Valley.
<i>Carmichaelia crassicaule</i> (coral broom)	Gradual decline.	Scattered across mid to upper slopes, particularly at dry sites, throughout.
<i>Geranium microphyllum</i>	Data deficient.	Upper Mackenzie Valley; slopes above Mackenzie Pass Road.
<i>Helichrysum plumeum</i> X <i>H. intermedium</i>	Range restricted.	Scattered on rock tors and outcrops on eastern slopes.
<i>Pimelea pseudolyallii</i>	Sparse.	Range crest; mid and upper eastern slopes.
<i>Pterostylis tristis</i> or <i>Pterostylis tanypoda</i>	Sparse.	Upper eastern slopes.
<i>Sophora microphylla</i> (kowhai)	Not threatened; an original forest tree.	One grove of four or five trees (several metres tall) in lower Avalanche Stream valley.

Significance of Vegetation and Flora

The southern Rollesby Range supports good condition slim snow-tussockland and narrow-leaved snow-tussockland, the former representing original communities. Rock outcrops and talus support original rockland and boulderfield communities. The Mackenzie Valley contains a complete altitudinal sequence from alpine tors, mossfields and tall tussock, through sub-alpine tall tussock to montane tall tussockland and short tussockland. Threatened coral broom is scattered through the Mackenzie Valley and two data deficient plant species are present.

The eastern catchments support good or moderate condition slim snow-tussockland and narrow-leaved snow tussockland, the former representing original communities. Rock outcrops and talus support original rockland and boulderfield communities, with numerous tors on or near the summit ridge. Minor areas of shrubland occur in some lower valleys representing remnant elements of original woody communities. The threatened coral broom is scattered through the area, while threatened *Pimelea pseudolyallii* was recorded at three localities and *Pterostylis tristis* or *Pterostylis tanypoda* was recorded at one locality. Hybrid *Helichrysum plumeum* was found on a number of rock tors and rocky areas. One substantial montane wetland is present in the northeast corner, representing a community type that has all but disappeared from the property.

2.5.3 Problem Plants

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

Gorse and broom

Infestations of gorse and broom are present on a prominent spur on the northern side of upper Avalanche Stream, between altitudes of approximately 1200 m and 1000 m. These infestations pose a significant threat to higher-altitude tussocklands.

Elderberry

Elderberry trees are scattered through shrublands in Hayter and Avalanche streams. Elderberry fruits are readily dispersed by birds.

Cherry plum, poplar, green alder and *Cotoneaster* sp.

These trees are present along Hayter Stream at the southern boundary of the property. Cherry plum and *Cotoneaster* sp. fruits are readily dispersed by birds. Poplar and green alder sucker and readily colonise adjoining areas.

Crack willow

Crack willow trees are present along Hayter Stream and along Avalanche Stream in the vicinity of the homestead.

Russell lupin

An infestation of Russell lupin is present in lower Avalanche Stream. Russell lupins readily colonise disturbed ground.

Male fern

Male fern is present in Avalanche and Hayter streams. This species is now widespread in the high country. Removal or containment is probably impractical.

Wilding conifers and larches

Upper slopes on the property contain wilding conifers at densities of up to 20 to 30 stems per hectare. The total area affected is approximately 1000 hectares although there are significant portions of this area where wilding tree densities are less than one stem per hectare and some areas where there are no wilding trees. The predominant wilding species are contorta pine, Corsican pine and larch. A single specimen of mountain pine was also recorded. Along the Mackenzie Pass Road there are small stands of Douglas fir and radiata pine. The radiata pine does not appear to be spreading at this stage. A small stand of larch near the northern boundary of the property has been sprayed. Wilding pine tree control will be necessary to protect conservation values.

2.6 FAUNA

2.6.1 Bats

Short-tailed bats have not been recorded in Canterbury since the arrival of Europeans. A small population of South Island long-tailed bat is present in South Canterbury. The closest bat records to Bauchops Hill Pastoral Lease are from the Tengawai River (Sedgeley, 2002). The property was not surveyed for bats because bat roosting and feeding habitats (forest and mature shrubland) are not present in the area.

2.6.2 Birds

The bird fauna of Grampians Ecological District is characterised by species typical of open tussockland and shrubland habitats including Australasian harrier, New Zealand pipit and New Zealand falcon (threat status: gradual decline) (Espie *et al.*, 1984; McEwen, 1987). McEwen (1987) notes that New Zealand falcon is widespread and that blue ducks (nationally endangered) have been recorded in the district. The absence of forest in Grampians Ecological District means that few forest birds are present except for common shrubland species such as grey warbler, silvereve and South Island fantail.

Birds observed on Bauchops Hill Pastoral Lease are described for the five distinct parts of the property surveyed.

Eastern Rollesby Range

This area covers the northeast-facing slopes of the Rollesby Range above approximately 800 m altitude. These slopes have numerous large rock outcrops or tors amongst sub-alpine tussockland, low shrubland, herbfield, stonefield and scattered exotic pine trees. These habitats support southern-black-backed gull, Australasian harrier, New Zealand pipit and the threatened New Zealand falcon (gradual decline). New Zealand falcon were observed twice here, one sighting of a single bird and another of two birds together in the vicinity of a large rock tor. The rock tors provide suitable roosting and nesting habitat for falcons. Introduced yellowhammers were abundant throughout high altitude habitats.

Mackenzie River Tributary

This small valley in the southwest corner of the property has shrubland, tussockland, rockland and stonefield (talus) habitats. Southern black-backed gull, New Zealand pipit and welcome swallow were recorded in these habitats along with the introduced yellowhammer, Australian magpie, redpoll and skylark.

Hayter Stream

The Hayter Stream area on the southern boundary of the property has exotic trees (predominantly willow) along its margins and shrubland, tussockland and grassland on lower slopes. The shrublands provide feeding and nesting habitat for silvereve, grey warbler and a range of introduced passerines. South Island pied oystercatcher and paradise shelduck were present on open grassland along the margins of the stream.

Avalanche Stream

Avalanche Stream flows through a small gorge at the centre of the property. Lower altitude habitats are modified by over-sowing, spraying and grazing. Small rock outcrops and areas of shrubland and fernland are present. South Island fantail, grey warbler, silvereve and a range of introduced passerines were observed in the shrublands.

Northeast wetland

This 600 m-long wetland at the northeast corner of the property supports sedgeland, red tussockland, grassland and stream habitats. Australasian harrier, spur-winged plover and South Island pied oystercatcher were recorded here. The wetland appears to provide suitable habitat for the threatened marsh crake (sparse), but conditions were not suitable to use the call-playback equipment that is required for surveying marsh crake.

Bird Species Recorded

Twenty-five bird species were recorded on Bauchops Hill Pastoral Lease during this inspection: 11 indigenous species and 14 naturalised species.

Table 2 Indigenous bird species recorded from Bauchops Hill Pastoral Lease, December 2005.

Bird species	Threat status	Distribution on property
Australasian harrier	Not threatened.	Throughout.
grey warbler	Not threatened.	Indigenous shrubland.
New Zealand falcon	Gradual decline.	Northern part of property.
(eastern)		
New Zealand pipit	Not threatened.	Throughout at higher altitudes.
paradise shelduck	Not threatened.	Throughout lower altitude habitats.
silvereve	Not threatened.	Indigenous shrubland.
southern black-backed gull	Not threatened.	Throughout.
South Island fantail	Not threatened.	Shelter belts around farm buildings.
South Island pied	Not threatened.	Hayter Stream and adjacent to the
oystercatcher		northeast wetland.
spur-winged plover	Not threatened.	Throughout lower altitude habitats.
welcome swallow	Not threatened.	Mackenzie Valley.

Naturalised bird species observed on the property were Australian magpie, blackbird, chaffinch, chukor, dunnoek, goldfinch, greenfinch, house sparrow, redpoll, ring-necked pheasant, skylark, song thrush, starling and yellowhammer.

Significance of the Bird Fauna

Bauchops Hill Pastoral Lease provides relatively extensive areas of intact high-altitude habitat, contiguous with other areas of similar habitat on adjoining properties. One threatened bird species, New Zealand falcon (gradual decline), was recorded in this habitat. The numerous rock tors provide suitable falcon nesting habitat. The small wetland in the northeast corner of the property appears to provide suitable habitat for marsh crake (sparse).

2.6.3 Lizards

The Department of Conservation Herpetofauna Database lists several threatened lizard species in the vicinity of the property. Jewelled gecko (gradual decline), spotted skink (gradual decline), scree skink (gradual decline) and long-toed skink (sparse) have been reported from the Tasman and Tekapo river margins and Lake Tekapo and Edward Stream in the adjacent Mackenzie Basin. Jewelled gecko has also been recorded from Hakataramea Pass. Large skinks observed in a boulderfield above Mackenzie Pass in the 1960s and recorded as *Leiolopisma otagense waimatense* (McEwen, 1987) and *Leiolopisma grande* (Espie *et al*, 1984) are most likely to have been scree skinks (gradual decline). More common species of lizard (common skink, McCann's skink and Southern Alps gecko) are widespread and abundant in the Mackenzie Ecological Region, although there are no previous records from the property. The closest records are McCann's skink from approximately two kilometres southwest of the property and Southern Alps gecko approximately three kilometres east of the property (Sedgeley, 2002).

The cold, cloudy, wet and often windy weather conditions during the inspection were unfavourable for surveying lizards. Lizards observed on Bauchops Hill Pastoral Lease are described below for the four areas surveyed.

Eastern Rollesby Range

This area covers the northeast-facing slopes of the Rollesby Range above approximately 800 m. These slopes have numerous large rock outcrops or tors amongst sub-alpine tussockland, low shrubland, herbfield, stonefield and scattered exotic pine trees. There is abundant habitat for lizards on the rock tors and in the patches of talus around the tors. Four McCann's skinks and 17 Southern Alps geckos were found under rocks in these habitats.

Mackenzie River Tributary

This small valley in the southwest corner of the property has shrubland, tussockland, rockland and stonefield (talus) habitats. Shrubland associated with talus and rock outcrops provides good cover for lizards. One McCann's skink and eight Southern Alps geckos were found under rocks in this area.

Hayter Stream

The Hayter Stream area on the southern boundary of the property has exotic trees (predominantly willow) along its margins and shrubland, tussockland and grassland on lower slopes. Suitable lizard habitat is provided by areas of talus at the base of steep slopes, boulderfield on the river bed and rocky eroding stream banks. Eleven Southern Alps geckos were found in these habitats.

Avalanche Stream

Avalanche Stream flows through a small gorge at the centre of the property. Small rock outcrops and areas of shrubland and fernland are present. Boulderfield and eroding stream banks along the margin of lower Avalanche Stream provide suitable lizard habitat. One McCann's skink and one Southern Alps gecko were found in the lower reaches of the stream and one Southern Alps gecko in the gorge just west of the farm buildings.

Lizard species recorded

Forty-four lizards were recorded from 19 different locations on the property, comprising six McCann's skinks and 38 Southern Alps geckos. See attached map.

Table 3 Lizard species recorded from Bauchops Hill Pastoral Lease, December 2005.

Lizard species	Threat status	Distribution on property
McCann's skink	Not threatened.	At a range of altitudes on the eastern faces of the Rollesby Range and in the lower reaches of Avalanche Stream.
Southern Alps gecko	Not threatened.	At a range of altitudes on the eastern faces of the Rollesby Range; upper Mackenzie River catchment; Hayter Stream; and Avalanche Stream.

Significance of lizard fauna

The property provides extensive habitat for common lizard species: McCann's skink and Southern Alps gecko. Areas of talus on the property could provide habitat for spotted skink (gradual decline) and scree skink (gradual decline), but none were found during this survey.

2.6.4 Freshwater Fauna (fish and invertebrates)

Most parts of Bauchops Hill Pastoral Lease are drained by Hayter Stream and its tributaries (notably Avalanche Stream). Hayter Stream is a tributary of the Tengawai River which is part of the Opihi River catchment. A smaller southwest part of the property is drained by a tributary of the Mackenzie River, in the Waitaki River catchment.

A distinguishing feature of the Opihi River is the lack of dams. This has two main effects on fish communities. The first is that the fish communities are more likely to have diadromous species present (species with a sea phase in their lifecycle). The second effect is that fish are able to migrate between streams, allowing colonisation of previously dewatered streams. In contrast, the Waitaki River has several hydroelectric dams along its length. The effects of this are that fish communities upstream from the dams are generally composed of only non-diadromous species (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) and that fish communities are separated into discrete populations sometimes preventing re-colonization of previously dewatered streams.

The New Zealand Freshwater Fish Database (NZFFD) has 94 records from the Opihi River catchment and 890 records from the Waitaki River catchment (at 16th of February 2006). Species recorded from Opihi catchment streams near the property are shortfin eel, koaro, banded kokopu, Canterbury galaxias, upland bully, common bully and brown trout. Species recorded from Waitaki catchment streams near the property are koaro, Canterbury galaxias, rainbow trout and brown trout.

Three freshwater habitats, classified by size and physical character, were observed on the property. These habitats and the fish and macro-invertebrate species recorded are described below.

Permanent Streams

Permanent streams have year-round surface water flows and are confined to a single, sometimes gorged, channel. Streams or sections of streams of this habitat type on the property are the Mackenzie River tributary, Hayter Stream, Avalanche Stream and some of the northern tributaries of Avalanche Stream. They commonly flow through grassland, shrubland and willows, though the Mackenzie River tributary and upper Avalanche Stream flow through tussockland and areas of denser shrubland. Monkey musk is present in some stream channels. Stock and wild animal access is unrestricted. These permanent streams are generally between one and two metres wide and 100 to 300 mm deep with some deeper pools. Permanent stream substrates vary, with areas of bedrock gravel and cobbles.

Fifteen permanent stream sites were electro-fished, three in the Mackenzie River tributary, five in Hayter Stream and seven in Avalanche Stream. Canterbury galaxias were recorded at all sites except in the upper part of the Mackenzie River tributary (14 sites). Upland bullies were recorded at eight sites in Hayter and Avalanche streams, but not in the Mackenzie River tributary. Additional (NZFFD) records from the Mackenzie River are upland bully, rainbow trout and brown trout. Additional NZFFD records from the Opihi River are shortfin eel, koaro, banded kokopu, common bully and brown trout.

Macro-invertebrates observed in the permanent streams were *Archichauliodes diversus*, *Ameletopsis perscitus*, *Coloburiscus humeralis*, *Deleatidium* spp., *Rallidens mcfarlanei*, *Megaleptoperla* sp., *Stenoperla prasina*, *Helicopsyche albescens*, *Hydrobiosis* sp, *Hydropsychidae* sp., *Olinga feredayi* and *Pycnocentria* sp.

Ephemeral Streams

These are streams that do not have year-round surface flows. This habitat is present in all of the catchments on the property. The ephemeral streams generally have steep gradients and flow only after periods of heavy rain. The stream beds are often partly vegetated and pass through areas of tussockland and shrubland. Stock and wild animal access is largely unrestricted. Ephemeral streams are generally one to two metres wide, sometimes smaller, and less than 100 mm deep when flowing, though all were dry at the time of survey. Most ephemeral stream substrates are gravel with boulders and cobbles, though areas of silt are present.

No ephemeral streams were surveyed for fish or macro-invertebrates, as there were no surface flows in the streams at the time of the inspection.

Wetlands

One wetland was observed, near the northeast boundary of the property. This palustrine seepage is dominated by sedgeland, rushland, introduced grasses and monkey musk. Stock and wild animal access is unrestricted. A vehicle track crosses the upper part of the wetland. The wetland is about two and a half hectares in size, with a mud substrate.

The wetland was not surveyed for fish or macro-invertebrates.

Species Recorded

Two fish species were recorded during this survey of Bauchops Hill Pastoral Lease: Canterbury galaxias and upland bully.

Significance of the Freshwater Fauna

The Mackenzie River tributary is significant as it is the best-protected freshwater habitat on the property, due to the dominance of relatively intact indigenous vegetation in its catchment and the steep topography keeping animals out of most of it. Otherwise, freshwater fauna populations are typical of this area. Bauchops Hill Pastoral Lease covers parts of two freshwater ecosystems (the upper Opihi and the upper Waitaki) ranked as Waters of National Importance Type II (Chadderton *et al.*, 2004). See attached map.

2.6.5 Invertebrates

To date, there appear to have been no published invertebrate studies of Bauchops Hill Pastoral Lease. However, numerous collection records exist for invertebrate species found at Mackenzie Pass, Burke Pass, the Albury Range and the Grampian Mountains. The Canterbury knobbed weevil (*Hadrampus tuberculatus*) was recently found at Burke Pass. This weevil had not been seen since 1922 and was considered extinct until this discovery (Pawson, 2005). Several invertebrate species have been previously collected from near Mackenzie Pass, including an acutely-threatened species of *Peripatoides*, an at-risk false wireworm (*Mimopeus tibialis*), *Anopsobius neozelandicus* (data deficient) and *Zelanophilus provocator* (range restricted) (Peter Johns, *pers.comm.*).

The collecting in this survey targeted endemic invertebrate taxa of the following groups: Arachnids (spiders and harvestmen), beetles, Orthopteroids (grasshoppers, weta and cockroaches) and Myriapoda (millipedes and centipedes). Species within these taxonomic groups often display local endemism and are often flightless. Invertebrates were collected from spot sites, generally within the least (visually) modified habitats. Weather during the inspection period was cold, windy, overcast and often wet. Invertebrates of Bauchops Hill Pastoral Lease are described below for the main parts of the property surveyed.

Eastern Rollesby Range

This area on higher-altitude parts of the Rollesby Range (above 1000 m) is dominated by tussockland and herffield. Within this habitat a juvenile trapdoor spider (*Misgolas* sp., most likely *M. cognata*, threat status: data deficient) was collected. This is apparently a new location record for this species. Immediately below the summit ridge a number of rock outcrops occur. Invertebrates recorded in these micro-habitats were the tunnelweb spider, mountain stone weta, stout sac spider (*Clubiona* sp.) and *Colaranea* spp. spiders. The spiders had evidently been preying on the cockroach *Celatoblatta pallidicauda*, a sub-alpine species which is not found north of the Rangitata River or south of the Mackenzie Basin (Johns, *pers comm.*). Other invertebrate species of note found in this area were the ubiquitous native wolf spider *Anoteropsis hilaris* and two species of endemic centipede: *Geophilus* sp. (possibly *G. spenceri*) and *Henicops maculatus*.

Mackenzie River Tributary

This montane stream habitat is arguably the most ecologically intact area on the property. It is dominated by tall tussockland with speargrass and shrubland. Invertebrate sampling yielded a wide range of native species, illustrating the ecological stability and altitudinal range of the area. For example, at approximately 1300 m, sub-alpine species of fungus-feeding millipedes (*Icosidesmus latidens* and what is probably *I. saxatilis*), and the cockroach *Celatoblatta pallidicauda* were abundant.

The common grasshopper *Sigaus australis* was active within tall tussocks between 940 and 1200 m. An unusual Opilione (probably *Pantopsalis* sp.) and a species of *Oregus* beetle were present. The genus *Oregus* includes one range restricted Otago species (*O. inaequalis*), while the group as a whole are of conservation interest (Pawson *et al*, 2003a, Pawson *et al*, 2003b; Johns, 2005). Several individual carabid beetles (of which the majority are likely to be *Mecodema brittoni*) were seen throughout the descent of this valley.

On the true left of the valley, a number of small rock outcrops occur above the river at c.900 m. Numerous large male mountain stone weta along with their harems of females were found in dens at this location. This suggests that these weta populations have experienced little disturbance. The

cockroach *C. pallidicauda* was also abundant at this site, with large colonies beneath *Gaultheria crassa*.

The diversity of insects found on giant speargrass in the lower valley was remarkably high (six species on one plant). Speargrass is host to many endemic insects and giant speargrass tends to support many insect species possibly on account of its large, showy flower spikes and extensive tiller bases. Insects collected included the medium sized (15 mm) weevil *Inophloeus sulcifer*, which feeds on the inflorescence stems and leaves. A *Eugnomini* weevil species was also found on the flower heads, probably feeding on pollen, as was a flower beetle *Dasytes* sp. Other species associated with speargrass were the hover fly (*Melangyna* sp.), kekerewai manuka chafer and the speargrass moth *Graphania nullifera*. Amongst the riparian litter were numerous carabid beetles (*Syllectus* sp. possibly *S. anomalus*) and spiders (*Clubiona* sp.).

Lower Southern and Eastern Slopes

This area covers lower-altitude modified areas along Hayter and Avalanche streams. At sites adjacent to Mackenzie Pass Road, three invertebrate species of conservation interest were found. The water spider (data deficient) was found under rocks in the bed of Hayter Stream. In the upper reaches of the stream a carabid beetle (*Mecodema brittoni*,) and an endemic *Pseudoneitea* slug were found; both species are of conservation interest. The presence of these endemic species within such modified habitats indicates that ecological conditions are still favourable for some invertebrates. At the mouth of Avalanche Stream, parasitic *Ichneumon promissorius* wasps were frequent, probably parasitising moth larvae such as the southern armyworm. Hover flies, *Eudonia* sp. and blue butterflies (*Zizina* sp.) were also active above the lower reaches of the Avalanche Stream river bed.

Eastern Rollesby Range

The most significant find in this area, near the north boundary of the property, was a population of the large flightless and endemic Hutton's speargrass weevil *Lyperobius huttoni*. This is a protected species with an eastern distribution from the south coast of Wellington to The Hunters Hills, near Timaru. This find is possibly a new record and, at the very least, demonstrates that the species distribution includes the Rollesby Range. The species has also been recorded from the nearby Grampian Mountains and Albury Range (Craw, 1988).

Grasshoppers were common in the tussockland habitats within this area with three endemic species identified: *Paprides nitidus*, *Sigauss australis* and the New Zealand grasshopper. *Paprides nitidus* was collected at 1060 m altitude and is common from Nelson to the Mackenzie Basin. In contrast, *Sigauss australis* is found throughout the eastern Southern Alps from Arthur's Pass to the Queenstown mountains (Bigelow, 1967). The widespread and small New Zealand grasshopper occurs throughout lower altitude parts of the property.

Northeast Wetland

This small wetland provides habitat for many native insects and spiders associated with sedges and grasses. The two common native damselfly species (*Xanthocnemis zealandica* and *Austrolestes colenisonis*) were active throughout the area and crane flies (*Austrotipula* sp.) were abundant. Numerous root gnats (Sciridae) and Chironomid flies were being caught by the northern common robber fly, a native species. A single stiletto fly (*Anabarhynchus* sp.) was found. Twelve *Anabarhynchus* species are listed as data deficient.

Spiders are usually well represented in wetlands due to an abundance of insect prey. Common here were the nurseryweb spider and bigjawed orbweb spider (*Tetragnatha* sp.). The native wolf spider, grass moth (*Orocrambus flexuosellus*) and numerous Hemipterans (*Rhyodes* sp. and the leaf hopper

Arawa sp.), were collected here. Despite the high number of native invertebrates found within the wetland, none of the species are listed as threatened.

Species Recorded

During this survey, 52 species of invertebrate were collected from 18 collection sites across the property. Nearly all these species are native.

Table 4 Notable invertebrate species recorded from Bauchops Hill Pastoral Lease, December 2005.

Species	Threat status/significance	Distribution on property
<i>Dolomedes aquaticus</i>	Data deficient.	Hayter Stream bed, adjacent to Mackenzie Pass Road.
<i>Hemideina maori</i>	At risk from habitat modification.	Summit ridge of Rollesby Range.
<i>Inophloeus sulcifer</i>	A medium sized (15 mm) endemic weevil, generally found on large mature speargrass plants in stable environments.	Mackenzie River tributary.
<i>Lyperobius huttoni</i>	Protected species, nearing range limit.	Northernmost spur on the property.
<i>Mecodema brittoni</i>	Probably range restricted. An endemic Canterbury species.	Mackenzie River tributary and head waters of Hayter Stream.
<i>Misgolas</i> sp. ? <i>M. cognata</i>	Data deficient.	Summit ridge of Rollesby Range.
<i>Oregus</i> sp.	A widespread endemic genus with several rare species including <i>O. inaequalis</i> (Otago) and <i>O. septentrionalis</i> (North Canterbury and South Marlborough).	Mackenzie River tributary.
<i>Porrhothele antipodiana</i>	Data deficient.	Head of Avalanche Stream.

Significance of the Invertebrate Fauna

Fifty-two species of invertebrate were collected from Bauchops Hill Pastoral Lease. The property supports one nationally protected species, Hutton's speargrass weevil (*Lyperobius huttoni*), and seven other taxa which are either range restricted, data deficient or of general conservation and biogeographical interest. Hutton's speargrass weevil belongs to a sub-family of taxonomically and ecologically diverse beetles which are valuable indicator species for conservation assessments. An acutely-threatened *Peripatoides* sp. has been previously recorded from near Mackenzie Pass. The upper slopes of the Rollesby Range and the tributary of Mackenzie River at the southwest corner of the property provide significant habitats for invertebrates. See attached map.

2.6.6 Problem Animals

Introduced animal species 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. Other ubiquitous naturalised species for which containment or control are probably impractical (such as rodents) are not discussed here.

Brushtail possum

Possum sign was observed in rockland habitats throughout the property. Possums are browsers of palatable indigenous plants and predators of birds, lizards and invertebrates.

Rabbits and hares

Hares were observed throughout the property, and rabbits were observed at lower-altitudes.

Cats and hedgehogs

Scats (droppings) of cats and hedgehogs were observed on the property. These animals are predators of indigenous invertebrates.

Wallaby

Wallabies were observed throughout higher-altitude parts of the property.

2.7 HISTORIC

2.7.1 European Heritage Values

Bauchops Hill Pastoral Lease was formerly part of the 10000-hectare Rollesby Run (Run 184), covering both sides of the Rollesby Valley between Burke Pass and Mackenzie Pass. The Rollesby Run was applied for by Kennaway and Delamain in 1857 and stocked in 1858. The property had a number of partners and owners till, in 1872, it transferred to Alexander Bruce Smith (Pinney, 1971). In 1879 Mr Smith lost his son and a shepherd in an avalanche (Pinney, 1971; Andersen, 1916), presumably the origin of the name of Avalanche Stream. Rollesby Run was transferred to Francis Hayter in 1882. The Bauchops Hill property was created following the division of the Rollesby Run in 1917 (Pinney, 1971).

Mackenzie Pass at the southwest corner of the property and the Mackenzie Basin west of the property derive their names from the Scotsman James McKenzie. In March 1855, 1000 sheep were taken from the Levels Run by James Mackenzie (sic) and mustered inland up the Tengawai River (Andersen, 1916). It is difficult to discern fact from folklore in accounts of the event. However, McKenzie was captured just west of Mackenzie Pass on what was then part of the Opawa Run (Pinney, 1971). The Mackenzie Memorial stands at this site today.

2.8 PUBLIC RECREATION

2.8.1 Physical Characteristics

The property can be divided into two main recreation units:

Rollesby Range

This recreation unit covers the higher-altitude parts of the property on the slopes of the Rollesby Range. The predominant tall tussockland cover and scattered rock outcrops and tors provide a relatively natural setting for recreation. A radio mast and associated building is present at the

property boundary on the ridge crest. A vehicle track traverses the ridge crest between Burke Pass and Mackenzie Pass. This part of the property is partly visible from the Fairlie Tekapo Road (State Highway 8) and clearly visible from the Rollesby Valley and Mackenzie Pass roads. The range crest provides good views of the Mackenzie Basin and surrounding mountain ranges. The recreation opportunity spectrum classification for this unit is Backcountry Accessible (Motorised).

Valleys

This recreation unit covers the lower-altitude parts of the property along Rollesby Valley Road and the lower (eastern) part of Mackenzie Pass Road. It is more modified and provides a less natural though still interesting recreation setting. It is traversed by a number of vehicle tracks and contains the homestead and farm buildings. This area is clearly visible from the Rollesby Valley and Mackenzie Pass roads. The recreation opportunity spectrum classification for this unit is rural.

2.8.2 Legal Access

Roads

Two formed legal roads provide access to the property boundaries: Rollesby Valley Road along part of the eastern property boundary and Mackenzie Pass Road along part of the southern property boundary. Another legal road provides access from Rollesby Valley Road to the homestead, though the formed road does not appear to follow the legal alignment at this location. An unformed legal road provides access from Rollesby Valley Road to the northeast corner of the property.

Marginal Strips

No marginal strips are present along streams within the property boundaries but may be laid off if the land is freeholded.

Adjoining Public Conservation Land

One small Conservation Area lies adjacent to the southeast boundary of the property along Hayter Stream: Hayter Stream Marginal Strip (Conservation Land Unit I38010). The property adjoins pastoral lease or freehold land on all other boundaries.

2.8.3 Activities

The Rollesby Range provides good opportunities for walking, mountain-biking, horse-riding, four-wheel-drive vehicle use and scenery viewing. Bauchops Hill Pastoral Lease provides opportunities to gain access to the southern end of the range from Mackenzie Pass. Lower-altitude parts of the property provide potential opportunities for walking, mountain-biking, horse-riding and nature study. The traverse of the Rollesby Range, between Mackenzie and Burke passes, is popular with local tramping clubs.

Significance of Recreation

The most significant feature of the property for recreation is the vehicle track at the southwest end and along the western boundary of the property, which provides good access to the crest of the Rollesby Range from Mackenzie Pass Road. The Rollesby Range provides opportunities to gain spectacular views of the Mackenzie Basin and surrounding mountain ranges. The traverse of the Rollesby Range is an existing recreational use.

PART 3 OTHER RELEVANT MATTERS AND PLANS

3.1 CONSULTATION

Information gathering meetings were held with representatives of non-governmental organisations (NGOs) at Christchurch on 5th September 2005 and at Geraldine on 6th September 2005. Comments made at those meetings are summarised below.

- Remnant native vegetation in the gullies is likely to be important.
- Protection of vegetative cover, especially tussockland, on the property is important for water quality and yield in this catchment.
- The southern part of the property is more rugged and less modified.
- The property makes an important contribution to the natural landscapes of the area.
- There is a registered Land Improvement Agreement over the property.
- There is a good access track along the Rollesby Range, which provides good opportunities for walking, mountain-biking and horse riding.
- The vehicle track along the Rollesby Range was originally maintained as a firebreak; this may continue to be an important function of the track.

3.2 DISTRICT PLANS

Bauchops Hill Pastoral Lease lies within the Rural Zone of the Mackenzie District. One Site of Natural Significance (51 Rollesby and Dalgety Ranges) covers the northwest part of the property (north of the radio mast and west of the 900 m contour). The Mackenzie District Plan contains a number of rules relating to land use activities within sites of natural significance, within riparian areas and in high altitude areas (i.e. areas above 900 m):

- No clearance of indigenous vegetation (in the case of riparian areas, no vegetation) to exceed 100 m² per hectare in any continuous period of 5 years, except for declared weed pests or for the purpose of track maintenance or habitat enhancement.
- No earthworks to exceed 20 m³ (volume) or 50 m² (area) per hectare in any continuous period of 5 years, except for the purpose of track maintenance (applies to earthworks in Sites of Natural Significance, riparian areas and over 900 m).
- No pastoral intensification to exceed 5% of any Site of Natural Significance, except where that activity is provided for under a consent under the Crown Pastoral Land Act, or other management plan or covenant ratified by the District Council.
- No tree planting in Sites of Natural Significance or above 900 m, but forestry up to a maximum of 2 hectares per Certificate of Title is a controlled activity within a wetland and riparian areas.

3.3 CONSERVATION MANAGEMENT STRATEGIES

All parts of Bauchops Hill Pastoral Lease, except the Mackenzie River tributary in the southwest corner of the property, lie within the Pareora Place Unit of the Canterbury Conservancy. Relevant priority objectives for this unit are listed in the CMS (Department of Conservation, 2000) as:

- To identify the significant indigenous vegetation and threatened plant and animal species of the Pareora Unit.
- To use a range of effective methods to protect the indigenous biodiversity of the Pareora Unit.

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

3.4 NEW ZEALAND BIODIVERSITY STRATEGY

The New Zealand Government is a signatory to the Convention on Biological Diversity. In February 2000, Government released the New Zealand Biodiversity Strategy. This strategy is a blueprint for managing the country's diversity of species and habitats. It sets a number of goals to achieve this aim. Of particular relevance to tenure review is Goal 3, which states:

- *Maintain and restore a full range of remaining natural habitats and ecosystems to a healthy functioning state, enhance critically scarce habitats, and sustain the more modified systems in production and urban environments, and do what is necessary to:*
- *Maintain and restore viable populations of all indigenous species across their natural range and maintain their genetic diversity.*

PART 4 ATTACHMENTS

4.1 ADDITIONAL INFORMATION

4.1.1 Scientific Names of Species

Plant Species

Species names follow those in the published volumes of New Zealand Flora and the name changes listed in A Checklist of Indigenous Vascular Plants of New Zealand, 10th Revision (*Unpublished Document*, S. Courtney, Department of Conservation, Nelson). Maori names are included for taonga species listed in Schedule 97 of the Ngai Tahu Claims Settlement Act 1998. Naturalised species are indicated by an asterisk (*).

<u>Common name</u>	<u>Scientific name</u>
bittersweet*	<i>Solanum dulcamara</i>
blue tussock	<i>Poa colensoi</i>
bog pine	<i>Halocarpus bidwillii</i>
bog rush	<i>Schoenus pauciflorus</i>
bracken	<i>Pteridium esculentum</i>
broom*	<i>Cytisus scoparius</i>
browntop*	<i>Agrostis capillaris</i>
Californian thistle*	<i>Cirsium arvense</i>
catsear*	<i>Hypochoeris radicata</i>
cherry plum*	<i>Prunus cerasifera</i>
Chewings fescue*	<i>Festuca rubra</i>
cleavers*	<i>Galium aparine</i>
clover*	<i>Trifolium</i> spp.
cocksfoot*	<i>Dactylis glomerata</i>
contorta pine*	<i>Pinus contorta</i>
coral broom	<i>Carmichaelia crassicaule</i>
Corsican pine*	<i>Pinus nigra</i> ssp. <i>laricio</i>
crack willow*	<i>Salix fragilis</i>
creeping buttercup*	<i>Ranunculus repens</i>
creeping mapou	<i>Myrsine nummularia</i>
dainty daisy	<i>Celmisia gracilentia</i>
Douglas fir*	<i>Pseudotsuga menziesii</i>
duckweed	<i>Lemna minor</i>
edelweiss	<i>Leucogenes grandiceps</i>
elderberry*	<i>Sambucus nigra</i>
everlasting daisy	<i>Helichrysum bellidioides</i>
false speargrass/taramea	<i>Celmisia lyallii</i>
fescue tussock	<i>Festuca novae-zelandiae</i>
floating sweet grass*	<i>Glyceria fluitans</i>
giant speargrass/taramea	<i>Aciphylla scott-thomsonii</i>
golden speargrass/taramea	<i>Aciphylla aurea</i>
gorse*	<i>Ulex europaeus</i>
green alder*	<i>Alnus viridis</i>
harebell	<i>Wahlenbergia albomarginata</i>

haresfoot trefoil*	<i>Trifolium arvense</i>
inaka	<i>Dracophyllum uniflorum</i>
kahikatea	<i>Dacrycarpus dacrydioides</i>
king devil hawkweed*	<i>Hieracium praealtum</i>
koromiko	<i>Hebe salicifolia</i>
kowhai	<i>Sophora microphylla</i>
larch*	<i>Larix decidua</i>
lawyer	<i>Rubus schmidelioides</i>
little hard fern	<i>Blechnum penna-marina</i>
male fern*	<i>Dryopteris filix-mas</i>
matagouri	<i>Discaria toumatou</i>
matai	<i>Prumnopitys taxifolia</i>
monkey musk*	<i>Mimulus guttatus</i>
mountain clubmoss	<i>Lycopodium fastigiatum</i>
mountain flax/wharariki	<i>Phormium cookianum</i>
mountain kiokio	<i>Blechnum montanum</i>
mountain pine*	<i>Pinus mugo</i>
mountain ribbonwood/houhi	<i>Hoheria lyallii</i>
mountain toatoa	<i>Phyllocladus alpinus</i>
mountain totara	<i>Podocarpus hallii</i>
mountain wineberry	<i>Aristotelia fruticosa</i>
mouse-ear chickweed*	<i>Cerastium fontanum</i>
mouse-ear hawkweed*	<i>Hieracium pilosella</i>
narrow-leaved snow-tussock	<i>Chionochloa rigida</i>
native broom	<i>Carmichaelia australis</i>
native jasmine	<i>Parsonsia capsularis</i>
native violet	<i>Viola cunninghamii</i>
nodding thistle*	<i>Carduus nutans</i>
onion-leaved orchid	<i>Prasophyllum colensoi</i>
orange foxtail*	<i>Alopecurus aequalis</i>
patotara	<i>Leucopogon fraseri</i>
pohuehue	<i>Muehlenbeckia australis</i>
poplar*	<i>Populus</i> sp.
porcupine shrub	<i>Melicytus alpinus</i>
prickly shield fern	<i>Polystichum vestitum</i>
pukio	<i>Carex secta</i>
radiata pine*	<i>Pinus radiata</i>
rautahi	<i>Carex coriacea</i>
red tussock	<i>Chionochloa rubra</i>
red woodrush	<i>Luzula rufa</i>
Russell lupin*	<i>Lupinus polyphyllus</i>
Scotch thistle*	<i>Cirsium vulgare</i>
scrub pohuehue	<i>Muehlenbeckia complexa</i>
sheep's sorrel*	<i>Rumex acetosella</i>
silver tussock/wi	<i>Poa cita</i>
slim snow-tussock	<i>Chionochloa macra</i>
snowberry	<i>Gaultheria depressa</i>
snow totara	<i>Podocarpus nivalis</i>
soft rush*	<i>Juncus effusus</i>
spike sedge	<i>Eleocharis acuta</i>
stitchwort*	<i>Stellaria graminea</i>
sweet vernal*	<i>Anthoxanthum odoratum</i>
tauhinu	<i>Ozothamnus leptophyllus</i>
thousand-leaved fern	<i>Hypolepis millefolium</i>
totara	<i>Podocarpus totara</i>

tussock hawkweed*	<i>Hieracium lepidulum</i>
watercress*	<i>Rorippa</i> spp.
water forget-me-not*	<i>Myosotis laxa</i> ssp. <i>caespitosa</i>
white clover*	<i>Trifolium repens</i>
willow*	<i>Salix</i> sp.
wire moss	<i>Polytrichum juniperinum</i>
woolly moss	<i>Racomitrium pruinosum</i>
yarrow*	<i>Achillea millefolium</i>
Yorkshire fog*	<i>Holcus lanatus</i>

Animal Species

Species names follow King (1990) for mammals, the June 2003 version of the New Zealand Recognized Bird Names list (compiled by C.J.R. Robertson and D.G. Medway for the Ornithological Society of New Zealand Inc.) for birds, Whitaker (1998) for lizards and McDowall (2000) for fish. Common names for invertebrates are those listed in the Entomological Society of New Zealand's Handbook of New Zealand Insect Names (Scott and Emberson, 1999). Maori names are included for taonga species listed in Schedule 97 of the Ngai Tahu Claims Settlement Act 1998. Naturalised species are indicated by an asterisk (*).

<u>Common name</u>	<u>Scientific name</u>
Australasian harrier/kahu	<i>Circus approximans</i>
Australian magpie*	<i>Gymnorhina tibicen</i>
banded kokopu	<i>Galaxias fasciatus</i>
bat	see South Island long-tailed bat
blackbird*	<i>Turdus merula</i>
blue duck/kowhio	<i>Hymenolaimus malacorhynchos</i>
brown hare*	<i>Lepus europaeus occidentalis</i>
brown trout*	<i>Salmo trutta</i>
brush-tail possum*	<i>Trichosurus vulpecula</i>
Canterbury galaxias	<i>Galaxias vulgaris</i>
Canterbury knobbed weevil	<i>Hadramphus tuberculatus</i>
cat*	see house cat
chaffinch*	<i>Fringilla coelebs</i>
chukor*	<i>Alectoris chukar</i>
common bully	<i>Gobiomorphus cotidianus</i>
common skink	<i>Oligosoma nigriplantare polychroma</i>
dunnock*	<i>Prunella modularis</i>
European hedgehog*	<i>Erinaceus europaeus occidentalis</i>
European rabbit*	<i>Oryctolagus cuniculus cuniculus</i>
feral cat* (house cat)	<i>Felis catus</i>
goldfinch*	<i>Carduelis carduelis</i>
greenfinch*	<i>Carduelis chloris</i>
grey warbler/riroriro	<i>Gerygone igata</i>
hare*	see brown hare
hedgehog*	see European hedgehog
house sparrow*	<i>Passer domesticus</i>
Hutton's speargrass weevil	<i>Lyperobius huttoni</i>
jewelled gecko	<i>Naultinus gemmeus</i>
kekerewai manuka chafer	<i>Pyronota festiva</i>
koaro	<i>Galaxias brevipinnis</i>
longfin eel/tuna	<i>Anguilla dieffenbachii</i>
long-toed skink	<i>Oligosoma longipes</i>
McCann's skink	<i>Oligosoma maccanni</i>
marsh crake	<i>Porzana pusilla affinis</i>

mountain stone weta.....	<i>Hemideina maori</i>
New Zealand falcon/karearea.....	<i>Falco novaeseelandiae</i>
New Zealand grasshopper.....	<i>Phaulacridium marginale</i>
New Zealand pipit/pihoihoi.....	<i>Anthus novaeseelandiae novaeseelandiae</i>
northern common robberfly.....	<i>Neoitamus melanopogon</i>
nurseryweb spider.....	<i>Dolomedes minor</i>
paradise shelduck/putakitaki.....	<i>Tadorna variegata</i>
possum*	see brushtail possum
rabbit*	see European rabbit
rainbow trout*	<i>Oncorhynchus mykiss</i>
redpoll*	<i>Carduelis flammea</i>
ring-necked pheasant*	<i>Phasianus colchicus</i>
scree skink.....	<i>Oligosoma waimatense</i>
scree weta.....	<i>Deinacrida connectens</i>
shortfin eel/tuna.....	<i>Anguilla australis</i>
short-tailed bat.....	<i>Mystacina tuberculata</i>
silvereye.....	<i>Zosterops lateralis lateralis</i>
skylark*	<i>Alauda arvensis</i>
song thrush*	<i>Turdus philomelos</i>
Southern Alps gecko.....	<i>Hoplodactylus</i> aff. <i>maculatus</i> “Southern Alps”
southern armyworm.....	<i>Persectania aversa</i>
southern black-backed gull/karoro.....	<i>Larus dominicanus dominicanus</i>
South Island fantail/piwakawaka.....	<i>Rhipidura fuliginosa fuliginosa</i>
South Island long-tailed bat.....	<i>Chalinolobus tuberculatus</i>
South Island pied oystercatcher.....	<i>Haematopus ostralegus finschi</i>
spotted skink.....	<i>Oligosoma lineocellatum</i>
spur-winged plover.....	<i>Vanellus miles novaehollandiae</i>
starling*	<i>Sturnus vulgaris</i>
stoat*	<i>Mustela erminea</i>
tunnelweb spider.....	<i>Porrhothele antipodiana</i>
upland bully.....	<i>Gobiomorphus breviceps</i>
wallaby*	see Bennett’s wallaby
water spider.....	<i>Dolomedes aquaticus</i>
welcome swallow.....	<i>Hirundo tahitica neoxena</i>
yellowhammer*	<i>Emberiza cintrenella</i>

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