

Crown Pastoral Land Review of Other Crown Land

Property name : GLENLEE

Conservation Resources Report Part 1

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

They are released under the Official information Act 1982.

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07

GLENLEE

PASTORAL OCCUPATION LICENCE



CONSERVATION RESOURCES REPORT

DEPARTMENT OF CONSERVATION

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PART 1 INTRODUCTION

Glenlee Pastoral Occupation Licence is a 5787 ha property located on the northwest side of the mid-Awatere River valley in South Marlborough. It covers moderately-steep to steep broken hill country south of Ferny Gair, and including the summits of Barometer (1780 m), Glenlee North (1720 m) and Mt Alexander (1596 m). The property ranges in altitude from 500-700 m in the main valleys to over 1700 m on the central summits of Glenlee North and Barometer.

The northwest parts of the property are drained by Non Upton Brook, Upton Brook and the Teme River; southwest parts by Cow Stream and the two main tributaries of Tin Hut Stream; northeast parts by the Penk River and its tributary Dore Stream; and southeast parts are drained by the upper reaches of Ribble, Clyde, Burr and Bolton streams. Non Upton Brook, Upton Brook and the Teme River flow north to the Avon River, in the Wairau River catchment. All other streams on the property drain south into the Awatere River. The main access to the property is from the Awatere Valley via freehold parts of the Glenlee property.

Glenlee Pastoral Occupation Licence lies in the Waihopai Ecological District, within Inland Marlborough Ecological Region. The inland Marlborough ecological districts were investigated as a collation exercise for the Protected Natural Areas Programme in 1990. Areas on the property, in the Non Upton Brook and Upton Brook valleys, were identified for protection (Clare, 1990). More recently, Clerke (1994) investigated the conservation values on Glenlee Pastoral Occupation Licence. Clerke recommended that all northwest and eastern parts of the property be protected and administered by the Department of Conservation. He proposed that grazing of the Teme Basin be permitted under a special licence, and that freehold title be available for the catchments of Cow Stream and the northern tributary of Tin Hut Stream.

The property adjoins Ferny Gair Conservation Area (Conservation Land Unit 02124) to the north, a gridiron pattern of Glenlee and The Muller Station freehold land and The Jordan Pastoral Lease in the Penk valley to the east, Big Bolton Conservation Area (02125) to the southeast, freehold parts of Glenlee in the Awatere and Grey valleys to the south and west, and the Glazebrook Conservation Area (02123) and freehold land of the Malvern Hills property in the Avon valley to the northwest.

The tenure review inspection of the property was undertaken during April 2006 and December 2006 by a range of specialists. These specialists' reports (listed below) form the basis of this Conservation Resources Report.

- Vegetation Report for parts of Glenlee Pastoral Occupation Licence, Jan Clayton-Greene, August 2006, 10p + map.
- Assessment of the Fauna Values of Glenlee Pastoral Occupation Licence, Simon Elkington, *undated*, 11p + maps.
- Glenlee Pastoral Occupation Licence, A Report on the Freshwater Fish Survey, Scott Bowie, August 2006, 13p including photos + maps.
- Glenlee Pastoral Occupation Licence, Invertebrates, Ian Millar, March 2006, 8p + appendix + map.
- Glenlee Pastoral Occupation Licence, Landscape Assessment, Alan Petrie, December 2006, 8p + map.

Topo Map

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

2.1 LANDSCAPE

2.1.1 Landscape Context

Glenlee Pastoral Occupation Licence is located within inland Marlborough and found within the mid section of a large block of broken rangelands that separate the Awatere River valley in the south from the Wairau River valley in the north.

The block of high country that the property encompasses is described as being tectonically active, formed by the dramatic uplifting of the earth's crust, resulting in a crumpled-like landscape that features such natural elements as sharp crested ridgelines, deep dissected gullies and displaced watercourses. Generally, the surrounding rangelands convey an overall appearance of being bare, windswept and scarred by long scree slides.

The main structural components of the property include a cluster of northeast to southwest trending high peaks including Barometer, Glenlee North, and Glenlee South. Separating these high peaks there is an intricate pattern of valleys and gullies through which watercourses wind out to meet the surrounding rivers.

A large percentage of the property's boundary follows rigid survey lines that, in a landscape context, are arbitrary and from a land management perspective in many places are both indefinable and impractical.

2.1.2 Landscape Description

For the purposes of this landscape assessment Glenlee Pastoral Occupation Licence is divided into five landscape units with the boundaries being principally defined by catchment areas. The criteria used to assess and evaluate each unit's landscape values were based on the following attributes:

- Naturalness: an expression of the degree of 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 physical processes are.
- Aesthetic values: the concepts of memorability and naturalness, including factors which can make a particular landscape vivid, such as simplicity in landform, muted colours and fine-textured ground cover.
- Visual values: a subset of landscape values which relate to the visibility of a particular landscape or natural feature seen from public vantage points.

Unit 1, Avon River Catchment

This landscape unit covers all of the property that generally faces towards the north. The unit possesses a series of discrete catchment areas that contain tributaries of the Avon River including Non Upton Brook, Upton Brook and the northwest tributary of the Teme River. The upper limits to

the unit follow a craggy and weathered ridgeline that extends from Mt Abrupt to Mt Hall then descends towards the Teme River valley directly north. The northern property boundaries are defined by a series of rigid survey lines that frequently cut across high relief physical features.

Internally the unit contains a number of spot heights that are located along a series of knobbly spur lines possessing straight runnels and eroding chutes. Separating the spur lines are deep dissected gullies, many of which contain small watercourses that link up with the main tributaries.

The vegetation reflects the fractured nature of the topography with a mixture of beech forest and kanuka shrublands that dominate the lower and mid altitudinal slopes. Above the natural timberline the vegetation becomes sparse with patches of mixed short shrublands and tussock. The balance of the ground cover for the higher altitude land is bare ground, outcropping of bedrock and extensive scree slides.

Landscape Values

This unit has significant inherent landscape values due to the high natural qualities and integrity of the indigenous component of the unit. In places the unit possesses an uninterrupted sequence of vegetation types that spans from sparse tussocklands along the ridgelines down to diverse beech forests within the gully floors. The intactness of the native vegetation and lack of “built” elements combine to create a semi wilderness backcountry landscape.

Potential Vulnerability to Change

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

- The adoption of legal boundaries that frequently follows straight and surveyed lines.
- Earth disturbances across slopes and ridgelines.
- Intervention in the natural regeneration of seral shrublands back to primary forest.
- Wilding pine spread.
- Unsustainable grazing, particularly over fragile slopes and ridgelines.
- Burn-offs.
- Feral animal damage.

Unit 2, Rocky Gill Spur

This unit covers Rocky Gill Spur and the upper catchments of both Cow Stream and the west branch of Tin Hut Stream. The upper ridgeline of the unit connects Mt Abrupt, Mt Hall and the flat-topped summit of Mt Alexander. The southern property boundary follows a straight surveyed line that bisects high relief topographical features. Both of the catchments comprise v-shaped valleys that penetrate into the main ranges on the property. Stemming out from the valleys’ ridgelines knobbly spur lines drop to the valley floors.

Covering the main ridgelines and Rocky Gill Spur is bare ground, bedrock outcropping and scree slides with patches of tussockland and stunted shrublands. The vegetation, particularly in Cow Stream catchment, is dictated by slope and aspect with the steeper graded west facing slopes being widely covered in beech forest and kanuka shrublands while the corresponding more moderate slopes are clad in spasmodic patches of kanuka, rock fields and mixed grasslands. Introduced grasses have become established in clearings in the beech forest along the track by Cow Stream.

Landscape Values

This unit conveys moderately high inherent landscape values with natural patterns and processes still dominating over small modified areas of human intervention. This unit should be seen as part of a broader landscape type that reinforces the natural characteristics of the district’s rangelands that feature broken terrain, parched and bare ground and a patchwork of vegetation types.

Potential Vulnerability to Change

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

- The adoption of legal boundaries that follow straight and rigid survey lines.
- Intervention in the natural regeneration of seral shrublands back to primary beech forest.
- Erection of structures at prominent sites visible from the Awatere Valley Road.
- Earth disturbances across slopes and ridgelines.
- Unsustainable grazing over fragile slopes and ridgelines.
- Potential wilding pine spread.
- Burn-offs.
- Feral animal damage.

Unit 3, Southern Barometer Catchments and Tin Hut Stream Basin

This unit faces towards the southeast and over looks the Awatere River valley. The unit comprises the mid and upper sections of Tin Hut Stream basin and the series of discrete catchments south of Barometer. Tin Hut Stream basin is enclosed by a series of prominent peaks including the summits of Barometer, Glenlee South and Mt Alexander. The southwest, southeast and northeast boundaries to the unit follow rigid survey lines bisecting the topographical features.

Tin Hut Stream basin features complex and fractured topography with angulated outcropping of bedrock, scree slides and eroding chutes and displaced watercourses often resulting in tumbling waterfalls. The catchments south of Barometer contain a series of high-shouldered spur lines that descend rapidly towards the property's southeast front country with deeply dissected gullies dividing the spur lines.

The barren slopes within Tin Hut Stream basin reflect eroding and parched-like traits commonly being covered in a wide scattering of kanuka and tauhina. Along the ridgelines strips of tussock cling onto the more stable ground. Cladding the smaller catchments is regenerating kanuka shrublands.

Landscape Values

Tin Hut Stream basin possesses significant inherent landscape values owing to the diverse array of natural features and elements within the unit. The legibility of the underlying formative processes, especially in relation to natural weathering, is clearly demonstrated in the angulated bedrock formations, scree slides, eroding gravel chutes and the large expanses of wind swept bare ground. The unit is also significant because it contains some of Marlborough's highest peaks outside the Inland Kaikoura Range with Barometer being a standout landmark within the Awatere Valley. The series of smaller catchments south of Barometer have relevance providing the foreground and setting to the high peaks.

Potential Vulnerability to Change

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

- Earth disturbances across upper slopes and ridgelines.
- Intervention in the natural regeneration of seral shrublands back to primary beech forest.
- The adoption of existing legal boundaries that follow straight surveyed lines.
- Wilding pine spread.
- Unsustainable grazing.
- Erection of structures at prominent sites visible from the Awatere Valley Road.

Unit 4, Penk River Catchment

This unit covers the catchment area of the main tributary to the Penk River along with parallel strips of the property that straddle the catchment of Dore Stream. The top of the catchment includes the peaks of Glenlee North, Glenlee South and Barometer. A short length of the unit's boundary follows

along the Penk River with the remaining boundaries to the unit following rigid survey lines that cut across features with a high physical relief. The geometric outline of the property boundaries creates a distinct grid-like pattern over this section of the property.

The two head basins of the Penk River's upper catchment are characterized by an alternating pattern of steep craggy spur lines and crooked dissected gullies with the side slopes of the spur lines being deeply dissected and featuring extensive outcropping of parent rock. The Dore Stream catchment conveys similar traits with the topography being fractured and possessing knobbly spur lines, deep dissected gullies and expansive areas of barren ground.

The vegetative cover is diverse with the upper sections of both the Penk River catchment and the smaller Dore Stream catchment covered primarily in depleted tussock. The mid slopes of the Penk River catchment comprise a mixture of kanuka shrublands and remnants of beech forest. Beech forest is also present in the mid and lower slopes of the Dore Stream catchment, especially on the darker slopes, while the opposite drier and sunnier faces are covered extensively in kanuka.

Landscape Values

This unit conveys significant inherent landscape values owing to the high natural qualities and integrity of the indigenous component of the unit. An important feature is the high natural character of the upper Penk River and its tributaries. This unit forms a link between Ferny Gair Conservation Area in the north and the Big Bolton Conservation Area in the south. Both of these protected areas express the same inherent traits as the property.

Potential Vulnerability to Change

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

- Earth disturbances across upper slopes and ridgelines.
- Intervention in the natural regeneration of seral shrublands back to primary beech forest, especially through burn-offs and unsustainable grazing.
- The adoption of the existing legal boundaries that follow straight survey lines.

Unit 5, Teme Basin

This unit encompasses all of Teme Basin located in the central northern section of the property adjoining Ferny Gair Conservation Area. Teme Basin is enclosed by an alpine ridgeline encircled by a string of high peaks on the property. Directly below the alpine ridgeline the terrain abruptly descends to form a rocky scarp. Projecting out from this bluff-like scarp is a complex of crooked spur lines that fall towards the main valley, which contains the main stem of the Teme River. The side slopes of the spur lines are regularly broken by depressions that contain straight runnels. Intervening the spur lines are narrow concave gullies.

Modifications to the original ground cover, through human intervention, is evident by a wide scattering of standing burnt beech trunks. Natural reversion is taking place with extensive tracts of kanuka shrublands and bracken fernland now occupying the basin. Ground cover within the high altitude section is sparse with the occasional area being occupied by hard tussock supplemented by tauhinu. At a mid and lower altitude there are signs of reversion with taller tiered shrubs over topping both exotic grasses and lower tiered native species. Adjacent to the northern boundary exotic grasslands are a common feature.

Landscape Values

A large proportion of this unit possesses moderately high inherent landscape values attributable to the fact that natural landscape patterns and ecological processes are progressively replacing signs of human intervention. These dynamic processes are strikingly apparent with the reestablishment of beech seedlings over previously modified areas. This unit links the other key basins and valleys that radiate out from the core rangelands on the property.

Potential Vulnerability to Change

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

- Intervention in the natural regeneration of seral shrublands back to primary beech forest.
- Burn-offs.
- Unsustainable grazing.
- Wilding pine spread.
- Adoption of legal boundaries that follow straight survey lines.

2.1.3 Visual Values

The focus of attention for Glenlee Pastoral Occupation Licence is the series of high peaks that are visible along stretches of the Awatere Valley Road. Barometer is a prominent focal point, being one of the highest named peaks outside the Inland Kaikoura Range. The side slopes that overlook the Awatere valley also have a high resource value and augment similar landforms that follow the Awatere fault rift. The deep dissected valleys and gullies that typify much of the property have a limited visual resource value. However this obscurity helps to reinforce the property's sense of remoteness whilst the lack of formed access into the property strengthens its semi wilderness qualities and its importance as a backcountry recreational destination.

Significance of Landscape Values

Glenlee Pastoral Occupation Licence makes a significant contribution to the recognizable and distinctive landscape character of the rangelands within inland Marlborough. The notable traits of this property include the diverse range of geomorphic features that visually express the uplifting of the earth's crust in the form of fractured and contorted landforms. Glenlee's landscape can be summed up as austere, rugged, jumbled, sun parched and isolated. Glenlee adjoins other parcels of land that convey similar inherent characteristics that makes the property significant when considering the protection of uninterrupted ecological sequences of plant communities and full landscape continuum encompassing a full range of elements.

Map Landscape

2.2 GEOLOGY, LANDFORMS AND SOILS

2.2.1 Geology

The underlying geology of Glenlee Pastoral Occupation Licence consists of sediments of the New Zealand Geosyncline, mapped as massive greywacke with ‘cannonball’ concretions (Lensen, 1962). Rare conglomerate and limestone bands elsewhere associated with this geology were not noted to be present on the property. Through the eastern half of the property, around and north of Barometer, are extensive igneous bands, interpreted by Lensen (1962) as interbedded spilitic pillow lavas. These are altered basaltic lavas thought to have originated from underwater volcanoes. The Awatere Fault, which is a prominent feature in the Awatere valley, runs parallel with the southeast boundary of the property.

2.2.2 Landforms

Glenlee Pastoral Occupation Licence covers steep broken country spanning the headwaters of several tributaries of the Awatere and Wairau river systems. The property is dominated by the bare summits of the Glenlee peaks (Glenlee North and Glenlee South), Barometer, Mt Alexander, Mt Hall, Mt Argelin, Mt Abrupt and Mt Boltoff, all lying between altitudes of 1300 and 1800 m. The higher altitude ridges have broad crests; other ridges and spurs are narrower and more dissected. Between these high summits and ridges are steep and broken upper catchments of the small headwater streams. There is very little gentle lower altitude country on the property, other than some valley floors and small areas in the Teme Basin. Extensive areas of bare rock are present at higher altitudes.

2.2.3 Soils

Soils of the property are predominantly weakly developed Hurunui, Kaikoura and Tekoa steepland soils. Substantial areas of alpine soils and bare rock are present at higher altitudes. Soil depth and development varies considerably across the property.

Significance of Geology, Landforms and Soils

The bare broken country of the property is typical of the dry mountains of inland Marlborough. The effects of tectonic activity along the Awatere Fault, recent erosion and deposition are well illustrated by landforms on the property, notably the bare rocky upper slopes and ridges, steep mid-slopes and the narrow deeply-incised stream gullies. The igneous rock on the property is the largest exposure of this rock type in the ecological district. No geopreservation sites are listed for the property, though two sites are present nearby in the lower Grey and Penk rivers.

2.3 CLIMATE

Glenlee Pastoral Occupation Licence lies in an area characterized by warm to hot summer temperatures with frequent strong northwest winds, and cold winter temperatures with less frequent southerly storms (Tomlinson, 1976). Annual rainfall is between 750 and 1500 mm, with occasional heavy falls. Snow can occur at higher-altitude sites in winter. The area experiences high annual and moderate winter solar radiation and slight rainfall deficits (Leathwick *et al*, 2003).

2.4 LAND ENVIRONMENTS OF NEW ZEALAND (LENZ)

LENZ is, as described by Leathwick *et al.* (2003), "a classification of New Zealand's landscapes using a comprehensive set of climate, landform and soil variables chosen for their role in driving geographic variation in biological patterns." The classification units of LENZ, termed land environments by Leathwick *et al.* (2003), aim to "identify areas of land having similar environmental conditions regardless of where they occur in New Zealand." The consequences of this are that "LENZ provides a framework that allows prediction of a range of biological and environmental attributes. These include the character of natural ecosystems, the vulnerability of environments to human activity, and the potential spread or productivity of new organisms (Leathwick *et al.* 2003)." Leathwick *et al.*, (2003) present the LENZ information at four levels of detail, with level I containing 20 environments, level II containing 100 environments, level III containing 200 environments and level IV containing 500 environments. These LENZ classes are presented nationally to assist use at a range of scales; however, this data should be interpreted with caution, as the predicted extent and suggested vegetation types for each Land Environment (Leathwick *et al.*, 2003) have been extrapolated from limited field data.

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

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

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

All higher-altitude parts of Glenlee Pastoral Occupation Licence have no LENZ threat category. A very small area beside the Penk River at the northeast corner of the property is classified as an "at risk" land environment. Other lower-altitude areas in the main valleys are classified as "under-protected" land environments.

Significance of Land Environments

Lower-altitude areas, comprising c.6% of the property, are classified as "at risk" or "under-protected".

Map LENZ

2.5 VEGETATION

2.5.1 Ecological Context

Glenlee Pastoral Occupation Licence lies within Waihopai Ecological District, in the Inland Marlborough Ecological Region (McEwen, 1987). The original vegetation of the ecological district has been considerably modified since human arrival (Walls *et al.*, 2005). Originally, mixed beech forest would have been present over most montane parts of the property and sparse sub-alpine and alpine vegetation present at higher altitudes (Clerke, 1994). Above the natural timberline would have been a mosaic of upland communities including tussockland, shrubland, cushionfield, mossfield, scree and rockland. The steep areas dominated by bluffs would have supported sparse shrubland, tussock and endemic Marlborough plants such as rock daises, pink broom and *Heliohebe pentasepala*.

2.5.2 Vegetation and Flora

The original indigenous plant communities of Glenlee Pastoral Occupation Licence are substantially depleted. On most montane parts of the property forest has been replaced by grassland, kanuka forest, shrubland and scrub. Remnants of the original forest cover remain in the Upton Brook, Teme and Penk catchments. Extensive areas of low kanuka forest are present on the northwest and east parts of the property, in the Non Upton Brook and Penk catchments. Rockland (bluff) plant communities are less modified and probably support the most intact communities remaining on the property. Higher altitude rockland, scree and herbfield plant communities are largely representative of the original vegetation. In most other areas induced grassland and shrubland is dominant.

These indigenous plant communities are described below for the five main areas of Glenlee Pastoral Occupation Licence.

Northwest Corner (Avon Saddle to Mt Hall)

The northwest parts of the property, encompassing the upper catchments of Non Upton Brook, Upton Brook and a western tributary of the Teme River, support extensive areas of indigenous woody vegetation. Beech forest is dominant in Upton Brook and the Teme River tributary, and low kanuka forest is dominant in Non Upton Brook. The higher-altitude summits and ridges between Mt Boltoff and Mt Hall support grassland, tussockland, shrubland and rockland plant communities.

A beech forest community was visited in Upton Brook. The forest canopy is dominated by mountain beech with scattered patches of broadleaf, especially on rocky sites. Important understorey species are marbleleaf, yellowwood, bush lawyer, mingimingi, weeping mapou, *Clematis* sp., leather-leaf fern, and *Coprosma rhamnoides*. Ground-cover species present are prickly shield fern, *Polystichum richardii*, necklace fern, *Asplenium richardii*, *A. appendiculatum*, *Blechnum penna-marina*, *Hypolepis ambigua*, *Histiopteris incisa*, *Acaena* sp., king devil hawkweed and wall lettuce. Other species present at open sites and on the forest margin are tauhinu, kanuka, mountain wineberry, *Hebe decumbens*, *Helichrysum lanceolatum*, *Olearia paniculata*, *O. cymbifolia*, *Coprosma propinqua*, *C. tayloriae* and white fuzzweed (*Vittadinia australis*). Red beech has previously been recorded in parts of the Upton Brook and Non Upton Brook valleys (Clerke, 1994).

Recent riverbed surfaces in Upton Brook support strongly regenerating mountain beech and kanuka, with seedlings of most of the species recorded in the forest communities. Open bluffs and other rocky sites in the valley support cotton daisy, *Helichrysum parvifolium*, *H. coralloides*, *Blechnum penna-marina*, *Ranunculus* sp., blue tussock, *Polytrichum juniperinum*, *Asplenium appendiculatum*, *Heliohebe pentasepala*, *Hebe decumbens*, *Brachyglottis monroi*, broadleaf, flax and occasional wilding pines. Areas of colluvium and scree associated with forest communities support *Geranium*

sessiliflorum, *Myosotis* sp., *Galium perpusillum*, *Raoulia glabra*, sheep's sorrel, *Epilobium pycnostachyum*, *Acaena* sp., *Gingidia montana*, creeping pohuehue, *Poa lindsayii*, *Craspedia* sp., thousand-leaved fern, white fuzzweed and male fern.

Low kanuka forest and scrub on this part of the property ranges from an open-canopied scrub community dominated by kanuka and with few understorey species on dry sites, to a denser and more diverse low-forest community at damper sites. Many species present in and around beech forest, as described above, are present in kanuka forest and scrub. Common species are tauhinu, broadleaf, *Coprosma propinqua*, mingimingi, *Olearia paniculata*, creeping pohuehue, *Polystichum richardii* and *Blechnum penna-marina*. Kanuka forest is present on alluvial sites in this area; one of only two locations in the ecological district where kanuka occurs on such sites (Clerke, 1994).

Ridge crest plant communities on this part of the property are a mosaic of bare rock (20-60% cover), short tussockland-shrubland (40-80%) and bare ground (5-10%), with localised patches of herbfield and grassland. Shrublands are dominated by tauhinu or low kanuka. Other woody species present are *Hebe decumbens*, *Coprosma tayloriae*, matagouri and weeping mapou. Tussockland-herbfield-pasture communities are dominated by fescue tussock, bristle tussock, blue tussock, silver tussock, mouse-ear hawkweed, patotara, browntop and sweet vernal. Other species present are red woodrush, cotton daisy, sheep's sorrel, catsear, king devil hawkweed, *Gnaphalium* sp., *Acaena caesiiglauca*, *Lycopodium fastigiatum*, *Leucopogon suaveolens*, *Anisotome aromatica*, *Parahebe decora*, *Raoulia subsericea*, native violet, *Helichrysum filicaule*, *Polytrichum juniperinum* and white clover. Rockland communities support *Helichrysum parvifolium*, cotton daisy, *Celmisia discolor*, snowberry, *Geranium sessiliflorum*, *Myosotis* sp., *Heliohebe pentasepala*, harebell, scabweed, *Raoulia hookeri*, *R. glabra*, mingimingi, *Brachyglottis monroi*, golden speargrass, necklace fern, porcupine shrub, *Pimelea oreophila*, *Asplenium appendiculatum*, *A. trichomanes*, *Gingidia montana*, white fuzzweed, *Epilobium pycnostachyum* sp. and *Ranunculus insignis*.

Southwest Valleys (Rocky Gill Spur area)

This area covers Cow Stream, Rocky Gill Spur and the west branch of Tin Hut Stream. These upper catchments support open rockland, grassland, short tussockland and shrubland plant communities, with smaller areas of scrub and forest in the valleys. Forest patches are dominated by mountain beech with occasional broadleaf and mountain ribbonwood. Understorey species present are weeping mapou, *Coprosma tayloriae*, *C. cheesemani*, mingimingi, bush lawyer, thousand-leaved fern, prickly shield fern, *Blechnum penna-marina*, wall lettuce and *Acaena* sp. Tussockland, shrubland and rockland communities are similar to those described for the northwest part of the property, though grassland communities are more extensive and more modified. Clearings in the beech forest in Cow Stream have an abundance of exotic grasses (predominantly pasture grasses) present.

Teme Basin

Although it appears heavily modified by fire, the Teme Basin still supports a relatively diverse range of indigenous plant communities, including forest, shrubland, tussockland, herbfield, rockland, scree and seepage vegetation.

Remnant mountain totara trees, which are now locally uncommon, are present at lower altitudes along the river. Hill slopes in this area support kanuka and occasional red beech trees, including pockets of sapling red beech. A diverse range of shrub species are present, including *Helichrysum lanceolatum*, weeping mapou, mingimingi, marbleleaf, broadleaf, tauhinu, *Coprosma rhamnoides*, *Coprosma propinqua*, yellowwood, *Coprosma tayloriae*, lancewood, five-finger, *Olearia odorata*, *Olearia paniculata*, *Olearia avicenniifolia*, porcupine shrub and occasional wilding pines. Marlborough rock daisy is present on bluffs beside the stream bed.

Herbaceous species present in this area are *Aceana anserinifolia*, *Aceana caesiiglauca*, *Aceana glabra*, *Raoulia glabra*, *Anaphalioides bellidioides*, *Epilobium* sp., *Geranium microphyllum*, *Asplenium appendiculatum*, *Blechnum penna-marina*, white fuzzweed, *Astelia* sp., silver tussock, *Hieracium* sp. and a variety of exotic grasses including browntop and Yorkshire fog.

Herbfield in a seepage area is dominated by *Lagenifera pumila*. Also present are *Anaphalioides bellidioides*, *Gnaphalium* sp., *Corybus* sp., *Ranunculus foliosus*, *Epilobium komarovianum*, *Celmisia alpina*, *Carex* sp. and *Hydrocotyle* sp., selfheal, white clover, monkey musk and occasional toetoe and *Astelia* sp. Several pukio (*Carex secta*) wetlands drain into the main stream. Also present in these pukio wetlands are *Rumex flexuosus*, *Ranunculus foliosus*, *Gnaphalium* sp., *Epilobium chionanthum*, rushes (*Juncus* sp.), grasses and occasionally toetoe. All seepages are grazed and some heavily trampled.

Short tussockland at lower altitudes is dominated by silver tussock, fescue tussock, *Hieracium* sp. and exotic grasses such as browntop and sweet vernal. Also present are tauhinu, *Coprosma propinqua*, *Coprosma rhamnoides*, scrub pohuehue and scattered marbleleaf and kanuka. Occasional *Olearia odorata* shrubs are present on a river terrace in the mid-basin, and kowhai is present on streamside bluffs. A relatively dense patch of large matagouri and occasional kohuhu is present in the mid-section of the valley.

Mid altitude parts of the basin support relatively extensive areas of grassland, with scattered fescue tussock, silver tussock and tauhinu. Stream sides, rocky areas and seepages within the grassland-short tussockland support a greater diversity of indigenous species, e.g. *Lagenifera pumila*, *Anaphalioides bellidioides*, *Gnaphalium* sp., *Corybus* sp., and *Ranunculus foliosus*. The occasional *Cortaderia richardii* and *Astelia* sp. were also present.

Higher altitude parts of the Teme Basin are dominated by rockland, scree, tall tussockland and shrubland. Tall tussockland supports midribbed snow-tussock, silver tussock, fescue tussock, bristle tussock, blue tussock, cotton daisy and scattered tauhinu. Midribbed snow-tussocks are heavily browsed. Other species commonly present are mouse-ear hawkweed, sweet vernal, browntop, *Raoulia hookeri*, *R. subsericea*, *Helichrysum filicaule*, red woodrush, golden speargrass and *Gnaphalium* sp. Boulderfield on the broad bench at the base of the higher-altitude scree supports the following additional species: creeping pohuehue, mountain wineberry, porcupine shrub, *Blechnum penna-marina*, native violet, prickly shield fern and *Urtica* sp. Dead standing trunks of old burnt trees (presumably beech trees) are present.

Scree slopes on the northwest slopes of Glenlee North support *Epilobium pycnostachyum*, *Lignocarpa carnosula* and *Myosotis traversii*. Stable rock in this area supports bristle tussock, blue tussock, fescue tussock, *Hebe epacridea*, *Blechnum penna-marina*, vegetable sheep, porcupine shrub, patotara, golden speargrass, *Aciphylla monroi*, *Pimelea oreophila*, *Helichrysum coralloides*, *H. parvifolium*, cotton daisy, *Celmisia spectabilis* X *C. angustifolia*, *Ranunculus* sp. and *Caltha* sp.

The ridge crest between Mt Hall and Mt Alexander supports an open rockland-tussockland plant community similar to that described for the northeast part of the property. Additional species recorded here were *Anisotome flexuosus* and creeping pohuehue.

Southwest Ridge of Barometer and Tin Hut Stream

There are two distinct geologies on the southwest ridge of Barometer: greywacke and igneous. The igneous rocks stem from a swarm of basic dykes which are exposed on the surface on the upper part of the ridge, representing the largest area of igneous rock in the Waihopai Ecological District. Vegetation communities are quite distinct on each of the geologies.

Vegetation on igneous rock is very patchy and sparse. Tussock-herbfield communities on stable scree are dominated by bristle tussock, patotara and cotton daisy. Also present are *Celmisia*

gracilentata, harebell, red woodrush, creeping pohuehue, native violet and *Gingidia decipiens*. Woody species such as *Pimelea oreophila* and tauhinu are occasionally present. Igneous bluffs and outcrops support a sparse community of *Colobanthus acicularis*, *Colobanthus brevisepalus*, bristle tussock, blue tussock, *Helichrysum parvifolium*, patotara, harebell, *Melicytus* “Kaikoura”, golden speargrass, white fuzzweed, *Cardamine bilobata* and *Gaultheria crassa*. Igneous screes support *Poa* sp., *Myosotis traversii*, bristle tussock, *Epilobium pycnostachyum* and *Wahlenbergia cartilaginea*.

Greywacke substrates support a denser vegetation cover of tussock-tauhinu shrubland. In this community the dominant plants are *Festuca matthewsii* and bristle tussock, with emergent tauhinu. Also present are cotton daisy, mouse-ear hawkweed, *Raoulia subsericea*, golden speargrass, *Pimelea oreophila*, *Anisotome aromatica*, *Epilobium* spp. and *Colobanthus brevisepalus*. Matagouri and inaka are present at lower altitudes. Stable talus/screes supports a sparse tussock-herbfield consisting of cotton daisy, bristle tussock, *Festuca matthewsii*, *Anisotome filifolia*, *Aciphylla monroi*, *Epilobium glabellum* and, at damper sites, *Parahebe decora*. Greywacke bluffs support a sparse herbfield-shrubland dominated by bristle tussock, *Festuca matthewsii*, red woodrush, cotton daisy, *Helichrysum parvifolium* and tauhinu.

The east branch of Tin Hut Stream is generally rocky and bare. Mountain beech treeland extends almost to the ridge at lower altitudes; otherwise the sparse vegetation comprises regenerating kanuka-tauhinu shrubland, fescue tussockland and cotton daisy herbfield. Along the stream is a large population of pink broom, extending from adjoining freehold land onto the property. The steep bluffs of the stream gorge in this area support pink broom, weeping mapou, *Brachyglottis monroi*, *Olearia paniculata*, koromiko, lancewood, broadleaf, *Helichrysum lanceolatum*, Marlborough rock daisy, native broom, *Heliohebe hulkeana*, mountain ribbonwood, *Coprosma crassifolia*, kanuka, native jasmine, lawyer and white fuzzweed.

The southeast faces of Barometer are steep with numerous bluffs and a large proportion of exposed rock and bare ground. At lower altitudes, kanuka scrub and small areas of regenerating beech forest are present.

Northeast Ridge of Barometer and Penk Catchment

This area supports a mosaic of tussockland, shrubland and bluff communities. There is an increasing proportion of woody vegetation at lower altitudes, mostly comprising kanuka-manuka shrubland. On the south side of the ridge pockets of mountain beech forest extend to the ridge crest. The slopes of Big Bolton (across Dore Stream) support a mosaic of regenerating kanuka and remnant mountain beech forest. The vegetation pattern in the upper Penk is similar, with tussockland and shrubland at higher altitudes and woody species increasing at lower altitudes. Lower down the catchment, kanuka shrubland occupies the north-facing slopes and ridge tops, and mountain beech remnants are present on the south-facing slopes, in gullies and on steep bluffs.

Mixed herbfield-tussockland-shrubland on greywacke hill slopes is dominated by cotton daisy, blue tussock and bristle tussock. Also present are low-stature woody species such as *Helichrysum parvifolium*, tauhinu, *Gaultheria crassa*, *Leucopogon suaveolens* and inaka, and herbfield dominated by harebell, patotara, *Blechnum penna-marina*, *Colobanthus brevisepalus* and *Anisotome aromatica*.

Mixed herbfield-shrubland is present on greywacke bluffs. Prominent plants in this sparse community are Marlborough rock daisy, *Helichrysum intermedium*, *Helichrysum parvifolium*, inaka, *Heliohebe pentasepala*, *Pimelea oreophila*, tauhinu, *Celmisia insignis*, *Celmisia cockayniana*, bristle tussock, *Epilobium glabellum*, *Exocarpus bidwillii* and harebell. Also present at dry sites is white fuzzweed and, on talus, *Epilobium forbesii*. At lower altitudes, *Brachyglottis monroi*, *Gingidia montana* and *Coprosma cheesemaniae* occur.

Mountain beech forest on the south side of the ridge has a bare understorey, which has been overturned by pig-rooting. In places on the margins of the forest and beside bluffs plant diversity

increases with *Celmisia insignis*, *Gaultheria crassa*, *Heliohebe pentasepala*, *Hebe decumbens*, *Aciphylla monroi*, midribbed snow-tussock, flax, *Hebe brachysiphon*, red woodrush, *Brachyglottis lagopus*, *Coprosma* sp., blue tussock, five-finger, porcupine shrub and prickly shield fern.

Shrublands lower down the ridge are dominated by kanuka and manuka. Other species present are *Hebe brachysiphon*, *Hebe rakaiensis*, inaka, golden speargrass, flax, *Gaultheria crassa*, *Clematis* sp., mountain wineberry, midribbed snow-tussock, *Leucopogon fasciculatus*, mingimingi, *Leucopogon suaveolens*, *Coprosma propinqua*, porcupine shrub, cotton daisy, bristle tussock and occasional wilding pines.

Vegetation in the Penk River valley near Penk Hut is dominated by low kanuka forest. The hut sits in a grassy clearing with the occasional *Olearia odorata*. *Coprosma* sp. *Botrychium australe* was observed amongst the grass just outside the hut. Low forest along the river is dominated by kanuka. The relatively diverse understorey supports *Coprosma propinqua*, *Coprosma rhamnoides*, *Coprosma crassifolia*, *Coprosma rigida*, *Coprosma tayloriae*, *Olearia odorata*, lancewood, *Hebe traversii*, *Hebe brachysiphon*, weeping mapou, tauhinu, mingimingi, *Leucopogon fasciculatus*, mountain wineberry, native jasmine, *Clematis* sp., tree tutu and occasional mountain beech. River flats support tree tutu, matagouri and toetoe.

Beech forest is present on hill slopes in Dore Stream. The forest canopy is predominantly mountain beech with occasional broadleaf and kanuka. Within the forest and in light gaps are *Coprosma rhamnoides*, *Coprosma crassifolia*, lancewood, *Leucopogon fasciculatus*, *Helichrysum lanceolatum*, lawyer and *Uncinia* sp. Alluvial gravels in Dore Stream support a mixture of herbs and shrubs including *Helichrysum depressum*, *Raoulia tenuicaulis*, *Geranium microphyllum*, red woodrush, blue tussock, *Festuca matthewsii*, white fuzzweed, mouse-ear hawkweed, *Coprosma propinqua*, patotara, cotton daisy and mingimingi.

Notable Flora

Notable plant species recorded on the property are listed in Table 2 below. Threat categories are those proposed by de Lange *et al.* (2004).

Table 2 Notable plant species, Glenlee Pastoral Occupation Licence, April 2006.

Plant species	Threat status	Distribution on property
<i>Botrychium australe</i>	Sparse	River terrace outside Penk Hut.
<i>Cardamine bilobata</i>	Data deficient	Rocky ledges and overhangs on Barometer ridges.
<i>Carmichaelia carmichaeliae</i> (pink broom)	Nationally vulnerable; South Marlborough endemic	Riparian vegetation and bluffs, observed in Tin Hut gorge may be elsewhere on the property in stream gorges.
<i>Celmisia cockayneana</i>	Range restricted; South Marlborough endemic	Rock outcrops and bluffs on Barometer ridges, probably elsewhere on the property on rocky outcrops.
<i>Celmisia insignis</i>	Range restricted	Rock outcrops and bluffs on Barometer ridges, probably elsewhere on the property on rocky outcrops.
<i>Colobanthus brevisepalus</i>	Data deficient	Rock outcrops and bluffs and greywacke hill slopes on Barometer ridges, probably elsewhere on the property on rocky outcrops.
<i>Epilobium chionanthum</i>	Gradual decline	Teme Basin wetlands.
<i>Epilobium forbesii</i>	Range restricted	Screes on Barometer, likely to be elsewhere on the property on screes.

<i>Vittadinia australis</i> (white fuzzweed)	Data deficient	On rocky bluffs and gravel fields throughout property.
<i>Wahlenbergia cartilaginea</i>	Range restricted; South Marlborough endemic	Screes on Barometer, likely to be elsewhere on the property on screes.
Significance		
<i>Helichrysum coralloides</i>	South Marlborough endemic	Rocky areas, Upton Brook and Teme Basin.
<i>Heliohebe hulkeana</i>	South Marlborough endemic	Riparian vegetation and bluffs, observed in Tin Hut gorge may be elsewhere on the property in stream gorges.
<i>Heliohebe pentasepala</i>	South Marlborough endemic	Rocky outcrops and ridges throughout.
<i>Pachystegia insignis</i> (Marlborough rock daisy)	South Marlborough endemic	Rocky outcrops and bluffs, Teme Basin, Tin Hut Stream, Penk River.

Significance of Vegetation and Flora

Indigenous plant communities on higher-altitude parts of Glenlee Pastoral Occupation Licence (generally above 1100 m) have significant inherent values. These areas, mainly of rockland, scree, tussockland and shrubland, are representative, or have components that are representative, of the original vegetation, have high naturalness values and support populations of threatened plant species (*Cardamine bilobata*, *Celmisia cockayniana*, *Celmisia insignis*, *Colobanthus brevisepalus*, *Epilobium forbesii*, *Wahlenbergia cartilaginea* and white fuzzweed). Mid-altitude sites are more modified, though the rocky sides of the valleys are refuges for remnant original forest species, and support a threatened species (pink broom) and populations of species endemic to South Marlborough (*Helichrysum coralloides*, *Heliohebe hulkeana*, *Heliohebe pentasepala* and Marlborough rock daisy).

Areas of forest at lower and mid altitudes, notably in Upton Brook and Teme River, and in parts of Cow, Tin Hut and Dore streams and the Penk River, also have significant inherent values. These forests are representative of the original vegetation. In the east, south and west of the property (i.e. all parts of the property except the mid Teme Basin and parts of Cow and Tin Hut streams), areas of forest and high-altitude rockland are linked by strongly regenerating low kanuka forest or scrub. These scrub communities have significant inherent value as buffering to, and linkages between, other areas of indigenous vegetation, and as woody indigenous cover that will eventually regenerate to forest. The threatened *Botrychium australe* was recorded on river flats in the Penk valley. A number of small wetlands are scattered through the Teme Basin, and support the threatened *Epilobium chionanthum*.

Other significant features are the presence of plant communities on exposures of igneous rock, the presence of kanuka forest on alluvial sites in the northwest part of the property, and the extent of indigenous woody vegetation on the property that is contiguous with indigenous forest on adjoining protected lands.

2.5.3 Problem Plants

The only significant infestations of problem plants observed on the property, apart from ubiquitous naturalised species for which containment or control are probably impractical (such as mouse-ear hawkweed and pasture grasses), were scattered wilding pines. These wilding pines pose a significant potential threat to regenerating and high-altitude indigenous plant communities on the property. Removal and control of wilding pines is feasible and desirable.

Map Plants

2.6 FAUNA

2.6.1 Bats

The property was not surveyed for bats.

2.6.2 Birds

The bird fauna of Glenlee Pastoral Occupation Licence is typical of the dry mountains of South Marlborough. Areas of forest and shrubland in this area support common indigenous species such as bellbird, brown creeper, grey warbler, silvereye, South Island rifleman (threat status: gradual decline), South Island fantail and South Island tomtit. Open country habitats support Australasian harrier, New Zealand pipit, southern black-backed gull and New Zealand falcon (gradual decline). Other bird species are found in the more extensive forest and alpine habitats to the west, including kea (nationally endangered), long tailed cuckoo (gradual decline), New Zealand pigeon (gradual decline), rock wren (nationally vulnerable), South Island kaka (nationally endangered) and yellow-crowned parakeet (gradual decline). Blue duck (nationally endangered) and grey duck (nationally endangered) have been recorded from the Avon River. New Zealand falcon and South Island rifleman have been recorded recently from across the Awatere valley on Mt Gladstone Pastoral Occupation Licence.

Birds observed on Glenlee Pastoral Occupation Licence are described below for the three main parts of the property.

Forests of Upton Brook

Bird species recorded in the mountain beech-broadleaf forests in this area were South Island rifleman, New Zealand falcon, bellbird, brown creeper, grey warbler, silvereye, South Island fantail, South Island robin, South Island tomtit and five naturalised bird species.

Mt Hall

The ridge crest and summit of Mt Hall support tussockland, shrubland and rockland habitats. Birds observed here were New Zealand pipit, silvereye, grey warbler and four naturalised bird species.

Teme Basin

The upper reaches of Teme River and Teme Basin support forest, shrubland, tussockland, rockland and scree habitats. Indigenous birds recorded from forest and scrub habitats were bellbird, grey warbler, silvereye and South Island fantail. Birds recorded in other habitat in the area were Australasian harrier, New Zealand pipit, welcome swallow and seven naturalised species.

Barometer

The summit and southern ridges of Barometer provide extensive open rockland, scree and sparse tussockland habitats. The only bird species observed in this zone was New Zealand pipit.

Dore Stream

Dore Stream has relatively extensive areas of mountain beech forest, kanuka forest and scrub. Birds recorded here were New Zealand falcon, bellbird, grey warbler, silvereye, South Island fantail, South Island tomtit, South Island robin and five naturalised bird species.

Glenlee Peaks

The high peaks northeast of Barometer (Mt Alexander, Glenlee South and Glenlee North) provide extensive areas of open rock, scree and sparse tussockland-herbfield. Bird species recorded here were New Zealand pipit and four naturalised bird species.

Tin Hut Stream

Tin Hut Steam valley supports small patches of mountain beech forest, more extensive areas of low kanuka forest and scrub, and open tussockland habitats. Bird species recorded here were New Zealand falcon, bellbird, grey warbler, silvereve, South Island fantail, New Zealand pipit, welcome swallow, South Island tomtit and six naturalised bird species.

Cow Stream

Beech forest is present in the headwaters of Cow Stream. Birds recorded from this forest habitat were bellbird and South Island robin.

Bird Species Recorded

Twenty-two bird species were recorded on Glenlee Pastoral Occupation Licence: 12 indigenous species and 10 naturalised species. Two threatened species were recorded: New Zealand falcon (gradual decline) and South Island rifleman (gradual decline). Threat categories are those proposed by Hitchmough and Bull (*in press*).

Table 3 Indigenous bird species recorded from Glenlee Pastoral Occupation Licence.

Bird species	Threat status	Distribution on property
Australasian harrier		Teme Basin.
bellbird		Forest and scrub throughout.
brown creeper		Upton Brook forest.
grey warbler		Forest and scrub throughout.
New Zealand falcon	Gradual decline	Tin Hut Stream; Dore Stream; Upton Brook.
New Zealand pipit		High altitude areas throughout.
silvereve		Forest and scrub throughout.
South Island fantail		Forest and scrub throughout.
South Island rifleman	Gradual decline	Upton Brook forest.
South Island robin		Upton Brook, Cow and Dore stream forests.
South Island tomtit		Forest and scrub throughout.
welcome swallow		Teme Basin and Tin Hut Stream.

Naturalised bird species observed on the property were blackbird, chaffinch, chukor, dunnock, goldfinch, greenfinch, redpoll, skylark, song thrush and yellowhammer.

Significance of the Bird Fauna

Forest on Glenlee Pastoral Occupation Licence provides important nesting and feeding habitats for South Island rifleman (gradual decline) and other forest birds, notably South Island robin. The mosaic of forest, shrubland, tussockland and rockland on the property provide favourable habitats, including good breeding habitat, for New Zealand falcon (gradual decline). The significance of bird habitats on the property is enhanced by their proximity to contiguous areas of forest and open country habitats on adjoining properties, including Ferny Gair Conservation Area.

2.6.3 Lizards

The lizard fauna of South Marlborough is diverse. Five species of the *Hoplodactylus maculatus* complex are known from the general area. Common gecko and Canterbury gecko are found in shrubland and forest, and Southern Alps gecko, Marlborough mini gecko and the threatened Kaikouras gecko (data deficient) are found in open rocky areas. The threatened black-eyed gecko (sparse) and rough gecko (gradual decline) have also been recorded. Four skink species are present in the general area: common skink, scree skink (gradual decline), spotted skink (gradual decline) and long-toed skink (sparse) (Whitaker and Gaze, 1999; R. Hitchmough, *pers. comm.*).

Four lizard species: Southern Alps gecko, common skink, Marlborough mini gecko and the threatened black-eyed gecko have been recorded across the Awatere valley on the Inland Kaikoura Range (Department of Conservation Herpetofauna Database). Marlborough mini gecko has been previously recorded close to Glenlee Pastoral Occupation Licence (Clerke, 1994).

The property supports substantial areas of apparently suitable lizard habitat. Two lizard species were recorded during this survey: common skink and Marlborough mini gecko. Individuals of these species were found under stones on terraces alongside the Teme River. The apparent paucity of lizards may be due to the failure of lizards to colonise areas following burning, or may be a consequence of the unfavourable survey conditions, (i.e weather and the time of year).

Significance of lizard fauna

Glenlee Pastoral Occupation Licence provides relatively extensive areas of apparently suitable habitat for lizards, including habitat that is potentially suitable for threatened species. Two common species of lizard were recorded from lower-altitude areas along the Teme River.

Map Birds and Lizards

2.6.4 Freshwater Fauna

The northwest part of Glenlee Pastoral Occupation Licence is drained by the headwaters of Non Upton Brook, Upton Brook and Teme River, which are tributaries of the Avon River in the Wairau River catchment. South and east parts of the property are drained by tributaries of the Penk River, including Dore Stream, and the headwaters of Cow, Tin Hut, Ribble, Clyde, Burr and Bolton streams, in the Awatere River catchment.

One of the distinguishing features of the Wairau and Awatere rivers is that they are not affected by dams. This has two effects on the fish communities. The first is that diadromous species (those species with a sea-going phase in their lifecycle) are more likely to be present. The second effect is that fish are able to move between catchment tributaries, allowing re-colonisation of streams.

The New Zealand Freshwater Fish Database (NZFFD) has 117 records from the Awatere River catchment and 395 records from the Wairau River catchment (at 22nd of June 2006). Fish species recorded from rivers and streams near the property are shortfin eel, longfin eel, Canterbury galaxias (Northern), koaro, torrentfish, upland bully and brown trout. The freshwater crayfish, koura, are also recorded in the NZFFD near the Glenlee Pastoral Occupation Licence boundary. Three of the fish species are considered threatened by Hitchmough and Bull (*in press*): longfin eel (gradual decline), Canterbury galaxias (Northern) (range restricted) and koura (gradual decline).

Glenlee Pastoral Occupation Licence comprises two main geographic areas of freshwater habitat, classified by river catchment. Freshwater habitats and the fish species recorded are described below for each of these areas.

The Wairau River catchment is listed as a "Type I" Waters of National Importance (Chadderton *et al.*, 2004), indicating that the majority of the river and its tributaries are nationally significant. The significance is due to it being in the top ten sites by Natural heritage value score in its biogeographical unit, it contains records of blue duck (*Hymenolaimus malacorhynchos*) recorded in the last ten years, it contains populations or records of threatened plants and birds, it contains nationally significant bird populations and it contains or flows into a wetland that has been designated nationally important.

Avon River Catchment

This area incorporates the north-facing slopes on the property which drain to the Avon River via Non Upton Brook, Upton Brook and Teme River. These three valleys have similar characteristics: large-stream habitats near the northern boundary of the property, small-stream habitats in the middle reaches and ephemeral stream habitats in the upper reaches. Non Upton Brook flows through extensive low kanuka forest, Upton Brook flows through mountain beech forest and Teme River flows through forest, treeland and tussockland. Small seepages are present in the Teme River catchment. Farm animals appear to be grazed only in the Teme Basin, though wild animal access is unrestricted throughout.

The ephemeral streams appear to be generally more than a metre wide after high rainfall. The small streams are up to two metres wide, and the large streams generally up to four and occasionally six metres wide. The ephemeral streams are, when flowing, less than 100 mm deep, the small streams are up to 200 mm deep and the large streams are 300 to 500 mm deep with pools over 700 mm deep. Ephemeral stream substrates are generally soil or bedrock. Small and large stream substrates are boulders, cobbles and gravels. The small seepages in the Teme Basin are generally spongy areas with small springs. These wetlands are no larger than 50 m², commonly less than 20 m² and are mud and silt based.

One site was electro-fished in the Teme River. Canterbury galaxias (Northern) was the only species recorded. Additional species found in the Avon River catchment near the Glenlee Pastoral Occupation Licence and recorded in the NZFFD are brown trout, longfin eel and upland bully.

Awatere River Catchment

This area incorporates the south- and east-facing slopes on the property which drain to the Awatere River via Penk River (including Dore Stream), Grey River (Cow and Tin Hut streams) or directly to the Awatere River (Ribble, Clyde, Burr and Bolton streams). These streams are similar in character to those described for the Avon River catchment. The streams flow through open tussockland and rockland vegetation in their upper reaches, and shrubland, scrub and forest in their lower reaches. Some parts of the streams flow through small rocky gorges, notably Tin Hut Stream. All these streams are accessible to stock and wild animals, except that topography restricts access in some places.

The ephemeral streams appear to be generally more than a metre wide after high rainfall. The small streams are up to two metres wide, and the large streams generally up to four and occasionally eight metres wide. The ephemeral streams are, when flowing, less than 100 mm deep, the small streams are up to 200 mm deep and the large streams are 400 to 500 mm deep with pools over 900 mm deep. Ephemeral stream substrates are generally soil. Small and large stream substrates are bedrock, boulders, cobbles and gravels.

Four sites were electro-fished in this area: two in the Penk River, one in Dore Stream and one in the eastern branch of Tin Hut Stream. Canterbury galaxias (Northern) were recorded at all four sites. Additional species found in the Awatere River catchment near the Glenlee Pastoral Occupation Licence and recorded in the NZFFD are brown trout, koaro, longfin eel, shortfin eel and torrentfish.

Species Recorded

One fish species was recorded during this survey of Glenlee Pastoral Occupation Licence: Canterbury galaxias (Northern). This species was recorded from Teme River, Penk River, Dore Stream and Tin Hut Stream. It may also occur in other streams which were not sampled during this survey.

Significance of the Freshwater Fauna

Canterbury galaxias (Northern) is present in streams at several locations on the property, in both the Avon (Wairau) and Awatere river catchments. Other native and introduced fish species have been recorded in streams near the property. Canterbury galaxias (Northern) are a threatened species (range restricted). The Wairau River catchment is listed as a "Type I" Waters of National Importance (Chadderton *et al.*, 2004), indicating that the majority of the river and its tributaries are nationally significant.

Map Fish

2.6.5 Terrestrial Invertebrates

Due to the time of year and the limited time available for the survey, priority was given to covering ground and visually assessing invertebrate habitat, rather than to sampling invertebrate species. There was no opportunity to employ large-scale sampling methods such as UV light traps. Therefore only a minimal catch of specimens was taken from the property.

Many species were observed but not collected, generally because identifications were unlikely to be possible (e.g. centipedes, millipedes and many other groups which are poorly known or described in New Zealand) or because appropriate specialists were unavailable for identification work (e.g. spiders, insect families).

Areas for which no ground assessment could be made were much of the Non Upton Brook catchment on the western side of the property, the northernmost tributary of the Teme River within the property, the Penk River catchments in the east (the area with gridlock land boundaries) and the spurs and gully heads between upper Ribble Stream and Snowdon along the southeastern boundary. The major south/southwest draining catchments of Cow Stream, Tin Hut Stream and the large unnamed tributary of Tin Hut Stream were only observed from limited sites on the surrounding ridges.

Existing Invertebrate Information of Relevance

Surveys for invertebrates have occurred at several sites in the general area during tenure review surveys of the Camden, Mt Gladstone and Ramshead properties and of the Penk Saddle-Ferny Gair ridge area. Published data on individual species indicate that other collecting has occurred in the general area, but no survey reports have been published. A number of notable invertebrate species, including some which are uncommonly encountered and/or have limited distributions are known to occur nearby. These are discussed below.

The giant scree weta is widely distributed in screes of the eastern South Island alpine country. The bluff weta (threat status: sparse) occurs in hard-rock bluffs with deep cracks at several sites in inland Marlborough (Seaward and Inland Kaikoura ranges; southern Raglan Range) as well as at Mt Somers (Canterbury).

Mt Lookout, south of the property across the Awatere valley is the type locality for the rarely encountered high-altitude tiger beetle, *Neocicindela hamiltoni*. This species is also known from the Tone River Conservation Area (*personal obs.*), from at least two other sites to the west, and from two sites in mid-Canterbury (Savill, 1999).

The moderate-sized carabid beetle *Megadromus compressus* is known from scattered sites through inland Marlborough, including the Avon Valley and at Upcot in the Awatere Valley (McGuinness, 2002). This species is considered to be sufficiently rare (threat status: sparse) to be included in the Threatened Carabid Recovery Plan (McGuinness, 2002) as a high priority species for survey and other information gathering.

A number of darkling beetle species, several with quite limited distributions, occur in South Marlborough (Watt, 1988; Watt 1989). *Mimopeus vallis* occurs in the lower to mid-Awatere Valley, from Seddon to Upcot. Most known sites are on the lower valley sides, but this may be in part an artefact of collection effort. Lower-altitude parts of the property in the Awatere valley provide adjoining suitable habitat. *Mimopeus clarkei* is recorded by Watt (1988) from the Molesworth Homestead area in the upper Awatere valley and from the Avon valley near Avondale, a range which straddles the property, making it likely that this species also occurs there. Both *M. vallis* and *M. clarkei* are listed as range restricted.

Hutton's speargrass weevil was found along the major ridge northeast of Ferny Gair in 2001. The weevils were moderately numerous both just above Penk Saddle and along a substantial area of the ridge at the furthest extent of the survey. A notable feature of these populations is that the animals are consistently larger than in any other known population of this species. No speargrass weevil feeding sign was noted on the property although only a very limited extent of the available habitat was surveyed. The timing of the survey reduced the chances of observing live animals.

Rare moth species which have been found to occur in the general area include a number of species associated with the small-leaved species of *Olearia* such as the noctuid *Meterana exquisita*. Also found in the area are two species, or species-complexes, of *Gingidium*-feeding geometrids, *Gingidiobora nebulosa* and *G. subobscurata*. *G. nebulosa* appears more likely to occur in drier eastern areas and *G. subobscurata* in slightly wetter situations. It was present on Ramshead Pastoral Lease, c.10 km northeast of the property. *M. exquisita*, *G. nebulosa* and *G. subobscurata* are all listed as gradual decline.

Invertebrates and invertebrate habitats observed on the property are described below for the main areas surveyed.

Upton Brook catchment

This catchment has good remnants of mature beech forest and broadleaf forest and substantial areas of kanuka low-forest. It appears to have a diverse forest invertebrate fauna, with a wide range of species including spiders, millipedes, moths, beetles, etc. recorded. Species of note include a *Wainuia* snail of a new species and possibly even a new genus and ground beetles of the genus *Megadromus*, probably *M. compressus* which has a threat category of sparse.

Teme River catchment

Although this is the most extensively modified of the catchments visited, it nonetheless has many habitats with high value for invertebrate diversity. In the head of Teme Basin the upper slopes, especially below the ridge summit from Glenlee North to beyond Mt Alexander, comprise a complex of bluffs, small screes, steep vegetated faces and steeply-falling gullies. Below the Glenlee peaks, a high altitude bench has a mosaic of fellfield, small streams, small patches of riparian wetland and mixed tussockland and woody vegetation, providing a diverse mix of invertebrate habitats. The larvae of an undescribed tortricid moth species in the genus *Merophyas* was observed in fellfield in the upper Teme Basin.

The midslopes of the basin are the most modified with short tussockland mixed with pasture species, but also with small wetland areas, either streamside or in sites with seasonally or intermittently impeded drainage. The lower basin has substantial regeneration of a large variety of woody species, including many plant species that have characteristic associated invertebrate faunas. One of the most important plant species in this respect is the small-leaved *Olearia odorata* which is moderately numerous near the major waterways in the lower basin. The population of this species within the lower basin is such that it is almost certain to hold populations of its associated invertebrate fauna, (e.g. *Declana sp* and *Pseudocoremia sp.*) The lower parts of the basin also have a number of seepages and patches of riparian vegetation which add considerable diversity to invertebrate habitats.

Spur Leading NE from Barometer

Two specimens of darkling beetle (*Mimopeus sp*) were collected along the spur leading NE from Barometer, between Dore Stream and the SW branch of the Penk River. Both specimens appear different from a specimen collected from above the bushline near Penk Saddle, five kilometres to the north of the property. The specimens collected appear broadly similar to *M. clakei* but both are

larger than the maximum size range given for this species (Watt,1988). It is unclear whether the specimens collected represent two species or a single more variable one or whether either or both can be ascribed to *M clakei* or any other described species.

Species Recorded

Amongst the species collected, of particular interest are the ground beetles (*Megadromus ?compressus*), the darkling beetles (*Mimopeus*), a possibly un-described tortricid moth species in the genus *Merophyas*, and a *Wainuia* snail of a new species and possibly even a new genus. *Megadromus compressus* is listed as sparse and is listed as a high priority species for survey and other information gathering in the Carabid Beetle Recovery Plan (McGuinness, 2002).

Either or both of the *Mimopeus* species could be *M. clarkei*, in which case the size range of the species requires expansion in the species description. This species is listed as range restricted. However it is possible that either or both could represent new species within this genus. The Awatere Valley appears to be a key area for this genus, with several species exhibiting limited ranges.

Significance of the Invertebrate Fauna

Limiting factors meant that only a part ground assessment of the property could be carried out. Of those areas assessed, the highest significance for invertebrate conservation are the Upton Brook catchment and the higher altitude parts of Teme Basin. These areas have a high diversity of interconnected invertebrate species habitats. The Upton Brook catchment supports the threatened species *Megadromus compressus* (sparse), and a *Wainuia* snail of a new species and possibly even a new genus.

Other parts of the property are likely to have significant inherent values for invertebrates due to the vegetation present and the likelihood of associated invertebrate fauna. These areas are the lower-altitude parts of Teme Basin, Non Upton Brook, east branch of Tin Hut Stream, Ribble Stream and upper Cow Stream. Other significant parts of the property are the mid-altitude parts of Teme Basin and mid Cow Stream. The ridgeline between Dore Stream and the western branch of Penk River may also be significant due to the presence of one or two species of darkling beetle.

Map Invertebrates

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.

Feral goat and feral pig

Feral goats and sign of feral pigs (rooting) were observed throughout the property, with relatively high numbers in at least the Upton Brook and Teme Basin. Populations of these wild animals pose a significant threat to indigenous plant communities, invertebrates and fauna habitat.

Brushtail possum

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

2.7 HISTORIC

2.7.1 European Heritage Values

The southern part of Glenlee Pastoral Occupation Licence was first taken up for grazing in 1851 when Edward Bolton secured a licence to graze 7285 ha (18000 acres) bounded by Bolton Stream, Grey River and the range tops to the north. The grazing run was transferred to J.C. Whitehead in 1853, and then to William Bursill and Thomas Howard in 1860. In 1864, Bursill and Howard purchased the Redwood Run in the adjoining Avon valley, increasing the area under their control to over 16000 ha (40000 acres). By 1866, they had gained freehold title to almost 4047 ha (10000 acres) of the property. Bursill purchased Howard's share of the property in 1866. After Bursill's death in 1868, the property was sold to George Bennett and John Symons, and then, in 1877, to Charles Teschmaker. Glenlee regained its identity when, in 1907, Teschmaker sold Glenlee together with c.4047 ha of the Redwood Run to William Shipley. The property changed ownership six times between 1907 and 1925, after which the property was purchased by James Samson. In 1966, the property was bought by Ian Hamilton (Kennington, 1978).

There are three huts within the pastoral occupation licence. They are Cow Stream, Teme Basin and Penk huts.

Significance of Historic Resources

No significant historic resources are known to exist on the property.

2.8 PUBLIC RECREATION

2.8.1 Physical Characteristics

The property is predominantly one recreation unit. It is characterised by the chain of mountains from Barometer through Glenlee North, Glenlee South, Mt Alexander, Mt Hall, Mt Delight, Mt Argelin and Mt Abrupt to Mt Boltoff near the Avon Saddle. An intricate pattern of valleys and gullies run off the mountainous chain on the property forming the headwaters of catchments draining into the Avon, Gray, Awatere and Penk rivers.

The land is principally bare windswept mountains containing pockets of forested areas in the stream valleys. Three huts are located in the Penk River, Cow Stream and in the Teme Basin. The only tracking on the property is a single farm track following Cow Stream in to the huts.

The property provides a high natural setting for recreation due to the property's isolation and limited development.

2.8.2 Legal Access

Roads

There are no formed legal roads to the property. An unformed legal road exists along the ridge that runs south from Ferny Gair starting at point 1168 and connects with Glenlee North, through to Glenlee South, across to Barometer then northeast down a major ridge line running into the Penk catchment. An unformed legal road heads south east from this ridge at point 1673 into the head of Bolton Stream. Various legal roads (unformed) exist over adjoining freehold lands with several connecting to the property boundary though none provide practical access to the property. Current

practical access to the property is achieved over farm tracks on adjoining freehold land with permission of the freehold owner.

Legal access that is sometimes used for access to the hut in the headwaters of Penk River is along the Penk River by use of the adjoining unformed legal road. The legal road that approximately follows an existing track across the Avon Saddle to the west of the property also connects to the property boundary.

Marginal Strips

No marginal strips appear to be present along streams within the property boundaries.

Adjoining Public Conservation Land

The property adjoins the Ferny Gair Conservation Area along a large portion of the northern property boundary, Big Bolton Conservation Area to the southeast and connects with the Glazebrook Conservation Area at the Avon Saddle to the northwest.

2.8.3 Activities

Limited practical access exists to the property for recreational activities. The area is known to be used for hunting (pigs, goats, deer and chamois) primarily in the Non Upton Brook, Upton Brook, Teme Basin and the Penk River catchments. The peaks of Glenlee North, Glenlee South, Barometer, Mt Alexander and Big Bolton are a focus for tramping parties. There is some use of the Avon River and Avon Saddle by tramping parties. There is little other information available about the existing recreational use of the property.

Significance of Recreation

The highly natural setting throughout the property offers significant recreational values. There is however, limited practical access to the property and recreation opportunities will need to be developed in conjunction with adjoining freehold land. Hunting and tramping access to the mountain range and catchment headwaters within the property are the key recreation values.

PART 3 OTHER RELEVANT MATTERS AND PLANS

3.1 CONSULTATION

Information gathering meetings were held with representatives of non-governmental organisations (NGOs) at Blenheim on the 6th September 2004 and at Geraldine on the 9th of September 2004. Comments made at those meetings are summarised below.

- Area is really good for tramping, Penk Hut (ex NZFS) is used by trampers.
- California quail, chukor, grey duck and paradise shelduck are present; no Canada geese; no fisheries values; good hunting for goats, deer, chamois, pigs (especially in the Teme Basin); NZDA/hunters definitely interested in hunting opportunities on the property; limited access can be gained from Avon Saddle.
- Main areas of interest for tramping are Rocky Gill (access from Malvern Hills), Bolton and Barometer (access from Awapiri via Little Bolton) and Avon Saddle (access from Avon River); these are all good day trips.
- There is a very good track up the Avon Valley, across Avon Saddle and down the Grey Valley; it is an old musterers' track that is now overgrown.
- There used to be a good track up the Teme Valley (an old walkway) to the property boundary at Teme Basin, though it was mostly used to gain access to Ferny Gair (north of the property).
- The Penk River, on the eastern boundary of the property, is popular for hunting; it also supports a small trout fishery. Historically the area around Ferny Gair has been difficult for access. The Grey River also supports a small trout fishery.
- It looks like access up the Grey Valley would be desirable.

3.2 DISTRICT PLANS

Glenlee Pastoral Occupation Licence lies within Marlborough District. The relevant district plan forms part of the Wairau Awatere Resource Management (RM) plan. The Wairau Awatere RM plan is a combined district, regional coastal, and regional plan prepared by a unitary council. This plan applies to that part of the district located south of the Wairau River catchment, including the Awatere Valley where the property is located. The Wairau Awatere RM plan is still in the proposed stage with some plan provisions still subject to outstanding Environment Court Appeals which may result in changes being made to plan rules relevant to the information contained in this report.

The property is zoned Rural 4 under the proposed Wairau Awatere Resource Management Plan. Under this zoning farming, commercial forestry and protection and conservation forestry are permitted activities. The zoning also allows for home occupations, homestays and one dwelling house per certificate of title as permitted activities. Subdivision is a controlled activity in the Rural 4 zone to a minimum lot size of 20 net site area (excluding access).

The proposed plan has an indigenous forest clearance rule which would require resource consent for clearance of an area of more than 0.1 ha of indigenous forest from any certificate of title, in any twelve month period. It also requires a resource consent for the removal of any indigenous vegetation from a natural wetland which as an area of larger than 200 m². Other indigenous vegetation types are not subject to any plan rule which would prevent their destruction or removal. These rules may change as a result of outstanding appeals on the proposed plan.

The proposed plan includes land disturbance rules requiring resource consent for vegetation clearance, cultivation, excavation and tracking, filling of land and location of buildings of a standard set back of 8 metres from any river, drainage channel, landward toe of stopbank or from any protection works. These rules however may change as a result of unresolved appeals on the proposed plan.

The proposed plan includes a chapter on landscape values. This chapter has a focus on visual amenity, in particular on the identification of outstanding landscape values in accordance with 6 b of the RMA, "the protection of outstanding natural features and landscapes from inappropriate subdivision, use and development". This chapter identifies the property as being part of a landscape type classified as "high inland hills" which features river gorges and contains medium high and high visual qualities for the river gorges. The area is identified as having outstanding values with medium low landscape sensitivity generally and medium sensitivity within the river gorges. The identification of the area as having outstanding landscape value does not change the activity status of activities and structures. Council would be required to take this matter into consideration when assessing applications for discretionary and non-complying resource consents.

A register of significant heritage resources is included in the proposed plan as Appendix A. There do not appear to be any heritage trees or buildings identified within the property.

3.3 CONSERVATION MANAGEMENT STRATEGIES

Glenlee Pastoral Occupation Licence lies within the South Marlborough Management Unit of the Nelson/Marlborough Conservancy. Relevant priorities for this unit are listed in the CMS (Department of Conservation, 1996) as:

- Identify and protect traditional falcon nesting sites in western Molesworth and Inland Marlborough.
- Control goats to protect endemic plant communities at the Richmond Range, Inland Marlborough and Inland Kaikoura Range.
- Control the spread of wilding pines in Red Hills ultramafic areas, on Ferny Gair and on Molesworth.
- Resolve the status of conservation areas and reserves in Inland Marlborough and Inland Kaikoura Range.
- Provide for remote recreation in the Inland Kaikoura Range and western Molesworth.
- Negotiate access and provide for remote tussockland tramping in Inland Marlborough, western Molesworth and Inland Kaikoura Range.
- Maintain facilities and seek opportunities to improve access for recreational hunting, particularly in the Branch and Leatham catchments but also elsewhere in South Marlborough.
- Seek controls on land clearance and prevent fire in lowland areas and in Inland Marlborough.
- Seek control of those effects of pastoral farming that are detrimental to natural values.
- Protect freshwater fish habitat through statutory advocacy.

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 referred to in text

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>
beech/tawhai.....	<i>Nothofagus</i> spp.
black beech.....	<i>Nothofagus solandri</i>
blinks.....	<i>Montia fontana</i>
blue tussock.....	<i>Poa colensoi</i>
bristle tussock.....	<i>Rytidosperma setifolium</i>
broadleaf/kapuka.....	<i>Griselinia littoralis</i>
browntop*.....	<i>Agrostis capillaris</i>
bush lawyer.....	<i>Rubus cissoides</i>
catsear*.....	<i>Hypochoeris radicata</i>
cotton daisy/tikumumu.....	<i>Celmisia spectabilis</i>
creeping pohuehue.....	<i>Muehlenbeckia axillaris</i>
fescue tussock.....	<i>Festuca</i> sp.
fierce lancewood.....	<i>Pseudopanax ferox</i>
five-finger.....	<i>Pseudopanax arboreus</i>
flax/harakeke.....	<i>Phormium tenax</i>
golden speargrass/taramea.....	<i>Aciphylla aurea</i>
harebell.....	<i>Wahlenbergia albomarginata</i>
inaka.....	<i>Dracophyllum longifolium</i>
kanuka.....	<i>Kunzea ericoides</i>
king devil hawkweed*.....	<i>Hieracium praealtum</i>
kohuhu.....	<i>Pittosporum tenuifolium</i>
koromiko.....	<i>Hebe salicifolia</i>
kowhai.....	<i>Sophora microphylla</i>
lancewood.....	<i>Pseudopanax crassifolius</i>
leather-leaf fern.....	<i>Pyrrosia eleagnifolia</i>
male fern*.....	<i>Dryopteris filix-mas</i>
manuka.....	<i>Leptospermum scoparium</i>
marbleleaf.....	<i>Carpodetus serratus</i>
Marlborough rock daisy.....	<i>Pachystegia insignis</i>
marsh thistle*.....	<i>Cirsium palustre</i>
matagouri.....	<i>Discaria toumatou</i>
midribbed snow-tussock.....	<i>Chionochloa pallens</i>
mingimingi.....	<i>Leptecophylla juniperina</i> ssp. <i>juniperina</i>
monkey musk*.....	<i>Mimulus guttatus</i>
mountain beech.....	<i>Nothofagus solandri</i> var. <i>cliffortioides</i>

mountain ribbonwood/houhi	<i>Hoheria lyallii</i>
mountain totara.....	<i>Podocarpus hallii</i>
mountain wineberry.....	<i>Aristotelia fruticosa</i>
mouse-ear hawkweed*	<i>Hieracium pilosella</i>
native broom.....	<i>Carmichaelia australis</i>
native jasmine.....	<i>Parsonsia</i> sp.
native violet.....	<i>Viola cunninghamii</i>
necklace fern	<i>Asplenium flabellifolium</i>
patotara.....	<i>Leucopogon fraseri</i>
pink broom	<i>Carmichaelia carmichaeliae</i>
porcupine shrub	<i>Meliccytus alpinus</i>
prickly shield fern.....	<i>Polystichum vestitum</i>
pukio.....	<i>Carex secta</i>
red beech	<i>Nothofagus fusca</i>
red woodrush.....	<i>Luzula rufa</i>
scabweed	<i>Raoulia australis</i>
scrub pohuehue.....	<i>Muehlenbeckia complexa</i>
selfheal*	<i>Prunella vulgaris</i>
sheep's sorrel*.....	<i>Rumex acetosella</i>
silver tussock/wi.....	<i>Poa cita</i>
snowberry	<i>Gaultheria depressa</i>
sweet vernal*.....	<i>Anthoxanthum odoratum</i>
tauhinu.....	<i>Ozothamnus leptophyllus</i>
thousand-leaved fern	<i>Hypolepis millefolium</i>
toetoe.....	<i>Cortaderia richardii</i>
tree tutu.....	<i>Coriaria arborea</i>
vegetable sheep	<i>Raoulia eximia</i>
wall lettuce*	<i>Mycelis muralis</i>
weeping mapou	<i>Myrsine divaricata</i>
white clover*.....	<i>Trifolium repens</i>
white fuzzweed.....	<i>Vittadinia australis</i>
white sun orchid	<i>Thelymitra longifolia</i>
yellowwood.....	<i>Coprosma linariifolia</i>
Yorkshire fog*.....	<i>Holcus lanatus</i>

Animal Species referred to in text

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 (*).

<u>Common name</u>	<u>Scientific name</u>
Australasian harrier/kahu	<i>Circus approximans</i>
bat.....	see South Island long-tailed bat
bellbird/korimako	<i>Anthornis melanura melanura</i>
blackbird*.....	<i>Turdus merula</i>
black-eyed gecko.....	<i>Hoplodactylus kahutarae</i>
blue damselfly	<i>Austrolestes colensonis</i>
blue duck/kowhiowhio	<i>Hymenolaimus malacorhynchos</i>
bluff weta	<i>Deinacrida elegans</i>
brown creeper.....	<i>Mohoua novaeseelandiae</i>
brown trout*	<i>Salmo trutta</i>
brushtail possum*.....	<i>Trichosurus vulpecula</i>

Canterbury galaxias (northern).....	<i>Galaxias vulgaris</i>
Canterbury gecko	<i>Hoplodactylus</i> aff. <i>maculatus</i>
chaffinch*.....	<i>Fringilla coelebs</i>
chukor*.....	<i>Alectoris chukar</i>
common gecko	<i>Hoplodactylus maculatus</i>
common skink	<i>Oligosoma nigriplantare polychroma</i>
dunnock*	<i>Prunella modularis</i>
feral goat*.....	<i>Capra hircus</i>
feral pig*	<i>Sus scrofa</i>
giant scree weta.....	<i>Deinacrida connectens</i>
goldfinch*	<i>Carduelis carduelis</i>
greenfinch*.....	<i>Carduelis chloris</i>
grey warbler/riroriro.....	<i>Gerygone igata</i>
Hutton's speargrass weevil.....	<i>Lyperobius huttoni</i>
Kaikouras gecko.....	<i>Hoplodactylus</i> aff. <i>maculatus</i> "Kaikouras"
kea	<i>Nestor notabilis</i>
koaro.....	<i>Galaxias brevipinnis</i>
koura/freshwater crayfish.....	<i>Paranephrops planifrons</i>
longfin eel/tuna.....	<i>Anguilla dieffenbachii</i>
long-tailed cuckoo/koekoea.....	<i>Eudynamys taitensis</i>
long-toed skink.....	<i>Oligosoma longipes</i>
Marlborough mini gecko.....	<i>Hoplodactylus</i> aff. <i>maculatus</i> "Marlborough mini"
New Zealand falcon/karearea.....	<i>Falco novaeseelandiae</i>
New Zealand pigeon/kereru	<i>Hemiphaga novaeseelandiae novaeseelandiae</i>
New Zealand pipit/pihoihoi.....	<i>Anthus novaeseelandiae novaeseelandiae</i>
possum*.....	see brushtail possum
redpoll*	<i>Carduelis flammea</i>
rock wren.....	<i>Xenicus gilviventris</i>
rough gecko.....	<i>Heteropholis rudis</i>
shortfin eel.....	<i>Anguilla australis</i>
short-tailed bat.....	<i>Mystacina tuberculata</i>
silveryeye	<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 black-backed gull/karoro	<i>Larus dominicanus dominicanus</i>
South Island fantail/piwakawaka.....	<i>Rhipidura fuliginosa fuliginosa</i>
South Island kaka	<i>Nestor meridionalis meridionalis</i>
South Island long-tailed bat.....	<i>Chalinolobus tuberculatus</i>
South Island rifleman/titipounamu.....	<i>Acanthisitta chloris chloris</i>
South Island robin/kakaruai	<i>Petroica australis australis</i>
South Island tomtit/miromiro	<i>Petroica macrocephala macrocephala</i>
spotted skink.....	<i>Oligosoma lineocellatum</i>
torrentfish/piripiripohatu	<i>Cheimarrichthys fosteri</i>
upland bully.....	<i>Gobiomorphus breviceps</i>
upland longjaw galaxias	<i>Galaxias prognathus</i>
welcome swallow	<i>Hirundo tahitica neoxena</i>
yellow-crowned parakeet/kakariki	<i>Cyanoramphus auriceps auriceps</i>
yellowhammer*.....	<i>Emberiza cintrenella</i>

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