

Crown Pastoral Land Tenure Review

Lease name : GLENFELLAN

Lease number : PS 038

Conservation Resources Report - Part 1

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

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

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

November

05

DOC CONSERVATION RESOURCES REPORT
ON TENURE REVIEW OF

GLENFELLEN PASTORAL LEASE
(PAL-14-07-38)

UNDER PART 2 OF THE CROWN PASTORAL
LAND ACT 1998



TABLE OF CONTENTS

PART 1 3

INTRODUCTION 3

1.1 Introduction 3

1.2 Ecological Setting 3

PART 2 4

INHERENT VALUES: DESCRIPTION OF CONSERVATION RESOURCES AND ASSESSMENT OF SIGNIFICANCE 4

2.1 Landscape 4

 2.1.1 LANDSCAPE UNIT 1 5

 2.1.2 LANDSCAPE UNIT 2 7

 2.1.3 LANDSCAPE UNIT 3 8

 2.1.4 Significance of landscape 9

2.2 Landforms & Geology 9

2.3 Land Environments of New Zealand 10

2.4 Climate 11

2.5 Vegetation 12

 2.5.1 Western faces (including Fosters Creek) 12

 2.5.2 Summit Ridge 13

 2.5.3 Eastern slopes 14

 2.5.4 Flora 16

 2.5.5 Problem plants 16

 2.5.6 Significance of vegetation 16

2.6 Fauna 18

 2.6.1 Invertebrate Fauna 18

 2.6.2 Significance of the Invertebrate Fauna 19

 2.6.3 Herpetofauna 20

 2.6.4 Avian Fauna 20

 2.6.5 Aquatic Fauna 21

 2.6.6 Significance of Aquatic Fauna 21

 2.6.7 Problem Animals 21

2.7 Historic 21

 2.7.1 Historical Significance 24

2.8 Public Recreation 25

 2.8.1 Physical Characteristics 25

 2.8.2 Legal Access 26

 2.8.3 Activities 26

 2.8.4 Significance of Recreation 27

PART 3 28

OTHER RELEVANT MATTERS & PLANS 28

3.1 Consultation 28

3.2 Regional Policy Statements & Plans 29

3.3 District Plans 31

3.4 Conservation Management Strategies & Plans 32

3.5 New Zealand Biodiversity Strategy 32

PART 4 34

MAPS, REFERENCES, APPENDICES ETC. 34

4.1 References 34

4.2 Illustrative Maps 35

4.3 Appendices 36

**DOC CONSERVATION RESOURCES REPORT ON TENURE REVIEW OF
GLENFELLEN PASTORAL LEASE (PAL-14-07-38) UNDER PART 2 OF THE
CROWN PASTORAL LAND ACT 1998**

PART 1

INTRODUCTION

1.1 Introduction

The Lessee of Glenfellen Pastoral Lease (PL) has applied to the Commissioner of Crown Lands for a review of the property's pastoral lease tenure. The review is being undertaken under the provisions of the Crown Pastoral Land Act 1998. As part of the review process, a range of specialists visited the property to undertake an inspection on the 15 and 16 of November 2004. Their findings have been incorporated into this Conservation Resources Report.

Glenfellen PL covers an area of approximately 1563.3 hectares at the Garston end of the Nevis Road, on the southern end of the Hector Mountains. It is bounded by Lorne Peak PL to the north, the Nokomai River and Nokomai PL to the west and adjoining Blackmore Conservation Covenant to the south. The lease is bisected by the Nevis Road.

1.2 Ecological Setting

Glenfellen PL is located adjacent to the north-western boundary of the Nokomai Ecological District (McEwan, 1989). A Protected Natural Areas Programme (PNAP) survey was undertaken in 1986-87 (Dickinson, 1989). This PNAP survey identified eleven Recommended Areas for Protection (RAP's). One of these RAP Nok 7- Upper Nokomai (c. 575 ha) is largely located on Glenfellen PL. RAP Nok 8 – Blackmore (C. 495 ha) partially adjoins the southern boundary of Glenfellen PL and has been protected within a large (1000 ha) conservation covenant. The Flagstaff conservation covenant (168 ha) protects RAP Nok 11- Lower Slate and is located 12.5km to the southwest. The nearest areas of DOC administered conservation land within the Nokomai Ecological District are:

- Marginal Strip on the Nokomai and Nevis Rivers.
- Gow, Blue and Scott Lakes Scenic Reserve (103.75 ha), located 9km to the east across the Garvie Mountains and includes part of RAP Nok 2 – Gow Burn.
- Gow Forest (part Waikaia Forest Conservation Area, 10,479 ha), located 10 km to the south-east across the Garvie Mountains and includes part of RAP Nok 2 – Gow Burn and Nok 1 - West Waikaia.
- East Dome Scenic Reserve (768.5 ha) located 16km to the south and includes part of RAP Nok 5 – East Dome.

- Mataura Range Scenic Reserve (1551.75 ha) located 19.5 km to the south and includes part of RAP Nok 4 – Mataura Range.
- Part Blackhill Conservation Area, near Mataura Range Scenic Reserve.
- Cupola Conservation Area (1060.27 ha) located 22.5 km to the south-west.

The Pastoral Lease is located approximately 20kms south of the Remarkable Conservaton Area, ex Glen Nevis Pastoral Lease tenure review, in the adjoining Remarkable Ecological District.

PART 2

INHERENT VALUES: DESCRIPTION OF CONSERVATION RESOURCES AND ASSESSMENT OF SIGNIFICANCE

2.1 Landscape

Glenfellen PL straddles the Nokomai Range in Northern Southland. To the west, these low rangelands border the upper Mataura valley, a wide alluvial valley which extends from Kingston in the north down to the Parawa downlands in the south, where the valley merges in with the Waimea Plains. A wide concave valley floor that has been converted into intensive mixed farmland typifies the upper Mataura valley. The bordering lower slopes are more extensively grazed. To the east, a deep v-shaped valley that contains the Nokomai River, which is also extensively grazed, especially on the sunnier faces, bounds the Nokomai Range. Immediately north of Glenfellen is the watershed between the Nokomai River and the Nevis River, which drains into the Kawarau River near Gibbston.

The three main structural components of the property include the long colluvial slopes that overlook the Mataura valley. The summit of the Nokomai Range is typically dome-shaped and is studded with castellated tors. The eastern facing slopes are steep and hummocky in nature and contain substantial rock outcropping.

It should be noted that the holder has been given discretionary consent in terms of the CPLA 1998 to blanket plant the lower and mid western slopes in Douglas fir. This major change in land use will have a substantial effect on the character of these grasslands.

Methodology

The property was inspected from various vantage points along State Highway 6 and from along the Nevis Road which sidles through the property.

The fundamental components of the landscape assessment included dividing the property into three landscape units (LU) determined mainly on aspect and land cover. The criteria used to assess and evaluate each unit's landscape value were based on the following attributes:

- Naturalness – which is an expression of the degree of indigenous content of the vegetative cover, and the extent of human intervention.
- Legibility – which is an expression of the clarity of the formative processes and how striking these physical processes are.
- Aesthetic values – which includes the concepts of memorability and naturalness. Aesthetic factors, which can make a particular landscape vivid, include simplicity in landform, muted colours and fine-textured ground cover.
- Visual values - which are a subset of landscape values and relate to the visibility of a particular landscape or natural feature seen from public vantage points such as along district highways.

2.1.1 LANDSCAPE UNIT 1

This unit incorporates the entire western-facing slopes that overlook the upper Mataura valley. The lower boundary is defined by a straight survey line, which follows approximately the 500m.asl contour, whilst the unit's upper limits follow approximately the 1,000m.asl contour where there is a definable change in topography.

The unit's dominant physical feature is the catchment area of Fosters Creek, which is characterized by a large upper basin that tapers into a v-shaped gully in the mid section of the catchment area. The upper basin is bowl-like in profile and features substantial slumping that is associated with the water logging of the colluvial soils. Etched into the mantle of colluvial soils are numerous runnels that have their origins just below the summit of the Nokomai Range. The Fosters Creek catchment is enclosed by long even-graded ridgelines that extend from the summit of the Nokomai Range down to the alluvial floor of the upper Mataura valley. The low front slopes of this unit contain a number of small watercourses that drain out across the valley floor into the Mataura River.

The ground cover is strongly influenced by altitude and previous grazing pressure. The front slopes between the 500m.asl contour and up to about 700m.asl are heavily modified with the vegetation consisting of a mixture of introduced pasture grasses such as sweet vernal and Yorkshire fog, scrub matagouri, bracken fernlands, tufts of hard tussock and the ubiquitous golden spaniard. In the deeper gullies, Hebe shrublands still survive.

Above the 700m.asl narrow-leaved snow tussock begins to grade in, with these tall grasslands becoming the dominant vegetative cover above the 850m.asl. The density and stature of the tussock depends greatly on aspect. Throughout the tall grasslands there is a representation of sub alpine *Dracophyllum*, golden spaniard and dwarf snowberry. A remnant of beech forest still survives within the mid section of the Fosters Creek catchment. The only woody weeds include single broom plants that are widely distributed along the edges of the road, while there is a scattering of wilding pines across the front faces.

Bisecting the unit is the old Nevis Road that links Northern Southland with Central Otago. Sidling around the 600m.asl contour is a water race that has its headworks in the deep gullies opposite Kingston. Sited close to the Nevis Road is the old Southland Ski Club hut.

Landscape Values

This unit contains significant inherent landscape values principally due to the simplicity and intactness of the tall grasslands being overlaid on varying landforms. In aesthetic terms, the unit conveys a strong sense of coherence and visual harmony owing to the fine texture and near-monochromatic tonal range of the tussocklands. The Nevis Road, located within a setting of tall grasslands, is an important historic element within the high country, along with the old ski hut that is built in materials and style similar to the traditional high country musterers' hut.

Visual Values

This unit has a high visual resource value attributable to its accessibility from State Highway 6, especially when travelling southwards. From this direction, the front slopes and the upper and mid catchment area of Fosters Creek are highly visible. State Highway 6 between Queenstown and the Five Rivers junction is a part of the nationally significant tourist route that links Queenstown with Milford Sound.

Potential Vulnerability to Change

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

- The introduction of large-scale geometric land uses such as plantation forestry, which would be incompatible in this tall grassland context. It is noted that consent has been granted to the lessee to plant Douglas fir up to the 900m.asl contour.
- Further spread of wilding pines and other woody weeds across the tall grasslands.
- Infestation of the beech remnants with Douglas fir.
- Subdivision fencing that would lead to artificial fragmentation of the existing coherent tussock cover.
- Inappropriate changes to the ski hut, which reflects a certain era in backcountry vernacular.
- Widening of the Nevis Road, which presently still conveys a backcountry character.

2.1.2 LANDSCAPE UNIT 2

Description

This is a lineal unit that occupies the summit of the Nokomai Range, which forms the narrow watershed between the upper Mataura River in the west and the Nokomai River to the east. The summit is typically dome-shaped rising to a high point of 1,106m.asl. Protruding along the summit skyline are clusters of castellated tors and formations of rock outcropping. Winding around the rock formations is the Nevis Road that tends to follow the drier ridge crest of the summit.

The dominant vegetative cover is narrow-leaved snow tussock, which is supplemented by blue tussock, mountain cottonwood, subalpine *Dracophyllum*, boxwood and golden spaniard. Some of the inter-tussock spaces are occupied by bare gravel and grey lichens. The gravel verges of the Nevis Road are clad in a mixture of both native and introduced short grasses.

Landscape Values

The unit contains significant inherent landscape values attributable to the intactness and naturalness of the vegetation (part of the Nok.7 RAP, which identified this area as having important botanical and entomological values). The unit's naturalness has been reduced by the presence of the Nevis Road; however, from a landscape perspective the integrity of the high country has not been severely compromised. This is because the original alignment of the carriageway is not over-imposing on the landscape as it twists around the rocky outcrops and along the even-graded ridge crest. The lack of signage helps to reinforce the road's historic heritage traits.

Visual Values

The unit has a high visual resource value principally due to the position of the Nevis Road which winds around the ridge crest of the Nokomai Range. From this ridge crest, looking west, panoramic views of the upper Mataura valley and the distant Eyre Mountains are accessible, whilst to the east, short glimpses of the Nokomai valley are obtained. Rather than having impressive outward views, the unit's significance is due to the road's visual corridor that is still original in character. The road also allows the general public to travel through a tussock landscape rather than following the lower edge, which is the normal situation.

Potential Vulnerability to Change

This unit has the potential to be adversely affected by the following changes in land

use and activities:

- Further road widening and verge disturbances that would allow opportunist species such as introduced pasture grasses to spread.
- The opening of gravel borrow pits.
- The use of gravel that is infested with weed seeds to top-dress the Nevis Road.
- Further spread of wilding pines.

2.1.3 LANDSCAPE UNIT 3

Description

This unit encompasses all of the eastern-facing slopes that over look the Nokomai River, which drains into the Mataura River further to the south. The upper boundary to the unit is just below the ridge crest of the Nokomai Range (Landscape Unit 2), whilst the Nokomai River forms the lower physical boundary.

The primary physical component of the unit is that of the long colluvial slopes that dip rapidly towards the floor of the Nokomai valley. These steep slopes are typified by hummocky terrain, which is intermittently broken by incised watercourses that cut directly down the slopes into the Nokomai River. Just below the crest of the summit there is a scattering of rocky outcrops, while a series of impressive rock buttresses occupy the mid slopes.

The vegetative cover is strongly influenced by altitude, aspect and previous grazing, with the principal ground cover being narrow-leaved snow tussock. The density of the tussock varies with the tall grasslands becoming increasingly more modified towards the north where there has been more intensive grazing. Just below the summit there is a wide band of mixed shrublands that includes mountain cottonwood, boxwood and subalpine *Dracophyllum*. A ribbon of beech forest stretches along the valley floor supplemented by broadleaved shrublands. Remnants of beech forest extend up the major gullies principally being protected from fire by the steep terrain.

Inherent Landscape Values

This unit conveys significant inherent landscape values principally due to the overall impression of intactness of the native vegetation (a large proportion of this unit was identified as being significant during the 1989 PNAP survey). The unit is markedly different from the opposing western slopes due to the steepness of the hummocky terrain, rocky formations, extent of mixed shrublands and the substantial beech forest remnants. All of these elements provide the opportunity to protect a wide assemblage of topographical features and plant communities over a wide altitudinal range. A notable feature is the beech forest remnants, which makes a positive contribution to the high country and acts as a foil against the extensive open grasslands.

Visual Values

This unit has only a local visual resource value due to the Nokomai River catchment conveying a strong sense of containment with the only public views accessible being the occasional glimpse along the summit of the Nokomai Range.

Potential Vulnerability to Change

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

- Further loss of beech fringe species that act as a natural buffer around the remnants.
- Loss of forest under story vegetation, especially palatable species such as broadleaf due to further stock browsing and concentrated camping.
- Fire that would further reduce the size and sustainability of the beech forest.
- Infestation of the beech forest remnants with woody weeds and wilding pines.
- Unnecessary earth disturbances such as dozed fence lines across slopes that are free of human intervention.

2.1.4 Significance of landscape

The landscape of Glenfellen PL makes a significant contribution to the natural character of Northern Southland and is the southern entry to the iconic Nevis Valley landscape. The property contains large tracts of intact tall tussock grasslands that still extend to a relatively low altitude. Furthermore, the tussock cover spans a wide assemblage of landforms that include the long colluvial slopes overlooking the Mataura valley, the domed ridge crest and the hummocky steep faces that descend towards the Nokomai River in the west containing sustainable remnants of beech forest. This coupled with the property having a common boundary with the large conservation covenant to the south, provides an opportunity to protect a large tract of high country that possesses high inherent landscape values, easily accessible to the public via the Nevis Road.

Three areas on the Glenfellen PL have significant inherent landscape values; the west facing slopes overlooking the upper Mataura valley (above 900 m), the summit, and the eastern facing slopes overlooking the Nokomai River.

2.2 Landforms & Geology

It is likely that the upper Nokomai River follows the southern continuation of the

Nevis fault, the major structural feature of the Nevis Valley. During, and since the Pleistocene, the Nokomai River maintained an antecedent gorge in this part of the Garvie Mountains. In places, the valley is deeply incised with rock bluffs common. Above these, colluvial slopes showing a range of mass movement features, including slumped and ripply topography, rise to the broad, gently sloping ridge crest of the Nokomai Range. (Dickinson, 1989)

Soils are high country yellow-brown earths (Carrick, Carrick Hill and Fairlight soils), derived from greywacke, schist and semi-schist. Texture varies from silty and stony loams to stoney silt loams. (Dickinson, 1989)

2.3 Land Environments of New Zealand

There are two databases that have been used to assess biodiversity protection (Walker et al 2004).

1. Environmental distinctiveness has been assessed through the land Environments of New Zealand (LENZ). This is a classification of New Zealand landscapes using a comprehensive set of climate, landform and soil variables chosen for their roles in driving geographic variation in biological patterns (Leathwick et al 2002, 2003). It is presented at four levels of detail containing 20, 100, 200 or 500 environments nationally. The most detailed is called LENZ Level IV.
2. The area of unprotected indigenous cover in threatened land environments has been identified in the national land cover database (LCDB).

From the above databases, spatial data depicting indigenous cover and legal protection were overlaid on LENZ Level IV environments to identify biodiversity that is most vulnerable (most likely to be lost). This provides a measure for:

- a) percentages legally protected and;
- b) percentages of remaining indigenous cover.

Based on these two criteria, five categories of threatened environments have been used to identify environments containing indigenous biodiversity at most risk of loss. They are classified as follows:

1. *Acutely threatened*: <10% indigenous cover remaining
2. *Chronically threatened*: 10-20% indigenous cover remaining
3. *At risk*: 20-30% indigenous cover remaining
4. *Critically underprotected*: >30% indigenous cover remaining and <10% protected
5. *Underprotected*: >30% indigenous cover remaining and 10-20% protected
6. *No threat*: >30% indigenous cover remaining and >20% protected.

Glenfellen PL Land Environments

THREAT_CATEGORY	Approx. Area in lease	Lvl_4	% INDIGENOUS COVER REMAINING	% PROTECTED	INDIGENOUS Cover Change 97-02
At Risk	1.1140	Q4.3a	23.41	7.74	Decrease
Critically Underprotected	93.6370	Q1.1b	77.1	8.43	Decrease
Critically Underprotected	395.3540	Q2.2a	39.92	3.91	Decrease
Critically Underprotected	0.2170	Q2.2b	44.68	6.45	No Change
Critically Underprotected	1.7190	Q3.3b	80.51	0.94	Decrease
Underprotected	406.2190	Q1.1c	91.23	17.86	No change
Underprotected	46.0570	Q3.3c	90.03	17.21	Decrease
No Threat Category	177.3120	Q1.1a	98.37	24.81	No change
No Threat Category	56.6880	Q1.1d	84.66	34.76	No change
No Threat Category	179.5570	Q3.1a	66.59	35.8	No change
No Threat Category	97.7720	Q3.1b	34.54	27.21	Decrease
No Threat Category	100.1690	Q3.3a	96.91	25.62	No change
Total Area	1555.815				

LENZ analysis

There are 12 level 4 LENZ units found on Glenfellen PL. These are Q1.1a, Q1.1b, Q1.1c, Q1.1d, Q2.2a, Q2.2b, Q3.1a, Q3.1b, Q3.3a, Q3.3b, Q3.3c and Q4.3a. This is very rich considering the limited size of the property. The most extensive units are Q1.1c and Q2.2a, other major units are Q1.1a and Q3.1a. Approximately 1 hectare of unit Q4.3a is considered at risk (20-30% indigenous cover remaining). Units Q1.1b, Q2.2a, Q2.2b and Q3.3b are considered critically under-protected (i.e. <10% protected), while units Q1.1c and Q3.3c are considered under-protected (10-20% protected). A plan of the level 4 LENZ units for the Lease is attached as appendix 2.

2.4 Climate

The Glenfellen PL lies in the Nokomai District which has a cool temperate climate, transitional between the wetter Eyre District to the west, the humid-sub humid Umbrella District to the east, and the drier Central Otago Region to the north. Annual rainfall in the Nokomai District is given 767-995mm (Dickinson, 1989) at relatively

low altitudes, but could be undoubtedly wetter in the uplands and colder than recorded at the lowland sites. Mean monthly temperatures recorded at Mid Dome over 30 years averaged from 14.8 C (January) to 3.7 C (July), mean daily maxima from 21.1 C to 8.3 C and mean daily minima from 8.4 C to -1 C. (Dickinson 1989)

2.5 Vegetation

Glenfellen PL has been divided into three areas for the purposes of vegetation description. These are the western faces, summit ridge and the eastern faces.

The western faces are of moderate steepness and are drained by Fosters Creek and an unnamed creek, into the Mataura River. The eastern faces are more steep and drain into the Nokomai River. The pastoral lease extends from c. 430m to 1154m (i.e. an altitudinal range of c. 720m). The Nevis Road cuts across the front (western) faces and up the side ridge between Fosters Creek and the unnamed creek and along the summit ridge before descending down to the Nevis/Nokomai saddle.

2.5.1 Western faces (including Fosters Creek)

This area extends from c. 430m (in the lower Fosters Creek) up to the summit ridge at above 1060m. This portion of the property is the front country of the property and consequently the lower slopes have been heavily modified by pastoral activity. Narrow-leaved snow tussockland extends from below 900m to the top of the property. There has been a recent Crown Pastoral Land Act consent approved which allows the planting of Douglas fir on 467 ha and up to 900m. To date c. 190 ha has been planted within Fosters Creek catchment. Part of this area (c. 300ha) has also been approved for top-dressing and over-sowing.

The lower slopes (below c. 600m) are dominated by pasture grasses with some silver tussock (*Poa cita*) and occasional matagouri (*Discaria toumatou*), mingimingi (*Coprosma propinqua*) and briar (*Rosa rubiginosa*).

The mid slopes (c. 600-900m) are dominated by modified fescue tussockland containing much pasture grass. Narrow-leaved snow tussock (*Chionochloa rigida*) extends down to c. 750m on shady faces. There are scattered seepage areas that contain cutty grass (*Carex coriacea*) and patches of bracken (*Pteridium esculentum*).

There are several gullies on the front faces. These generally contain some mingimingi, matagouri, tutu (*Coriaria sarmentosa*), prickly shield fern (*Polystichum vestitum*). Also present are occasional *Aciphylla glaucescens*, golden speargrass (*Aciphylla aurea*) and other species. The southern most catchment contains many pine trees (*Pinus* sp.) and hawthorn (*Crataegus monogyna*) within mingimingi, briar, matagouri, bracken and prickly shield fern.

The snow tussockland is the most extensive community on the western faces and is similar in composition to that found on the eastern faces. Major associated species include lichens, bryophytes, *Pentachondra pumila*, snowberry, *Raoulia subsericea*, blue tussock, (*Poa colensoi*), with some *Lycopodium fastigiatum*, *L. australianum*,

Ranunculus multiscapus, *Gentiana bellidifolia*, *Leucopogon fraserii*, *L. colensoi*, *Blechnum penna-marina* and catsear. There is generally only a minor amount of exotic grass present. Visually prominent species include occasionally some *Dracophyllum uniflorum*, *Hebe anomala*, cottonwood (*Ozothamnus vauvilliersii*) and golden speargrass. The most extensive area of snow tussockland lies in the Fosters Creek catchment. Good condition narrow-leaved snow tussockland extends down to the beech forest remnant in Fosters Creek.

There is a small (c. 5ha) pocket of mountain beech forest in the south branch of Fosters Creek (Mataura River catchment). It is the only beech forest on the property on the western side of the summit ridge (larger areas are found on the adjacent Lorne Peak Station).

2.5.2 Summit Ridge

The summit ridge varies from 1060 – 1154m. The vegetation present at a site is primarily dependent upon the exposure and soils found. The summit ridge contains areas of fellfield, shrubland, shrub-snow tussockland, snow tussockland and tors.

The fellfields are comprised of much bare gravel, along with *Dracophyllum uniflorum*, the moss *Rhacomitrium lanuginosum* and lichen, with small amounts of *Pentachondra pumila*, narrow-leaved snow tussock, the clubmoss *Lycopodium fastigiatum*, *Lycopodium scariosum*, the mat daisies *Raoulia grandiflora* and *R. subsericea*, *Anisotome aromatica*, *Pimelea oreophila*, *Celmisia densiflora*, golden speargrass, *Hebe propinqua* and mosses. Locally this community grades into a mossfield-shrubland community dominated by *Rhacomitrium lanuginosum* and *Dracophyllum uniflorum*.

The shrub-tussockland community is dominated by narrow-leaved snow tussockland, with much *Dracophyllum uniflorum* and leaf litter ground cover. Other shrubs present include *Hebe anomala*, *H. propinqua*, and cottonwood. Other components of the community include bryophytes, *Celmisia densiflora*, golden speargrass, blue tussock, snowberry (*Gaultheria depressa* var. *novae-zelandiae*), *Pentachondra pumila*, *Raoulia subsericea*, *Lycopodium fastigiatum*, *Uncinia divaricata*, *Ranunculus multiscapus* and catsear (*Hypochaeris radicata*).

The snow tussockland consists of dense narrow-leaved snow tussock, that is 60-100cm tall. Visually prominent species include scattered *Dracophyllum uniflorum*, *Hebe anomala* and cottonwood (each being locally common), and golden speargrass. Other major associated species include lichens, bryophytes, *Celmisia densiflora*, *Pentachondra pumila*, snowberry, *Raoulia subsericea* and blue tussock. Other associated species include *Lycopodium fastigiatum*, *L. australicum*, *Ranunculus multiscapus*, *Gentiana bellidifolia*, *Leucopogon colensoi* and catsear.

There are rock tors and associated boulderfields scattered along the summit ridge. These are a distinctive feature of the summit area. They contain a characteristic flora which includes *Dracophyllum uniflorum*, *Gaultheria crassa*, *Celmisia densiflora*, *C. lyallii*, *Pentachondra pumila*, *Scleranthus uniflorus*, *Colobanthus buchananii*, *Leucogenes grandiceps*, *Koeleria cheesemanii* and other species.

2.5.3 Eastern slopes

This area extends from c. 500m (in the Nokomai River) up to the summit ridge at above c. 1060m. This portion of the property is the back country of the property and consequently the lower slopes have been less modified by pastoral activity. Much of the grazing pressure appears to be from Nokomai Station across the river.

Narrow-leaved snow tussockland is the major vegetation and generally extends from the summit area down to the forest on the lower slopes. The snow tussockland although generally intact and in good condition, however does vary somewhat in condition, with the best condition areas being found at higher altitude. At higher altitudes the community contains 60-100+cm tall, dense narrow-leaved snow tussock. At lower altitudes the narrow-leaved snow tussock is shorter and generally less dense, having been opened out by burning. Visually prominent species include some *Dracophyllum uniflorum*, *Hebe anomala* and cottonwood (each being locally common), along with *Astelia nervosa* and golden speargrass. Other major associated species include lichens, bryophytes, *Celmisia densiflora*, *Pentachondra pumila*, snowberry, *Raoulia subsericea* and blue tussock. Other associated species include *Lycopodium fastigiatum*, *L. australianum*, *Ranunculus multiscapus*, *Gentiana bellidifolia*, *Leucopogon colensoi* and catsear. There is generally only a minor amount of exotic grass present.

Along upper gully sides there is often a rich diversity of herb species present. These herbs include *Ourisia caespitosa*, *Anemone tenuicaule*, *Plantago lanigera*, *Geum leiospermum*, *Anisotome aromatica* var. *flabellifolia*, *Viola filicaulis*, *Oreomyrrhis ramosa*, *O. colensoi*, *Forestera sedifolia*, *F. tenella*, *Gentiana bellidifolia*, *Brachyglottis bellidioides* and *Anaphalis bellidioides*.

On lower shady faces there is much *Coprosma cheesemanii*, along with some *Dracophyllum uniflorum*, *Hebe anomala*, cottonwood, prickly shield fern and *Astelia nervosa*. Lower sunny faces have some *Gaultheria crassa*, golden speargrass and *Coprosma cheesemanii*, along with bracken patches.

Shrub-tussockland communities tends to be found on shady slopes and upper slopes, extending onto the summit ridge. The community is dominated by narrow-leaved snow tussockland, *Dracophyllum uniflorum* and leaf litter. Other shrubs present include cottonwood, *Hebe anomala*, *H. propinqua* and *Coprosma cheesemanii*. Other components include bryophytes, *Celmisia densiflora*, golden speargrass, blue tussock, snowberry, *Pentachondra pumila*, *Raoulia subsericea*, *Lycopodium fastigiatum*, *Anemone tenuicaule*, *Uncinia divaricata*, *Ranunculus multiscapus* and catsear.

In gullies there are areas of wet flush along streams. These contain much cutty grass, Maori onion (*Bulbinella angustifolia*), *Uncinia divaricata*, *Dolychoglottis lyallii* and *Oxalis lactea*. The lower sections of gullies have much woody vegetation. The woody vegetation includes *Coprosma cheesemanii*, *C. ciliata*, *C. rugosa*, *Hebe odora*, *H. rakiaensis* and *Carmichaelia virgata*. Other typical species include *Aciphylla glaucescens*, golden speargrass, *Hypolepis millefolium*, prickly shield fern, *Astelia nervosa*, *Uncinia divaricata*, *Dolychoglottis lyallii* and other species.

There are localised wetlands present. One area examined was associated with a tarn in a small basin formed by slumping. The wetland contained several distinct communities, including a flush area, turf area and red tussockland. The flush community was dominated by the liverwort *Marchantia berteroana*, mosses and *Carex gaudichaudiana*, with much *Gonocarpus aggregatus*, *Hydrocotyle microphyllum*, *Schizeilema cockaynei* and exotic grass. The turf area was found along a seasonally flooded channel. This turf community contains *Leptinella squalida* var. *mediana*, *Rumex flexuosus*, *Acaena tesca*, *Pratia angulata*, *Hydrocotyle microphyllum*, *Ranunculus foliosus*, *Juncus pusillus*, *Hydrocotyle microphyllum*, *Plantago triandra*, adders tongue fern (*Ophioglossum coriaceum*) along with some white clover (*Trifolium repens*) and exotic grasses. The red tussockland (*Chionochloa rubra*) area inspected was dominated by sphagnum moss and red tussock, with some *Dracophyllum uniflorum*, *Maori onion*, *Celmisia* sp. "rhizomatous gracilentata" but few other species.

Rock outcrops are sparsely scattered across the slope, some with associated with boulderfields. These rock outcrops act as a fire refuge especially at lower altitude, refuge species include *Olearia arborescens*, *Corokia cotoneaster*, *Coprosma ciliata* and *Gingidia montana*. Other rock outcrop species include *Celmisia hookerii*, *Asplenium richardii* and *Brachglottis southlandicus*.

The forest contains mountain (*Nothofagus solandri* var. *cliffortioides*), silver (*N. menziesii*) and red beech (*N. fusca*). Although not examined in detail during the inspection, it was described within the description for RAP Nok 7 (Upper Nokomai) and on earlier inspections (Rance, 1992). Each of the three beech species is locally dominant or co-dominant dependant upon slope, aspect, soils and other site factors. Generally mountain beech is most common, especially on ridge crests. This forest is c. 15-20+m tall. Associated tree species include broadleaf (*Griselinia littoralis*) and celery pine (*Phyllocladus alpinus*). The shrub layer contains *Coprosma colensoi*, *C.* sp. aff. *parviflora* as well as young beech seedlings. The ground cover is sparse but includes the hook grasses *Uncinia clavata*, *U. uncinata*, *U. filiformis* and *U. rupestris*, the filmy fern *Hymenophyllum multifidum*, other ferns and a number of herbs. The beech forest is generally extends from 500m to 800m, with one side gully up to 870m.

In the north of the property along the start of the track from the Nevis Road into the Nokomai Valley is an area of degraded snow tussockland. The area appears to be fenced into Nokomai Station. This area is grazed by cattle and the narrow-leaved snow tussock is in poorer condition than other areas of the property on this aspect. The narrow-leaved snow tussock is low statured (30-50cm) and of only moderate density, with much leaf litter and exotic grasses (mainly browntop (*Agrostis capillaris*)). Other species present include blue tussock, the alpine daisy *Celmisia densiflora*, the mat daisy *Raoulia subsericea*, the clubmoss *Lycopodium fastigiatum*, sub-shrubs snowberry and *Leucopogon fraseri* and catsear. Also in this area are flush areas present, these varied in condition and composition. One areas contained cutty grass and the exotic *Carex ovalis*, rushes, bryophytes including sphagnum, herbs and some red tussock. Herbs include *Hydrocotyle microphyllum*, *Montia fontana*, *Pratia angulata*, *Viola cunninghamii*, *Ranunculus cheesemanii*, *R. gracilipes*, *Celmisia* sp. "rhizomatous gracilentata", *C. glandulosa*, *Plantago uniflora*, *Gonocarpus micranthus*, *Schizeilema cockaynei*, *Epilobium komarovianum*, *E. brunnescens*, *Gnaphalium laterale*, *Carex gaudichaudiana*, *C. echinata*, spike rush (*Eleocharis acuta*) and *Junus*

antarcticus.

2.5.4 Flora

A flora of 250 species including 216 native species has been recorded for the area, most of these have been recorded on Glenfellen Station or thought likely to be present. This flora is considered rich for a moderate sized property with a limited altitudinal range and lack of alpine communities. A number of threatened and uncommon species (de Lange, 2004) have been recorded these include the yellow flowered beech mistletoe *Alepis flavida* (status – Gradual decline), *Anemone tenuicaulis* (status – sparse), *Celmisia hookerii* (status – sparse) and *Kirkianella novae-zelandiae* var. *novae-zelandiae* (status – sparse). In addition *Olearia fimbriata* (status – Serious decline) has been recorded on the opposite side of the Nokomai Valley.

2.5.5 Problem plants

While several exotic plant species are present there are few considered to be of conservation concern. The greatest threat is from wilding pine trees.

- Pine trees (*Pinus* sp.): There are many pine trees in the south-western catchment.
- Lodgepole pine (*Pinus contorta*): A few small Lodgepole pines were observed including a some scattered on the eastern faces.
- Douglas fir (*Pseudotsuga menziesii*): A 200ha Douglas fir plantation has been established on Glenfellen Station. Despite the wilding control provisions imposed under the CPLA consent there are concerns regarding the future establishment of wilding Douglas fir. Part of the property is outside the 2km control zone proposed.
- Gorse (*Ulex europaeus*) and broom (*Cytisus scoparius*): Some gorse is present in the south-western catchment with a few others observed along the Nevis Road on the western faces.
- Hawthorn (*Crataegus monogyna*) and elderberry (*Sambucus nigra*): Both were restricted to the south-western catchment.
- Briar (*Rosa rubiginosa*): Briar is common in lower altitude areas on the western slopes.
- Mouse-ear hawkweed (*Hieracium pilosella*) and tussock hawkweed (*H. lepidulum*): Mouse-ear hawkweed is widespread but not common on the property and does not significantly compete with or exclude native vegetation. Tussock hawkweed is currently uncommon on the property.

2.5.6 Significance of vegetation

Most of Glenfellen PL above c. 900m retains intact indigenous vegetation on the western faces, the summit ridge and down to the property boundary on the eastern

faces. The area is dominated by narrow-leaved snow tussockland, with areas of shrub tussockland and locally beech forest, shrubland, wetlands and fellfield. These native plant communities are highly representative of the montane, sub alpine and low alpine bioclimatic zones of the Nokomai ED and the wider Northern Southland/Central Otago region. The vegetation is found on a range of landforms and aspects. The flora is rich considering the limited size and altitudinal range of the property. The flora includes 4 nationally listed species, the yellow flowered beech mistletoe *Alepis flavida* (status – Gradual decline), *Anemone tenuicaulis* (status – sparse), *Celmisia hookerii* (status – sparse) and *Kirkianella novae-zelandiae* var. *novae-zelandiae* (status – sparse).

The property contains altitudinal sequences of vegetation which retains a high degree of natural character being dominated by indigenous species. The altitudinal sequence on the eastern side of the summit ridge extends from the floor of the Nokomai Valley to the summit ridge. In addition it forms part of a sequence across the Nokomai valley up to the Garvie Mountains. The area complements the large Blackmore Conservation Covenant.

The highly natural character is significant because of its visibility from both the Kingston-Garston Road (SH6) and the Nevis Road. The condition and significance of the vegetation has previously been recognised during the Natural Areas Programme (PNAP) survey of the Nokomai ED. RAP Nok 7- Upper Nokomai (c. 575 ha) occupies about one third of the property, extending from the Nokomai River up to and across the summit ridge. Particular features of the property include:

- The property is notable for its extensive, good condition narrow-leaved snow tussocklands. These tussocklands contain a healthy population of *Anemone tenuicaulis* and *Hebe propinqua*.
- Shrub tussocklands vary in composition with several shrub species being at least locally co-dominant. These communities are at a relatively low altitude (1000-1100m).
- The fellfield and rock outcrops are distinctive feature of the summit and occur at low altitudes 1080-1100m.
- The mixed beech forest is one of the northernmost in the Nokomai ED and is a remnant of a formerly much more widespread community.

The presence of a pocket of mixed beech forest is of importance as it represents the original vegetation cover that would have dominated below c. 1200m. The protection of an altitudinal sequences above the Nokomai River is important as it will promote the future expansion of forest and shrubland communities. The importance of woody vegetation, and the desirability of protecting shrublands across a full range of Central Otago environments has been given prominence by Walker et al. (2002). The recovery of shrublands in the absence of grazing and fire has been demonstrated at several sites in Central Otago (Walker loc. cit.) and is a desirable biodiversity outcome.

2.6 Fauna

2.6.1 Invertebrate Fauna

Due to poor weather conditions on the date of inspection, the invertebrate survey was undertaken when conditions improved on 1 December 2004. As a result of this, the invertebrate section focuses largely on habitat, rather than fauna collected, and utilises published information from previous surveys of the Nokomai and Waikia Ecological Districts (Dickinson 1989 and Dickinson et. al 1998).

Invertebrates were hand collected by net. Mainly collected from along the Nevis Road. The weather was dry, fine and warm, with intermittent patches of overcast sky. Light wind prevailed for most of the day which picked up mid afternoon.

Invertebrate fauna of grasses

Giant landsnail *Powelliphanta s. spedeni*

This snail (threat of extinction status – serious decline, Molloy et. al. 2002, Hitchmough 2002) was found (predated) on a steep south facing slope where tussock cover was dense, at the edge of the beech forest (850m a.s.l). In this region, their localities range from 850-1150m. Snail populations range from the southern Eyre Mountains in a band across uplands to Mt. Benger in the eastern limit. This long-lived carnivorous snail is likely threatened by animal trampling, predation and fire in grasslands, and in forest habitat: predation and possibly a reduction in undergrowth.

A number of day active moth species in the genera *Orocrambus* and *Eudonia* have larvae feeding in grasses. A range of leaf mining, seed, root and litter feeding moths, beetles and flies, although not collected in this survey, are likely to be present, and are representative of the grassland faunal community.

The only *Megadromus* species found in this survey was *M. sandageri*. In previous surveys in the Waikaia region, this was the most commonly occurring *Megadromus*.

Invertebrate fauna of herbs

The rich diversity of herbs recorded in montane and upland grasslands, snow banks, fellfields, erosion surfaces and other communities will be matched by a suite of insects that feed on them. A few associations found in the Nokomai Ecological District are noted below.

The larvae of the moth *Asterivora marmarea* which feed on *Celmisia gracilentia* complex, and the geometrid moth *Chloroclystis neresis* has larvae in *Celmisia* flowers. The moths *Dasyuris anceps* and *D. transaurea* have larvae on Anisotome. The moths *D. partheniata* and *Graphania nullifera* are among those species that feed on speargrasses. Day active moths, grasshoppers, weta, weevils and other insects feed on a range of snowbank herbs.

Invertebrate fauna of wetlands

In the gullies there are areas of wet flush along streams. Invertebrate communities in these areas were representative of northern Southland. The grasshopper *Sigaus australis* was relatively common on the edge of these wet areas, as too was *Orocrambus sabulosella* (sod webworm). *Orocrambus* species were represented in the tussockland around these flushes.

There are localised wetlands present. One area examined contained a small basin formed by slumping. The wetland contained several distinct communities, including a flush area, turf area and red tussockland. Of note is the moth *Asaphodes cinnabari* although not collected on the lease, has its type locality in the nearby Nevis Valley. This moth is local in its occurrence and associated with montane, open flushes such as those on Glenfellen PL.

Invertebrate fauna of summit ridge

Rock tors, rock piles and associated boulder fields are scattered along the summit ridge (~1000m). *Notoreas paradelpha*, is associated with *Pimelea*, which is found in these areas. The moth *Prepala austrina* is associated with *Leucopogon fraseri* which is a common plant on the lease.

Invertebrate fauna of shrublands

The tussock-shrubland plant communities of RAP NOK 7 – Upper Nokomai, hold special significance for invertebrates (Dickinson et. al. 1998).

The rare plant *Olearia fimbriata* has been recorded on the opposite side of the Nokomai Valley and may be present on Glenfellen PL. This is known to host larvae of a range of moths restricted to small-leaved divaricate *Olearia* (Patrick 2000).

2.6.2 Significance of the Invertebrate Fauna

Invertebrates collected on the Glenfellen PL are representative of the invertebrate communities found in northern Southland, south-western Otago.

Invertebrates collected on the lease with a threat of extinction status (Molloy et. al. 2002, Hitchmough 2002);

Common name	Taxon	Status	Habitat
Giant land snail	<i>Powelliphanta spedeni</i> var <i>spedeni</i>	serious decline	upland forest and dense tussock
A ground weta	<i>Hemiandrus</i> 'Nokomai' (Peter Johns)	data deficient	not recorded on the lease, and habitat uncertain

Based on invertebrate surveys of other *Olearia* shrublands, the following species of threatened moths that are very likely hosted on the rare tree daisy shrublands present on the property, are listed below. *Olearia fimbriata* has been recorded in an adjacent area in the Nokomai Ecological District.

<i>Protosynaema</i> sp. 'olearia' (nationally endangered)	Larvae eat <i>Olearia fimbriata</i>
<i>Prygotis</i> sp. 'olearia' undescribed (range restricted)	Larvae eat <i>Olearia fimbriata</i>
<i>Meterana grandiosa</i> (gradual decline)	Larvae eat small leaved <i>Olearia</i> spp.
<i>M. exquisita</i> (gradual decline)	Larvae eat small leaved <i>Olearia</i> spp.

Type localities of invertebrates

Common name	Taxon	Type locality
Moth	<i>Asaphodes cinnabari</i>	Nevis area, Northern Nokomai

2.6.3 Herpetofauna

Hand searches for lizards were undertaken on the rocky outcrops and rock piles on the summit ridge of the Nevis Road. No lizards were found although searching was not exhaustive.

The rock tors, rock piles and associated boulder fields scattered along the summit ridge are obvious places to look for geckos. On the nearby Mataura Range (within the Nokomai Ecological District), *Hoplodactylus* 'Southern mini' is found (Tocher, 2004).

Skinks found in tussock grassland areas on the nearby Mataura Range that could be present on Glenfellen are: *Oligosoma chloronoton*, *O. maccanni* and *O. nigriplantare polychroma* (Tocher, 2004). In damper areas we could expect to find *O. inconspicuum*.

These reptile fauna are representative of lizards found in northern Southland, south-western Otago.

2.6.4 Avian Fauna

Birds were recorded when observed, mainly from the Nevis Road. These included the Australian Harrier, Blackbird, Chaffinch, Dunnock, Pipit, Redpoll, Skylark, Song Thrush, Sparrow and Yellowhammer. A Bird list from previous surveys is included as Appendix 5, those recorded on Glenfellen are indicated with an '*'.

The New Zealand Falcon, a threatened species, as recorded in the Nokomai Ecological District PNAP report, has been spotted on more than one occasion. (verbal comment, Forest and Bird, NGO meeting of 12 April 2005)

2.6.5 Aquatic Fauna

Three sites on the Nokomai River, Site 1 (F43 GR 807204), Site 3(F43 GR 803181), Site 4 (F43 GR 803174), and two sites on two un-named tributaries that form part of the Nokomai catchment were inspected, Site 2 (F43 GR 807204) and Site 5 (F43 GR 802175).

Three sites, above, below and within the beech forest remnant in the main Nokomai River were sampled. The habitat ranged from riffle/run to pool/run with substrate of boulder/cobble/fine gravel. Water clarity was milky at all three locations. At Sites 3 and 4 there were no in stream invertebrates, but, brown trout (*Salmo trutta*) was recorded. Site 1 recorded an abundance of in stream invertebrates (green stonefly/mayfly) and one fish species, flathead galaxias (*Galaxias depressiceps*).

No fish were recorded on Site 2. The side tributary on the western slopes feeding into the Nokomai River, (Site 5) was recorded as a riffle/rapid habitat with a substrate of both cobble/fine and gravel/sand. Water clarity was clear and water levels normal with fish barriers of waterfalls and cascades of less than 1metre. An abundance of in-stream invertebrates (green stonefly/mayfly) were recorded. Flathead galaxias (*Galaxias depressiceps*) was found.

No previous freshwater fish records were found for Glenfellen PL in the New Zealand Freshwater Fish Database maintained by the National Institute of Water and Atmospheric Research (NIWA).

2.6.6 Significance of Aquatic Fauna

The Flathead galaxias (*Galaxias depressiceps*) is a threatened species and has a ranking of gradual decline (Hitchmough 2002).

2.6.7 Problem Animals

Animal pests very likely present on the property include rabbit, hedgehog, cats, ferrets, stoats, possums and hares, with hares and possums being the main pest species.

Occasionally red deer pass through the area.

2.7 Historic

Glenfellen PL includes no archaeological sites (European or Maori) recorded on the

NZAA site recording scheme. However, an archaeological survey undertaken by Jill Hamel of the Upper Nevis and the Nokomai gold workings and associated features in 1989, 1990, and 1991, noted two major features of significance within Glenfellen PL, namely, the Roaring Lion Race and the Diggers Creek Race. These were never added to the NZAA site recording scheme.

In addition to the goldmining history, the area is also linked with the history of skiing in the Nokomai and Nevis. This is represented by one heritage building, an old ski hut, and possibly some associated archaeological remains relating to the ski tow, which is perhaps the heritage feature with the greatest rarity value.

Goldmining

Gold was first discovered in the area of Nokomai in 1862 in what was then called Moa Creek, but later changed to Victoria Gully, by James Lamb. Lamb, on presenting 28 ounces of gold Dunedin reported that there was a large area of gold bearing land along the Nokomai and extending over the dividing range into the Nevis, and right through to the Kawarau River. Subsequently an area of 281,600 acres was designated as the Nokomai Gold Field. Two or three large 'rushes' ensued between 1862 and 1872. (Hamel, 1989:3-4.)

By 1872 most of the miners in the Nokomai field were Chinese, working the river flats and terraces on the west side of the river, south of the Glenfellen area. (Hamel, 1989:4.)

In 1894 Choie Sew Hoy, who had come to NZ in 1869 and established himself as a merchant in Dunedin, was granted two special claims at Nokomai with his son. The Sew Hoys immediately commenced construction of a large race to facilitate the use of hydraulic elevators in the sluicing operation on the claim. The gold bearing gravels were below the water table, making the use of elevators essential. The race carried water from Diggers Creek on the Garston side of the ranges, and it may have been a refurbishment of an existing race, rather than a construction of a new race. The Diggers Creek race did not provide sufficient water, and a second race was brought from Donkey Flat, drawing water out of the Nokomai River. A dam was later built at Donkey Flat to increase the water supplied by this race. (Hamel, 1989: 5, 7.)

In 1899 the construction of the Roaring Lion Race commenced, and was undertaken by the Golden Lion Sluicing Company. Thirty men were employed in the construction of the 29 miles of race from Roaring Lion Creek, across the divide from the Nevis catchment into the Nokomai Valley to the claim of the Golden Lion Sluicing Company. The race was not completed until 1902, at a cost of £11,000, a year after payable gold had been struck in the claim, which adjoined two of the Sew Hoy claims. It also operated using hydraulic sluicing. Following a series of safety problems the company went up for sale in 1904, then into liquidation, changed hands a number of times, and was finally acquired by Sew Hoy in 1906. They commenced repairing and upgrading the Roaring Lion race, and used it to work three of their claims. (Hamel, 1989: 6.)

Few other companies worked in the Nokomai during the Sew Hoy operations. Up to sixty men were employed in working the three claims the Sew Hoys held over

this period, and from 1911-14 their company was the leading alluvial gold mining company in NZ. The company worked not only in Victoria Gully, but in 1927 shifted on to the Nokomai Flats, for which the water from the races had to be carried an extra distance, and this was done using pipes and additional sections of race. (Hamel, 1989:3-8.)

In 1932 the Sew Hoys' Nokomai Hydraulic Sluicing Company was restructured to form the Nokomai Gold Mining Company and a dragline dredge as introduced alongside the elevators, and powered by a small hydroelectric plant. The dredge operated until 1935, and the company persisted with hydraulic sluicing until the death of Choie Kum Poy (Son of Choie Sew Hoy) in 1943.

The Sew Hoy family sluicing operation in the Nokomai was *one of the longest running and most prosperous mining ventures in Otago and Southland* and continued for three generations of the Sew Hoy family over fifty years. (Hamel, 1989: 2.) Only the major companies mining at Round Hill and Gabriels Gully operated for a comparable length of time (Hamel, 1989:7.)

Description of Archaeological Features

Roaring Lion Race.

Approximately eight kilometres of this race runs through Glenfellen PL. This includes the section of race which crosses the divide from the Nevis to the Nokomai. At the divide there is a sluice hollow across which the race is carried in a siphon. The race no longer carries water. Its water channel averages 70-90cm in width and around 50cm in depth, and a broad track follows its length. Race features, many in reasonable condition, include overflow sills, spillways, stone revetment to support race walls, feeder races, remains of racemen's huts (consisting of low sod walls) and associated cultural scatters, sections of wooden fluming and pipe for crossing streams, and feeder races. (For more detail refer to Hamel, 1991:5-6)

Diggers Creek Race

This race is sometimes called the Fosters Creek Race. The race is notable for the number of major siphons along its length, especially in Fosters Creek where they are used to cross the many steep gullies of its tributaries. The race also includes features typical of races of this length and scale, such as feeder races, overflow sills, spillways, and remains of racemens huts. (For more detail refer to Hamel, 1991: 7-10.) The length of this race has been planted out with Douglas Fir, and this may have caused considerable damage to the race and associated features.

Alluvial ground workings

Hamel's reports of 1989 and 1990 did not include investigation and survey of any alluvial workings along the western banks of the upper Nokomai, or in the tributaries of creeks, including Fosters, that run off the Slate Range and to the west, within the PL. Given the richness of this field and the level of interest in it by individual miners during its initial rush years it is highly likely that such alluvial workings along with signs of prospecting do exist within the PL.

Recreational History

The first recorded ski trip to Garston took place in June 1933. Following the success of the trip, a meeting was called in Invercargill in July 1933 to form a club, and thus began the history of skiing in Southland and the Southland Ski Club.

Club outings usually involved a departure to Garston early on Sunday mornings, followed by a climb to the top of the ridge, and two or three hours of skiing.

Socialising was an important aspect of the clubs activities, and trips were concluded with a visit to the Garston Hotel on a regular basis. It was only a year before a hut was built on the Garston hill. The hut was prefabricated in Invercargill, and taken to the site along the Nevis Road on a truck. Club legend has it that the hut was erected at the point where the truck broke down on the roadside, just short of its intended destination.

Popularity of the club continued after an interlude for WWII, and the hut on the Garston Hill was extended in 1939, allowing it to accommodate up to 45 people. A rope tow was constructed in 1948, changing the style of skiing to something more like what skiers experience today, and further adding to the popularity and standard of skiing within the club.

Just as popularity of skiing at Garston was at an all time high, the new field at Coronet Peak began to draw its skiers away. The Club diverted some of its attentions to Coronet, and built a hut there in 1950. By the mid 1950s Garston had been almost entirely abandoned in favour of Coronet Peak, but the Southland Ski Club continued to grow, not only for skiing but also as a social group.

(Abridged from "Ski Club 50 Years Old" in *Southland Times*, Friday, May 20, 1983. p.16.)

2.7.1 Historical Significance

The historical significance of the Nokomai field and its water supply infrastructure, including the Roaring Lion Race, Diggers Creek Race, both of which pass through Glenfellen PL, is a result of the associations with Choie Sew Hoy. Sew Hoy was successful as a leader of the Chinese community and was rare in his success as a businessman within the European community during a period when Chinese in New Zealand were severely discriminated against. James Ng, the leading authority on Chinese in the NZ goldfields, credits Choie Sew Hoy with being the greatest of the New Zealand Chinese of the nineteenth Century. (Ng, 1989.)

Sew Hoy was also historically significant because he pioneered the use of the bucket dredge in the Shotover which paved the way for the major boom in dredging in New Zealand at the turn of the century. By employing more efficient goldworking technologies Sew Hoy and his sons revived mining in the Shotover, Cardrona and Nokomai. (Hamel, 1989: 5.) The contribution this made to the goldfields economy cannot be understated, and it was a new turning point in NZ goldfields history.

Archaeological and heritage sites associated with Chinese history in NZ are highly valued by the Chinese community today. The survival of an almost completely intact archaeological complex relating to hydraulic sluicing, and its association with the Sew

Hoys means the whole cultural landscape has a very high level of cultural significance.

The Nokomai field workings and water supply are also historically significant because of the unparalleled longevity of the sluicing operation.

Collectively these factors mean the Nokomai goldfield and associated water supply infrastructure are of national historical significance.

The Garston ski hut built by the Southland Ski club represents the very beginnings of recreational skiing in New Zealand, and as such is of national historical significance. Skiing in Garston was some of the first skiing undertaken in the southern part of the South Island, and is associated with the first southern Ski club. The ski hut, although a humble vernacular building, is of considerable significance as a virtually unmodified example of one of the first ski club huts in New Zealand.

2.8 Public Recreation

2.8.1 Physical Characteristics

Glenfellen PL falls within the Garvie and Northern Plains landscape units as identified in the Mainland Southland – West Otago Conservation Management Strategy (Department of Conservation, 2000). The primary access to the property is along the Nevis Road which bisects the property, connecting the main Kingston-Garston highway in the west with Bannockburn in the north.

Glenfellen PL can be split into two areas:

a) western section below the 900 metre contour (Douglas fir plantation area)
This section was in the process of being planted up with Douglas fir during the site visit, and is characterised as improved pastures with low conservation values (at lower elevations) through to grazed tussock land at higher reaches. This section contains part of the historic Diggers Creek water race.

b) remaining property to the east of the 900m contour
This section comprises lightly grazed tussock grasslands. This section contains part of the historic Roaring Lion water race.

Several features afford recreational value. These include:

- Historic water races. These include the Roaring Lion race that runs through the eastern section of the property from the headwaters of the Nevis River (Roaring Lion Creek) to Nokomai in the south and a second Diggers Creek race on the western section of the property.
- Historic Southland Ski Club hut (a 12 bunk hut – approximately 60m²)
- Nevis Road which is recognised as an opportunities for mountain biking its own right (e.g., Kennett, Kennett and Kennett 1996). The road is a ‘grade 2’

ride of 80km in length. The road is also a recognised four-wheel driving opportunity.

- Relatively undeveloped open country
- Recreational values on land surrounding Glenfellen such as the Nokomai River and high country land adjoining the property.

2.8.2 Legal Access

The primary access through Glenfellen is via the Nevis Road which is managed by Southland District Council. This legal road is now used as an alternative route between Garston and Bannockburn. It should be noted that the actual formation of the road deviates in some places as much as 500m from the alignment shown on the plans.

Further public access is available along the marginal strip (F430013) on the true left of the Nokomai River. The Nokomai River qualifies for a marginal strip on the Glenfellen boundary on the true right bank of the river.

2.8.3 Activities

Recreational values on the pastoral lease were assessed as part of the Southland Conservancy Recreation Opportunity Spectrum (ROS) inventory (1995 – refer appendix 8). The ROS zoning appears incomplete because the property bridges Southland and Otago Conservancies. Recreational values are ‘Back Country 4x4 Drive In’ throughout the entire property. The property is located along a band of ‘Back Country 4x4 Drive In’ that follows the hillside area on the westward edge of the Garvie Range, flanked by ‘Rural’ in the plains in the west, and ‘Remote’ in the east.

Glenfellen’s recreational values derive from its underlying natural and historic values which are described elsewhere in this report, and access. In summary, they result in opportunities for the following seasonal recreation activities:

- road-side natural, scenic and historic appreciation (with particular emphasis on the historic Southland Ski Club hut and water-races from the gold mining era, and views east across to the main Garvie Range and down into the Nokomai River).
- passive appreciation (e.g., picnicking, historic appreciation, botanising, photography)
- walking (along the Roaring Lion and Diggers Creek water-races and exploring at-will through tussock land). There are various routes; however a common example is the linking route between the Southland Ski Club hut and the water-races through to the main Nokomai River.
- mountain biking, four wheel driving and horse-riding opportunities along the Nevis Road. (There is an annual bike race, the ‘Pub to Pub’ held between the Garston and Bannockburn Hotels).

- potential access for trappers into more remote opportunities eastward into the Garvie Mountains and north into the Hector's/Remarkables Range.
- access to backcountry fishing opportunities in the Nokomai River
- in winter time, access to the property is presently limited through road closure, although the opportunity for cross-country skiing and other winter sports are potential future opportunities.

There are opportunities to enhance recreational activities on the property such as:

- restoring the Southland Ski Club hut – which is a strategically opportune location for interpreting high country values in Glenfellen and beyond. In addition to its inherent historical values, the hut is a logical focal point for visitor/orientation information.
- assessing the value of short walking track development around the Southland Ski Club hut site
- forming a loop walking track opportunity along the Roaring Lion water-race on the eastern part of the property back to the Nevis Road. This opportunity could be one section of a wider walking and or mountain biking opportunity connecting the Roaring Lion and Diggers Creek water races
- improving public access.

2.8.4 Significance of Recreation

Glenfellen contains the following significant recreational values:

- The property's nationally significant historic values, and its relatively intact natural values which in turn afford recreational value.
- Highly significant strategic linkages for publicly accessible existing and potential cross country skiing/walking/tramping and mountain-biking opportunities from and through this property. The need to obtain practical public access to and along the nationally significant Roaring Lion and Diggers Creek water-races presents a highly significant need.
- Significant value of the Nevis Road in terms of a backcountry 4WD route. This is a known gap in the network of recreation opportunities managed by the Department of Conservation in Southland Conservancy (Department of Conservation, 2003).
- The relative accessibility of opportunities on the property afforded by the Nevis Road enabling opportunities to interpret Glenfellen's natural and historic values. This affords the ability to secure improved practical public access to Nokomai River and adjoining opportunities which rates of 'high' significance.
- Significant opportunities for mountain biking, horse riding, four wheel and at times two wheel driving along the Nevis Road.

PART 3

OTHER RELEVANT MATTERS & PLANS

3.1 Consultation

ENVIRONMENT NON-GOVERNMENT ORGANISATIONS

The following comments were made at the early warning meeting with NGO's in Alexandra on 23/09/2004 and follow up meeting of 12/04/2005.

- NGO opposition to existing Douglas fir plantation.
- Road alignment needs clarification.
- Old ski hut, conservation and recreation values high.
- Historic ski club rope tow should be noted as interest.
- Water races – whole section from Nevis Road to southern boundary should be easement if not included in Conservation Area.
- NGO's believe all land above plantings should become public conservation land, including the tributary of Fosters Creek.
- Recreation access – The track from Trig C from the west is an important road as leads to water race and hut which is interesting. If this is not included in conservation land then need to provide access to Trig C
- NGOs commented that there is a new fence from existing planting which would be a logical boundary for Conservation land and freehold.

The following additional comments were supplied by Federated Mountain Clubs (FMC) at the 23/09/2004 meeting;

Sustainability Issues:

- All land classified LUC Class VIII should become conservation or stewardship land because pastoral use of such land is not ecologically sustainable.
- Most land about 1,000 – 1,100m should also become conservation land either (a) because of SIVs and or (b) because ecologically sustainable pastoral land use is not possible as it is uneconomic to maintain the balance of nutrient losses caused by grazing and burning.
- Weed invasion by broom, gorse etc is unlikely to be a problem on land above about 1,000m

Marginal Strips:

- It is understood that LINZ has agreed that all waterways which obviously qualify for marginal strips will have marginal strips formally recognised as part of tenure review.
- Other waterways which may qualify for marginal strips should also be assessed because if these qualify for marginal strips this decision has a

significant impact on what public access provisions will be required during tenure review.

Written submissions were received from, the Dunedin and Upper Clutha Branches of Forest and Bird, Central Otago and Southern Lakes Branches of the New Zealand Deer Stalkers Association, and Federated Mountain Clubs of New Zealand. A copy of each submission is attached as Appendix 7.

3.2 Regional Policy Statements & Plans

a) Regional Policy Statement for Southland

The Regional Policy Statement for Southland provides a policy framework for all of Southland's important resource management issues. It does not contain rules. District and Regional Plans shall not be inconsistent with the Regional Policy Statement.

The Regional Policy Statement has a number of objectives, policies and methods that are pertinent to cultural and natural values. These include:

b) Cultural Heritage Values

Objective 10.3: To protect heritage values and archaeological sites of regional significance.

Policy 10.5: Protect buildings, structures, places or areas that have heritage cultural or traditional value.

Method 10.3:

Advocate to relevant agencies the use of other legislation such as Conservation Act 1987 for the purpose of protecting buildings, structures archaeological sites with significant heritage values and archaeological sites where the use of such legislation appears more appropriate than the resource management process.

c) Natural Heritage Values

Objective 2.1: To protect areas of significant indigenous vegetation and significant habitats of indigenous fauna within Southland where this will maintain and enhance biodiversity of indigenous ecosystems.

Objective 2.2:

To maintain and enhance the biodiversity of indigenous species within the Southland Region.

Policy 2.1:

Identify and encourage the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna which maintain or enhance the biodiversity of indigenous ecosystems within Southland.

Its explanation includes criteria for determining significance.

Method 2.16:

Recognising that in some instances restrictions on the use of land are desirable in order to protect areas of significant indigenous vegetation and significant habitats of indigenous fauna, it may be desirable for that land to be held in public ownership.

d) Lakes and Wetlands

The relevant objectives, policy and method for lakes and wetlands:

Objective 6.1:

To protect the natural character, heritage values and outstanding natural features of lakes, rivers and wetlands in the region.

Objective 6.3:

To maintain and enhance public access by suitable means, to, along and across lakes, rivers and wetlands and their margins, and where appropriate, the use of those areas for recreational purposes.

Method 6.16:

Ownership- In cases where areas with adjoining lakes, rivers and wetlands are of high recreational or conservation value, for example, significant wetlands, it may be appropriate that they be held in public ownership.

e) Natural features and landscapes

The following objectives, policies and methods are relevant to natural features and landscapes:

Objective 9.1:

To protect outstanding natural features and landscapes of the Region.

Objective 9.2:

To avoid, remedy and mitigate adverse effects on ecosystems which contribute to the diversity of landscapes in the region.

Policy 9.1:

Identify and encourage the protection of outstanding natural features and landscapes within Southland.

Method 9.10:

Recognising that in some instances restrictions on the use of land are desirable in order to protect outstanding natural features and landscapes, it may be desirable for that land to be held in public ownership.

3.3 District Plans

The Southland District Plan includes policies and methods to protect areas of significant indigenous vegetation, and significant habitats of indigenous fauna and cultural heritage. The main method is to rely on listing areas of significance in the plan. The relevant objectives and policies are outlined below:

a) Cultural Heritage

Objective HER 3: *To recognise the importance of, and provide for the protection, conservation and where possible, the enhancement of the District's cultural heritage.*

Policy HER 9: *In consultation with Iwi, Historic Places Trust, the Department of Conservation, and other heritage protection authorities, to identify and list cultural heritage sites worthy of protection and or conservation.*

b) Natural Heritage

The objectives and policies on natural heritage are further developed in the Southland District Plan.

Objective HER 1: *To recognise the importance of, and provide for the protection, conservation and where appropriate, the use and development of the District's natural heritage sites for the enjoyment of both present and future generations.*

Policy HER.1: *To identify those natural heritage sites of relevance to the District in consultation with all interested parties.*

Explanation: Identifying and listing significant areas of indigenous vegetation, indigenous habitat, outstanding landscapes and landforms in the District Plans is the first method of protecting such sites and enables Council to develop methods within the plan to achieve appropriate protection.

Policy HER.2: *To promote the protection of those areas of significant indigenous vegetation, habitat landscapes and landforms and to require resource consents for any activity that may or will have adverse effect on the quality of those areas.*

Explanation: Resource consents will be required in instances where the effects of any activity will impact adversely on any registered sites.

There is a rule for indigenous vegetation clearance:

Rule HER.3: *No person shall carry out any activity which involves the clearance, modification, damage, destruction or removal of indigenous vegetation or habitats of indigenous fauna otherwise in accordance with this plan.*

Permitted activities include:

Clearance modification or destruction of indigenous vegetation which has grown

naturally on land cleared on vegetation in the fifteen years immediately prior to this plan becoming operative
The clearance or modification of indigenous grass lands where the percentage canopy of tussock species is less than 50%.

Discretionary activities include:

Any activities which do not comply with the above rule shall be discretionary activities.

3.4 Conservation Management Strategies & Plans

Conservation management Strategy – Mainland Southland – West Otago

The Glenfellen PL is primarily located in the Garvie Landscape Unit. A small area also lies in the Northern Plains unit. The CMS discusses ecological values in this area. It notes there are extensive alpine tussock grasslands and a number of threatened species including plants and the snail *Powelliphanta novae-zealandiae*.

As with many upland catchments the freshwater systems are relatively intact. Opportunities for preservation of indigenous freshwater fisheries habitats are high. It is likely that small lakes, tarns and streams are refuges for native fish and macroinvertebrates. Very little information is available from this area. Therefore, because of its possible high values it is identified as a priority for freshwater fishery survey.

It also highlights that the major ecosystem without legal protection is lowland red tussock grasslands.

Ecological Objectives include

To continue to seek protection for those areas recommended by the PNA survey.

Te Whakatau Kaupapa O Murihiku

Archaeological Sites

Map 7 Identifies two archaeological sites in the Glenfellen area.

Archaeological and Rock Art sites Policy 1 (Pg. 41) states.

That all archaeological sites of interest to Ngai Tahu Whanui be given formal protection, and that right to modify them shall remain with Ngai Tahu.

3.5 New Zealand Biodiversity Strategy

New Zealand Biodiversity Strategy

The New Zealand Government is a signatory to the Convention on Biological Diversity. In February 2000, Government released the *New Zealand Biodiversity Strategy* which is a blueprint for managing the country's diversity of species and

habitats and sets a number of goals to achieve this aim. Of particular relevance to tenure review, is goal three which states:

Maintain and restore a full range of remaining natural habitats and ecosystems to a healthy functioning state, enhance critically scarce habitats, and sustain the more modified ecosystems in production and urban environments, and do what is necessary to:-

- *Maintain and restore viable populations of all indigenous species across their natural range and maintain their genetic diversity.*

The strategy outlines action plans to achieve this goal covering terrestrial and freshwater habitat and ecosystem protection, sympathetic management, pest management, terrestrial and freshwater habitat restoration, threatened terrestrial and freshwater species management and so on.

PART 4

MAPS, REFERENCES, APPENDICES ETC.

4.1 References

Connell, J. (2005) Department of Conservation guidance on significant inherent values (SIV's) under the Tenure Review programme Crown Pastoral Lands Act 1998 (CPLA). Unpublished report, Department of Conservation, Dunedin.

De Lange, P.J., Norton D.A., Heenan, P.B., Courtney, S.P., Molloy, B.P.J., Ogle, C.C., Rance, B. D., Johnson P. N. and Hitchough R. (2004) Threatened and uncommon plants of New Zealand. *New Zealand Journal of Botany*, Volume 42: 45-76.

Department of Conservation (2000) Conservation Management Strategy for Mainland Southland/West Otago (1998-2008), Southland Conservancy, Invercargill.

Department of Conservation (2003) Towards a Better Network of Visitor Facilities – Southland Conservancy Proposal Summary, Southern Regional Office, Christchurch. <http://wgnhoiis2/Explore/DOC-Recreation-Opportunities-Review/My-Favourite-Place/015~Southland.asp>

Dickinson, K.J.M., 1989 Nokomai Ecological District. Survey Report No. 9 for the Protected Natural Areas Programme. Department of Conservation, Wellington.

Dickinson, K.J.M., Mark A.F., Barratt B.I.P., and Patrick, B.H. (1998) Rapid ecological survey, inventory and implementation: A case study from Waikaia Ecological Region, New Zealand. *Journal of the Royal Society of New Zealand*, Volume 28: 83-156.

Garven, P., Nepia, M., and Ashwell, A. (1997) Te Whakatau Kaupapa O Murihiku: Ngai Tahu Resource management Strategy for the Southland Region, Aoraki Press.

Hamel, J. (1989) Historic and Archaeological sites at Nokomai and the Upper Nevis, (1991) Goldmining in the Nokomai Valley, a Second Report, (1990) Broken Crocks and Bottles, Nokomai.

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

Johns, P.M. (2001). Distribution and Conservation Status of ground weta, *Hemiandrus* species (Orthoptera: Anostostomatidae). Department of Conservation, Science for Conservation 180. Wellington.

- Kennett, P; Kennett, S; and Kennett, J** (1996) 'Classic New Zealand Mountain Bike Rides' The Kennett Bros, Wellington.
- Leathwick, J. R., G. Wilson, D. Rutledge, P. Wardle, F. Morgan, K. Johnston, M. McLeod, R. Kirkpatrick,** (2003). Land Environments of New Zealand. David Bateman Ltd, Auckland.
- Leathwick, J.; Morgan, F.; Wilson, G.; Rutledge, D.; McLeod, M. and Johnston, K.** (2002). Land Environments of New Zealand. A technical guide. Ministry for the Environment, Wellington.
- McEwen, W.M.** (1987) Ecological regions and districts of New Zealand. Department of Conservation, Wellington.
- Molloy, J., Bell, B., Clout, M., de Lange, P., Gibbs, G., Given, D., Norton, D., Smith, N., and Stephens, T.** (2002). Classifying species according to the threat of extinction: a system for New Zealand. Threatened Species Occasional Publication 22. Department of Conservation, Wellington.
- Ng, James.** (1995,1999). Windows on a Chinese Past, Vols.2 & 3.
- Patrick, B. H.** (2000). Lepidoptera of small-leaved divaricating *Olearia* in New Zealand and their conservation priority. Science for Conservation 168. Department of Conservation, Wellington.
- Rance, B.D.** (1992) Botanical Report – Beech forest and adjacent vegetation in the head of the Nokomai River catchment. Unpublished report, Department of Conservation, Invercargill.
- Tocher, M.** (2004). Unpublished field notes from a herpetological survey of the Matura Ranges, Codfish Island, Stewart Island and Ulva Island, 17/01/04 – 22/02/04. Department of Conservation, Southland Conservancy, Invercargill.
- Walker, S.; Lee, W.G.; Rogers, G.M.** (2003): The woody vegetation of Central Otago, New Zealand: its present and past distribution and future restoration needs. Science for Conservation 226. 99 p.
- Walker, S.; Price, R.; Rutledge, D.** (2004): New Zealand's remaining cover: recent changes and biodiversity protection needs. Landcare Research Contract report: LC0405/038, prepared for Department of Conservation, March 2005.
- Southland Times**, Friday, May 20, 1983. p.16. "Ski Club 50 Years Old"
- Historic Places Trust Magazine**, winter 2004.

4.2 Illustrative Maps

- | | | |
|-------|---------------|---|
| 4.2.1 | Glenfellen PL | Topographical and Cadastral Map |
| 4.2.2 | Glenfellen PL | Landscape Units and Landscape Values |
| 4.2.3 | Glenfellen PL | Values – Ecological/Recreation/Historic |

2176000

2177000

2178000

2179000

2180000

2181000

5523000

5523000

5522000

5522000

5521000

5521000

5520000

5520000

5519000

5519000

5518000

5518000

5517000

5517000

5516000

5516000

2176000

2177000

2178000

2179000

2180000

2181000

-  Pastoral lease
-  Legal roads
-  Formed access
-  Marginal strips

4.2.1 Topographical and Cadastral Glenfellen

0.3 0 0.3 0.6 0.9 1.2 Kilometers

