

Crown Pastoral Land Tenure Review

Lease name : BEN LEDI

Lease number : PO 199

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.

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**DOC CONSERVATION RESOURCES REPORT ON
TENURE REVIEW OF**

BEN LEDI PASTORAL LEASE

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PART 1

INTRODUCTION

1.1

Ben Ledi was inspected on the 21- 25 January and the 4-7 February 2002 as part of a review of the pastoral lease tenure. The tenure review was requested by the lessees of the property and is being undertaken under the provisions of the Crown Pastoral Land Act 1998. As part of this process, a range of specialists in inherent values have visited the property and have contributed to this report.

Ben Ledi comprises 5398.5065ha of pastoral lease, which is run in conjunction with 593ha of freehold land.

The Property is located on the Danseys Pass Road approximately 65 km west of Oamaru. Being situated on the north western side of the Kakanui Range it is bounded by the North and South branches of the Maerewhenua River, and the Danseys Pass Road. Altitude ranges from 350 m asl. at the valley floor to 1550 m asl. on the crest of the Kakanui Range.

The property is in the Kakanui Ecological Region and the Dansey Ecological District. A Protected Natural Areas Programme survey report has been completed for this ecological district and parts of three RAPs lie within the property. (RAPs; 8 - Maerewhenua, 9 - Benledi, 10 - Nobbler).

PART 2**INHERENT VALUES: DESCRIPTION OF CONSERVATION RESOURCES AND ASSESSMENT OF SIGNIFICANCE****2.1 LANDSCAPE****Methodology:**

Ben Ledi has been divided four landscape units with the boundaries having been defined principally by changes in aspect and land cover. After defining the landscape units (LU's) the following assessment criteria were applied to each unit to help determine its distinctive character and landscape values.

- Landscape Character Description
 - Landform
 - Land cover
 - Land use
- Assessment of Landscape Values
 - Naturalness
 - Legibility
 - Aesthetic values
- Values that will be assessed when appropriate
 - Transient values
 - Landscapes commonly valued
 - Historical values
- Visual Values
- Potential Vulnerability to Change

Overview:

The landscape setting for Ben Ledi is the eastern side of the Kakanui Mountains that is characterised by the series of long back slopes that project out from the main mountain axis. Dissecting these back slopes are rugged gullies and incised streams. The back slope that dominates this pastoral lease is the Maerewhenua Spur, which stretches for 11km from the summit of the Kakanui Mountains the downlands of the Waitaki Valley.

Much of the native vegetation on the sunny faces, to the mid altitude, has either been converted to introduced pasture or modified grasslands. On the corresponding darker faces good condition snow tussock extends well down the main spur. The identified RAPs along the summit are representative areas of significant natural tussockland, which are similar to extensive areas of similar quality indigenous grasslands indicative of the original character of the Kakanuis.

Landscape Unit 1:

Description:

This unit is located close to the northern end of the Kakanui Mountains incorporating the low alpine zone that has an east-west axis. The unit incorporates all of the upper catchment of a major tributary of the North Branch Maerewhenua River (NBMR). It extends over an altitudinal range between 1550m.asl. which is the peak of Mt Nobbler, descending to about 750m.asl at the craggy confluence of the two tributaries that combine to form the NBMR. The unit's low alpine summit features a saddle that spans between Mt Nobbler in the north and a lower peak in the south. Just below the summit, the valley has a widened head basin containing numerous seepage areas, finger bogs and patches of stable scree.

Within the lower section of the unit, the secondary spurs that project from the main Maerewhenua Spur become steeper with the crests frequently being studded with rocky outcrops and tors. The base of this unit is defined by the distinctive "dog leg" in the NBMR with the boundary extending up to Trig E on the Maerewhenua Spur.

The drainage pattern is typical of the back slopes that extend out from the eastern side of the Kakanui Mountains. The streams in the mid and upper sections occupy well defined river beds bordered by rocky banks. In the lower section the stream winds as it passes around interlocking spurs.

The composition and quality of the vegetation is dictated by this unit's sunny aspect, altitude and stock impact. The dominant slim snow tussock is of varying stature depending on grazing pressure. Sub dominant species included the tufted blue tussock, false spaniard and prostrate snowberry. Along the narrow crest of the Maerewhenua Spur there are patches of stone pavement that are colonized by mats of cushion plants and grey lichen. A notable feature on the leeward side of the spur are large areas of earth striping which is generally in alignment with the prevailing wind. On the lower thinner soils there is a gradual change from slim snow tussock into a sparser narrow-leaved snow tussock associated with golden spaniard, hawkweed and browntop.

The unit has been subdivided into two extensive grazing blocks that are known as the wether blocks. There is good access to the high country by way of a well graded track that leads up from the front country along the Maerewhenua Spur.

The upper portion of this unit was identified during the PNAP survey in 1990 (RAPs: Ben Ledi and Nobbler) as an area that has significant natural values especially the intactness and diversity of the low alpine tussocklands.

Landscape Values:

This unit has high landscape values primarily due to natural elements and features dominating over cultural elements and influences. The high inherent values are most conspicuous in the upper limits of the low alpine zone where the tall tussocks are still intact, although there is some localized variation in condition according to grazing pressure.

It is important that this unit, in particular the area identified as an RAP, is not assessed in isolation but is looked upon as an integral part of a coherent tract of high country extending

along most of the main axis of the Kakanui Mountains. In specific terms, the high landscape/aesthetic values, contained within this unit are determined by:

- The homogenous ground cover that has a restricted tonal range.
- The lack of sub-divisional fencing and hard-edged intensification of grazing.
- The lack of "built" elements that help to generate remoteness and back country qualities.

Visual Values:

This unit has high visual resource values as the Kakanui Mountains rise above the lower hill country, with Mt Nobbler being a distinctive landmark from the surrounding road network and small settlements.

Potential Vulnerability to Change:

The possible threats to the existing landscape character include:

- Replacement and modification of the tall tussocklands.
- Further fragmentation of the tussocklands by fire and grazing intensification.
- Further spread of adventives such as hawkweed over barren ground and thinner soils.
- Further zigzag tracking over prominent and drier slopes.
- Further disturbances of the fragile summit by 4WD's.

Landscape Unit 2:

Description:

This unit includes the north-west slopes that overlook the NBMR at the lower end of the Maerewhenua Spur. The upper boundary to the unit follows a line between Trig E (1389m.asl.) down to a "dog leg" in the river. The lower boundary is the Ben Ledi freehold country and the Danseys Pass Road.

The dominant landform (in common with the whole of the property) is the extensive Maerewhenua Spur, with short side spurs which drop steeply towards the NBMR. Within the lower sections of the unit the crests of the side spurs increasingly become narrower. These crests have a scattering of rocky outcrops, and patches of stable scree.

In comparison with Landscape Unit 1, the river through this unit has a sinuous drainage pattern with the channel winding around the shoulders of the spurs. In places the river is constricted by steep rocky walls and jutting out platforms that create a series of plunge pools and continuous fast white water.

The vegetation has been affected by aspect, range, altitude and farming methods. The slopes close to the valley floor having been converted to pasture grasses with some silver tussocks. Between about 850m.asl. and Trig G (1170m.asl.) vegetation on the upper side slopes are clad in a mixture of low stature narrow-leaved snow tussock as well as silver tussock, golden spaniard and hawkweed. The lower slopes grade into introduced grasses. Between Trig G and Trig E (1389m.asl.) the native component becomes more intact with sparse snow tussock

being the dominant species. A feature on these lighter soils are large areas of open bare ground.

Along the margins of the NBMR, *Coprosma/matagouri* shrublands are well established, with these shrublands extending up the side slopes that have a darker aspect.

Landscape Values:

This unit's landscape values have been compromised by the extensive changes that have occurred to the original ground cover. Like the other back slopes that project out from the eastern side of the Kakanui Mountains, the Maerewhenua Spur is a prominent landform and makes a positive contribution to the overall character of the Kakanui Mountains. It is the "middle ground" between the high altitude area where the inherent natural values are still intact, to the lower country where cultural elements become more obvious. Furthermore this middle country helps to create the overall impression of distance and spaciousness, which is an inherent characteristic of tussocklands.

Visual Values:

This unit has only limited visual resource value as it can only be viewed from a restricted area of the property.

Potential Vulnerability to Change:

The activities that would have an adverse effect on this unit include:

- Further replacement of the snow tussock with more modified short tussock.
- Further tracking over the "tender" land.
- The potential of wilding tree spread.

Landscape Unit 3:

Description:

This unit comprises the lower southern slopes of the Maerewhenua Spur that overlook the South Branch of the Maerewhenua River (SBMR). Similar to Landscape Unit 2 the top boundary follows a line along Trig E, following the crest of the spur, while the bottom boundary is defined by the start of freehold land along Duthie Road. The eastern boundary is the lower ridgeline that runs parallel with the SBMR.

The physical characteristics of this unit closely resemble those on the corresponding side of the spur with the assemblage of natural features including a series of steep spurs, large outcroppings of base rock, and a scattering of tors along the mid slopes. Compared with Landscape Unit 2, a noticeable difference is the hummocky terrain.

The SBMR occupies a winding channel that meets the NBMR outside the property, with the main stem of the Maerewhenua River then draining into the Waitaki close to Duntroon.

The predominately shady slopes are clad in narrow leaved snow tussock in good condition with a wide distribution of golden spaniard. Below 600m.asl. there is a rapid grading in of pasture grasses and legumes which include sweet vernal, Yorkshire fog, browntop and white clover.

Halfway along the spur, adjacent to Trig G, there are expansive mixed shrublands dominated by *Hebe odora* with *Ozothamnus*, turpentine scrub and matagouri. Along the margins of the SBMR there are continuous shrublands that extend into the deep gorge within the freehold property, where the species composition includes the occasional broadleaf, koromiko, *Coprosma* and three-finger.

Landscape Values:

In striking contrast to the corresponding Landscape Unit 2, this unit has moderately high landscape value attributable to the overall intactness of both the tussocklands and shrublands. An overall sense of uniformity and coherence extends outside Landscape Unit 3 into the adjoining upper unit to create a harmonious high country landscape. The lower section of this unit forms the transitional zone between native tussocklands and exotic grasslands.

Visual Values:

This unit is not readily visible from the surrounding road network or settlements as the rolling hill country that overlooks the Danseys Pass obscures it.

Potential Vulnerability to Change:

This unit is relatively sensitive to further changes that could include:

- Further zigzag tracking.
- Fragmentation of the existing intact tussocklands.
- Replacement of the snow tussock with more modified grassland communities.
- Threat of wilding pine spread.

Landscape Unit 4:

Description:

This unit includes all the southern faces that form the large head basin just below Mt Pisgah. The altitude along the Maerewhenua Spur ranges from Trig E, at 1389m.asl. to 1565m.asl. at the apex of a small peak along the crest of the Kakanui Mountains. Within this low alpine zone the regular side slopes that stem out from the Maerewhenua Spur are rounded in form and lightly indented by the watercourses that lead down to the SBMR. The origins of these watercourses are frequently seepage areas located just below the summit, where there is the occasional alpine tarn.

Scattered over these slopes are stable scree faces and random slabs of rock.

The vegetative cover is strongly influenced by aspect and altitude with the dominant slim snow tussock being closely associated with turpentine scrub, blue tussock, snowberry and

mats of *Celmisia*. Around the margins of the scree faces and boulder fields, close to the summit, there are cushion fields comprising *Raoulia* and dwarf *Celmisia*.

Landscape Values:

This unit comprises relatively high landscape values attributable to natural elements and features being completely dominant. Like Landscape Unit 1 this unit forms an integral component of a larger high country landscape that extends for much of the summit of the Kakanui Mountains. In specific terms, the qualities that make this unit special include:

- The harshness of the climate that is reflected in the “ragged” edges to the tussocklands.
- The narrow tonal range of the ground cover, which is limited to gold, brown and grey.
- The lack of “built” elements that help to generate the strong sense of remoteness that is a key feature of a backcountry experience.

Visual Values

This unit has relatively high visual resource values as the rangelands rise above the lower hill country and downlands, with this part of Ben Ledi being conspicuous from the surrounding network of roads.

Potential Vulnerability to Change

The possible threats to this unit include:

- Further fragmentation of the tussocklands by fire and grazing.
- Further spread of adventives such as hawkweed over the thinner soils.
- Further disturbance of the fragile summit by 4WD's.

Significance of the Landscape:

Landscape Unit 1 has high landscape/aesthetic values which are determined by:

- The homogenous ground cover that has a restricted tonal range.
- The lack of sub-divisional fencing and hard-edged intensification of grazing.
- The lack of “built” elements that help to generate remoteness and back country qualities.

Although part of this area has already been identified for protection (RAP 9), it does not really capture the full essence of the high country, therefore a larger buffer area is of significance and worthy of protection.

Landscape Unit 3 has moderately high landscape values attributable to the overall intactness of both the tussocklands and shrublands on the dark faces. Accordingly, from a landscape perspective it is important that the overall “appearance” of the existing tussocklands remain. An overall sense of uniformity and coherence extends outside Landscape Unit 3 into the adjoining upper unit to create a harmonious high country landscape. Therefore a large percentage of this unit has significant landscape values.

Landscape Unit 4 comprises relatively high landscape values attributable to natural elements and features being completely dominant. It forms an integral component of a larger high country landscape that extends for much of the summit of the Kakanui Mountains. In specific terms, the qualities that make this unit special include:

- The harshness of the climate that is reflected in the "ragged" edges to the tussocklands.
- The narrow tonal range of the ground cover, which is limited to gold, brown and grey.
- The lack of "built" elements that help to generate the strong sense of remoteness that is a key feature of a backcountry experience.

This low alpine area has high inherent landscape values.

2.2 LANDFORMS & GEOLOGY

The Kakanui Mountains, one of several uplifted and tilted fault blocks in Central Otago, were formed by reverse faulting along the NW-SE trending Waihemo fault system (Cotton 1917). Ben Ledi is part of the gently inclined backslope descending gradually eastward towards the Waitaki River. This is believed to be a surface formed under periglacial climatic conditions and may in places be parallel, but much lower, to a firmer, stripped Cretaceous peneplain surface. Deeply incised streams have formed steep mountain slopes.

The topography of the property has been influenced by the north-eastern trending faults of the Maerewhenua and Danseys Pass faults (Bishop 1974). The Pisgah fault follows the South Branch of the Maerewhenua River and swings northward to the west of the homestead. The lower country to the south east of the Pisgah Fault is overlaid by beds of gravels of the upper Cretaceous and lower tertiary periods (MacDonald et al; 1970)

Bedrock is mainly moderately to highly metamorphosed schists (Bishop 1979; Mutch 1963).

The steep headwaters of the North Branch Maerewhenua River have been described by Comrie (1992) and encompass a series of rounded spurs that fall gently to the north-east from the broad ridge crest of the Kakanui Mountains. The underlying bedrock is schist, which dips 45 - 50° to the north, resulting in a marked asymmetry of the valley profile. Sunny north-west facing slopes are predominantly planar and well drained, with frequent patches of bare ground and terracettes. The topography is more hummocky on shady aspects, with extensive areas of poorly drained soils. There are localised areas of rock outcrop and associated coarse talus on shady aspects and more extensive area of bluffs in the lower reaches of the southern-most catchment.

2.3 CLIMATE

Ben Ledi has a continental type climate with hot summers and cold winters. Rainfall is approximately 600- 750mm per annum. Summers are normally droughty and winters are typically long and cold with severe frosts and snow. Snow from south-west storms lies during winter above 900m asl. Fogs from coastal easterly winds are a feature of the area. (MacDonald, 1970)

2.4 VEGETATION

In order to describe the vegetation, the property was divided into four main areas: the headwater catchments of both branches of the Maerewhenua River, the steep dark faces overlooking the south branch from the centre of the property north-eastwards, the sunny faces on the opposite side of Maerewhenua Spur, and the riparian zone and gorges associated with the south branch near the southern boundary of the freehold land of Ben Ledi Station.

Headwater catchments of both branches of the Maerewhenua River:

Much of this area falls within Dansey Ecological District RAP 9 Benledi as well as a small portion of RAP 10 Nobbler and is described by Comrie(1992).

The broad rolling spurs of the Kakanui Mountains and Maerewhenua Spur at the south-western end of the property carry snow tussock grassland dominated by slim snow tussock (*Chionochloa macra*) above c. 1100 m, and narrow-leaved snow tussock (*C. rigida*) below. False spaniard (*Celmisia lyallii*) and blue tussock (*Poa colensoi*) are the dominant inter-tussock species, and there are few exotic species. *Dracophyllum pronum* is prominent on shady slopes above 1200m, and occasional mats of *Celmisia viscosa* on sunny slopes.

Much of the slim snow tussock grassland has been moderately to severely modified by grazing. As a result, there are areas of exposed bedrock pavement with vegetation dominated by mat and cushion plants on the broad saddles along upper Maerewhenua Spur. Prominent species here include *Dracophyllum pronum*, blue tussock, *Raoulia subsericea*, *Gaultheria depressa*, *Celmisia sessiliflora*, *C. argentea*, *Hectorella caespitosa*, *Raoulia hectorii*, *Kelleria villosa*, *Phyllachne colensoi*, *Racomitrium* moss, and lichens. Snow tussock grassland on some sunny faces in the upper north branch Maerewhenua River is sparse and interspersed with relatively extensive areas of erosion, but snow tussock cover is more or less continuous on the dark faces of the upper south branch except for discrete patches of sheet and gully erosion.

Snowbanks and flushes lie in stream-head depressions along the upper slopes of the Kakanui Mountains. Comb sedge (*Oreobolus pectinatus*) and several other species characteristic of these habitats are present, including sphagnum (*Sphagnum cristatum*), *Celmisia alpina*, *Carpha alpina*, *Psychrophila obtusa*, *Ourisia glandulosa*, and *Euchiton mackayi*.

Bluffs and outcrops along the crests of Maerewhenua Spur carry an indigenous flora similar to that of the adjacent predominantly tussock-clad slopes, but diversified by species including everlasting daisy (*Anaphalioides bellidioides*), *Celmisia densiflora*, *Blechnum penna-marina*, South Island edelweiss (*Leucogenes grandiceps*), *Anisotome brevistylus*, prickly shield fern (*Polystichum vestitum*), *Poa imbecilla*, spleenwort (*Asplenium appendiculatum* subsp *appendiculatum*), and *Viola filicaulis*. In addition, stable talus on sunny slopes supports scattered shrubs of *Coprosma ciliata*, *Hebe odora*, and *Olearia bullata*, with patches of scrambling *Muehlenbeckia complexa*, prickly shield fern, and *Hypolepis millefolium*.

Steep dark faces overlooking the middle reaches of the south branch Maerewhenua River:

Terraces, fans, and broad lower slopes of spurs carry vegetation dominated by exotic pasture species, but with rare narrow-leaved snow tussocks, variable densities of silver tussock (*Poa cita*) and hard tussock (*Festuca novae-zelandiae*), and indigenous shrubs that include *Coprosma propinqua*, *C. rugosa*, *Carmichaelia petriei*, *Olearia bullata*, *O. odorata* and tutu (*Coriaria sarmentosa*). A small rock ridge enclosed by a sharp bend of the river (NZMS 260 I41 090737) has unusual vegetation of narrow-leaved snow tussock, *Blechnum procerum*, mountain flax (*Phormium cookianum*), golden spaniard (*Aciphylla aurea*), toetoe (*Cortaderia richardii*) and shrubland with inaka (*Dracophyllum longifolium*), *Coprosma* species, *Olearia bullata* and broadleaf.

Steep interfluves on the mid-slopes carry dense narrow-leaved snow tussock grassland, with mountain flax and golden spaniard especially on talus slopes, and patches of scrub with tauhinu (*Ozothamnus leptophyllus*) and *Hebe odora*. Craggy spurs and the bluffs along the summit ridge have low shrubby vegetation with snow tussocks, *Dracophyllum uniflorum*, *Gaultheria crassa*, tauhinu, *Hebe odora*, *Celmisia densiflora*, false spaniard, *Blechnum penna-marina*, edelweiss, and several other indigenous herbaceous species.

Sunny faces of the northern half of Maerewhenua Spur:

Exotic pasture species dominate plant cover of depleted tussock grassland below mid-altitudes, with scattered silver tussock, hard tussock, and matagouri (*Discaria toumatou*), and rare narrow-leaved snow tussocks. Golden spaniard is prominent on rock outcrops. Above about 900 m, tussock cover remains variable, with strong fenceline and stock camp effects, but in places reaches c. 50%. The indigenous component of intertussock vegetation increases with altitude, with conspicuous contributions from *Raoulia subsericea*, *Pentachondra pumila*, patotara (*Leucopogon fraseri*), and blue tussock, and less common *Brachyglottis bellidioides*, clubmoss (*Lycopodium fastigiatum*), *Ranunculus reflexus*, *Scleranthus uniflorus*, *Celmisia gracilentia*, *Helichrysum filicaule*, golden spaniard, and several other herbaceous species. Mouse-eared hawkweed (*Hieracium pilosella*) forms sometimes extensive patches on vehicle tracks and stock camps. Flushes are characterised by bog rush (*Schoenus pauciflorus*) and Maori onion (*Bulbinella angustifolia*).

Scrub in lower gullies close to the north branch Maerewhenua River commonly contains *Coprosma propinqua*, *C. rugosa*, *Carmichaelia petriei*, and *Olearia bullata*, with mountain flax prominent on talus. A steep north-westerly face beside the river near the eastern end of the PL contains part of Dansey Ecological District RAP 8 Maerewhenua (Comrie 1992;). The RAP comprises broadleaved forest with a canopy of broadleaf (*Griselinia littoralis*), marble leaf (*Carpodetus serratus*), kohuhu (*Pittosporum tenuifolium*), lancewood (*Pseudopanax crassifolius*) and occasional kowhai (*Sophora microphylla*), cabbage tree (*Cordyline australis*), tree fuchsia (*Fuchsia excorticata*), ribbonwood (*Plagianthus regius*), and lacebark (*Hoheria angustifolia*).

Riparian zone and gorges of the south branch Maerewhenua River:

Below about 600m, the riparian zone carries shrubland of variable density comprising *Coprosma propinqua*, *C. rugosa*, *Carmichaelia* cf. *petriei*, *Olearia bullata*, *O. odorata*, tutu and, in relatively shady or undisturbed sites, broadleaf, koromiko (*Hebe salicifolia*), tree fuchsia and *Fuchsia X colensoi*. Cabbage trees are particularly prominent on dry rocky sites. Much of the ground between shrubs is occupied by rank herbaceous vegetation dominated by exotic pasture species, but there are substantial areas of mountain flax, giant spaniard (*Aciphylla scott-thomsonii*), prickly shield fern, *Blechnum procerum*, hound's tongue fern (*Microsorium pustulatum*) and bracken (*Pteridium esculentum*). The section of deeply-incised gorge that is enclosed by the southern boundary of the freehold land and the adjacent part of the PL carries areas of similar shrubland, along with stands of broadleaved forest similar to that described above for RAP 8 Maerewhenua (Comrie 1992; appended).

Sunny faces to the east of the river carry highly modified tussock grassland dominated by exotic agricultural plant species, similar to that described above for the sunny faces of the northern half of Maerewhenua Spur.

Problem Plants:

Mouse-eared hawkweed, king devil (*Hieracium praealtum*), and tussock hawkweed (*H. lepidulum*) are distributed throughout the grassland vegetation, but only mouse-eared hawkweed presently reaches densities where it competes with or excludes indigenous species, and generally only on tracks, stock camps, and the severely grazed saddles on Maerewhenua Spur.

Several agricultural herbaceous weeds, including nodding thistle (*Carduus nutans*) and Californian thistle (*Cirsium arvense*), along with minor weeds such as sheep's sorrel (*Rumex acetosella*), tarweed (*Parentucellia viscosa*) and foxglove (*Digitalis purpurea*), are present in the developed pasture on the lower slopes of Maerewhenua Spur, but none pose a threat to natural values in predominantly indigenous vegetation at higher altitudes. Cleavers (*Galium aparine*) is widespread as a scrambling herbaceous weed through much of the low altitude shrubland, but is of little ecological concern.

Khasia berry (*Cotoneaster simonsii*) is present in the shrublands of the lower south branch Maerewhenua River, and has the potential to become prominent in woody indigenous vegetation.

Significance:

The extensive area of snow tussock grasslands and associated wetland and bluff/outcrop vegetation of the headwater catchments of both branches of the Maerewhenua River comprises almost entirely indigenous vegetation with a high degree of intactness and natural character. It is highly representative of the pre-European vegetation of the Dansey Ecological District, as is recognised by its inclusion in RAP 9. Adjoining is also a small portion of the second priority area to RAP 10 – Nobbler. The slim snow tussock community is a vegetation type that is highly vulnerable to grazing, and that has diminished markedly in extent since the advent of high country pastoral farming in Otago, increasing its importance here for biological conservation.

Comrie (1992) described RAP 9-Ben Ledi as representative a range of vegetation types and associated landforms in the mid to higher altitude zones of the District. Both naturalness of the area and overall condition of the vegetation are very good. The tussocks are the best in the District in terms of tussock height (> 1m tall) and cover (> 60%). It also contains the most extensive and least modified areas of wetland along the main range. The downstream section of this catchment was not included in the RAP, as although it contained similar values, it was without the diversity and high naturalness characteristic of the more northern catchments.

Steep slopes and fire refuges have provided protection from modification by pastoral management for the indigenous vegetation of the bluffs and interfluvies of the dark faces overlooking the middle reaches of the south branch Maerewhenua River. Consequently, an altitudinal sequence of vegetation exists that is almost completely natural and in excellent condition but for the dominance of exotic pasture species in herbaceous vegetation on the lower slopes. However, the latter is being displaced vigorously by indigenous shrubland communities and, in the further absence of fire, the exotic component of the vegetation will all but disappear, completing the re-establishment of the natural vegetation sequence that links the highest points of Maerewhenua Spur with the shrubland and forest of the river below. Opportunities for the protection of such sequences are rare elsewhere in the Ecological District.

Comrie (1992) emphasised the importance of the remaining indigenous forest vegetation of the Ecological District, much of which was forested below about 800 m before the arrival of humans. The remnant associated with shrubland in the gorge of the South Branch Maerewhenua River has the potential to spread both up and downstream, replacing the present shrubland and becoming linked with the altitudinal sequence of indigenous vegetation that extends to the high points of Maerewhenua Spur.

The remnant forest (RAP 8 – Maerewhenua) in the North Branch Maerewhenua River was described by Comrie (1992) as the largest and most intact forest north of the Kauru River. It remains in a relatively natural condition with a variety of forest species, a closed canopy and a healthy regeneration over much of the area.

The following threatened plants are present on the property, which are all classified as sparse (Molloy et al. 2000): *Olearia bullata*, *Clematis marata*, *Pimelea pseudolyallii*.

2.5 FAUNA

2.5.1 Invertebrate Fauna:

In total, 171 species of invertebrates were identified from the survey (see Appendix 2). This is a conservative estimate of the material collected because some groups such as Hymenoptera were not identified to species. However, it does reflect good diversity, much of which was restricted to certain habitat types as indicated below. Over 80% of species were collected only from one site, although the same collecting methodologies were not used at all sites.

Fauna Collection Sites:

The collecting sites are shown in map appendix 1 and details of each site are as follows:

Site	Grid reference	Altitude (m)	Description	Method
1	2308070E,557313 0N	650	South Branch Maerewhenua River, shrubby gully and stream-side	hand, beating shrubs, sweeping
2	2309590E,557519 0N	600	South Branch Maerewhenua River, shrubby gully and stream-side	hand, beating shrubs, sweeping, pitfalls
3	2310020E,557609 0N	600	South Branch Maerewhenua River, shrubby gully and stream-side	hand, beating shrubs, sweeping
4	2309700E,557752 0N	1060	Maerewhenua Spur tussock	pitfalls
5	2309020E,557654 0N	1125	Maerewhenua Spur tussock and rock outcrop	hand, sweeping, B-Vac
6	2304260E,556968 0N	1460	Maerewhenua Spur tussock, pavement rock and alpine veg.	hand, sweeping, B-Vac
7	2306110E,557248 0N	1420	Maerewhenua Spur rock outcrop, tussock and small wetland below ridge	hand
8	2308000E,557561 0N	1100	Maerewhenua Spur tussock	pitfalls

South Branch of Maerewhenua River tributary stream-side habitats (Sites 1, 2 and 3):

A feature of the SE-facing slopes of the Maerewhenua Spur is the many streams flowing in to the river. The gullies formed by the streams support diverse shrublands and riparian vegetation. These were found to contain a rich invertebrate fauna, totaling 57 species. A large, red margarodid, *Coelostomidia* sp. (pers. comm. Rosa Henderson) 13mm long was found near the stream under a rock. The significance of this is undetermined. The dobsonfly, *Archichauloides diversus*, was present. This species is the only representative of the family in New Zealand. Two native snail species, *Thalassohelix igniflua* and *Phrixgnathus celia* were found at sites 1 and 2. Several larvae and pupae of a lucanid (stag beetle) were found in woody stems of *Fuchsia*, and one of the pupae subsequently emerged successfully in the laboratory. This was identified as the widespread and common species *Ceratognathous helotoides*.

Most of the larger Coleoptera found at these sites are species characteristic of the area but also from Central Otago and the East Otago Plateau such as *Mecodema sculpuratum*, 'Anchonemus' (*Agonum*) *otagoensis* and the tenebrionid *Zeadelium nigrifulum*. A single individual of 'Peripatus' (see above) was found under a rock near the steam at Site 2, as was a flatworm, almost certainly a new species of the genus *Newzealandica* (P.M. Johns pers. comm.). At site 3, a common low to mid-altitude species of cockroach, *Parellipsidion pachycercum*, and the noctuid moth *Bityla defigurata*, were beaten from shrubs and flax overhanging the track. The larvae of *B. defigurata* feed on *Muehlenbeckia*.

Northern ridge of Maerewhenua Spur 1000-1100m (Sites 4, 5 and 8) :

From these three sites, 81 species of invertebrates were collected. Site 5 where an extensive Blower Vac sample was taken, was particularly rich in species diversity, with 53 species identified from that location alone. This site was a complex of rock tors with a diverse flora, some out of reach of stock. The striking chrysomelid beetle *Allocharis limbata* was found at this site, a species which is widespread but never abundant, and seems to be associated with a reasonably intact sub-alpine tussock herbfield environment. The large weevil *Anagotus lewisi* is also indicative of relatively undisturbed tussock, the larvae feeding on tussock tiller bases. Large numbers of the tenebrionid, *Artystona obscura*, were found under rocks near the tors.

Blower-Vac sampling gave an indication of the diversity of the smaller groups of Coleoptera which are unlikely to be collected by hand searching. These included 5 species of pselaphids; 3 species of *Baeosomus* (moss weevils), cryptophagids, and small staphylinids. These groups are too poorly known to assign any significance to their occurrence in this area.

The pitfall traps at site 4 were installed in part to determine whether *Prodontria patricki*, known from Dansey's Pass might be present at a similar altitude here. This species was not found, but a male *Mecodema* sp. nr. *laeviceps* was collected. The pitfall traps at site 8, which was a relatively dry, open tussock site collected the only cricket (Gryllidae) encountered in the survey, added to the list of Hymenoptera, and collected two other Coleoptera not found elsewhere, a colydiid sp. and the broad-nosed weevil *Irenimus* cf. *aemulator*, a typical tussock grassland species known from Kyeburn, the lower slopes of the Rock & Pillar Range, and intermontane basins of the Strath-Taieri and Maniototo.

Southern ridge of Maerewhenua Spur 1400-1500m (Sites 6 and 7) :

A total of 55 species were collected from these higher altitude sites. Snow had fallen during the previous 24 hours and this persisted at the highest site (Site 6).

One of the most notable discoveries of the Ben Ledi survey was two large groups of 'Peripatus' under rocks. Twelve individuals were found beneath a rock at Site 7, and a further group of 7 found again, under a rock, below the ridge top near a wetland area on the south side at 1350m.

On the ridge under rocks cockroaches were abundant, with 3 species present. *Celatoblatta anisoptera* is at the eastern end of its known range and similarly, *C. quinque maculata* is a Central Otago species at the north-easternmost limit of its known range (P.M. Johns, pers. comm.). A further common species, *Parellipsidion inaculeatum* was also present. A migadopine (Carabidae) species was found which Barbara Barrett has only collected previously on the Hawkdun Range. *Orocrambus paraxenus* is an alpine grass moth, widespread but not common. At the highest site (Site 6), where snow was still lying, a single adult male and some juveniles of the weta *Deinacrida connectens* were found under large flat slabs of rock.

This weta is common in South Island alpine environments (Field 1980). At this site it was not apparently abundant. Four diurnally active geometrids (Lepidoptera) were found including an undescribed species of *Notoreas*, also known from the Hawkdun and Dunstan Ranges as well as the Kakanui Mountains; the alpine *Aponotoreas anthracias*; *A. insignis*, an eastern South Island species indicative of high quality snow tussock; and the coastal to alpine *Paranotoreas*

brephosata. The larvae of these species are dependent upon their host plants *Kelleria villosa*, prostrate *Dracophyllum*, *Chionochoa* and *Epilobium* respectively.

The wetland area at site 7 was quite severely damaged by pigs but typically the small carabid *Scopodes versicolor* was found and the broad-nosed weevil *Nicaeana cervina* was abundant. Both are typical of eastern Otago tussock grasslands. *Peristoreus veronicae*, a widespread 'flower weevil' was swept from *Ozothamnus* near the wetland. The common native snail *Paralaoma sericata* was also present.

The wetlands and shrublands in association with rock outcrops, characteristic of the uppermost reaches of Maerewhenua Spur, have been identified by (Patrick 1991), as key areas for invertebrate conservation, as reported in (Comrie 1992).

Significant Invertebrate Fauna:

Mecodema sp. nr. *laeviceps* (Coleoptera; Broscinae)

This is one of the most significant species found during the Ben Ledi survey. Specimens have been examined by Ian Townsend who notes that while there are some characters which differ from *M. laeviceps*, it is the closest species to which the specimens can be ascribed. Given a revision of the genus, it could possibly be described as a new species placed phylogenetically very close to *M. laeviceps*. This species is listed by (McGuinness 2001), who suggests that the decline of the species might be attributable to loss of habitat through pastoral development. Until recently it was thought to be close to, if not already, extinct. However, specimens recently found at Piano Flat, Waikaia Bush are the first to be found since 1964 (Barratt 1994) when a specimen was collected at Oturehua (Peter Johns pers. comm.). It was originally described from the Ida Valley, and the only other known specimens are from the Old Man Range and Mt. Teviot. Recent specimens found at the New Zealand Arthropod Collection, also from Old Man Range, have "Speargrass Flat" on the label (Stephen Thorpe, pers. comm.). This is a name previously used for what is now known as 'Fruitlands' (M. Foord pers. comm.), an area at the foot of the range on the eastern side, so this may also have been the locality where the earlier specimens were found. Ben Ledi represents the easternmost extent of its range, and one of the higher altitude sites.

'Peripatus' new genus and sp. (Onychophora)

A single specimen of 'Peripatus' was found at Site 2 under a rock beside one of the tributaries of the South Branch of the Maerewhenua River, and two groups were found under separate large rocks, one on the Spur at Site 7, and the other close to a wetland area just below the ridge. They are members of a new genus and species known previously only from Danseys Pass (Diane Gleeson, pers. comm.). The first group comprised 12 individuals and the second 7 individuals. To find 'Peripatus' at this altitude is apparently not unusual (Diane Gleeson pers. comm.). While reasonably resilient to habitat modification and hard grazing (as was evident on this part of the range) eventually they might become short of invertebrates to feed on, and clumping under rocks possibly reflects a reluctance to disperse (Diane Gleeson, pers. comm.).

Onychophora are listed in the International Union for the Conservation of Nature Invertebrate Red Data Book as "vulnerable", and it has been suggested they warrant a high priority for conservation in New Zealand (Gleeson 1996). It has also been suggested that they represent a good indicator species in biodiversity assessments (Gleeson 1996).

***Notoreas* new species (Lepidoptera: Geometridae)**

This undescribed species has a very limited distribution. It is known from the Kakanui Mts., the Hawkdun Range and the Dunstan Mountains (B. Patrick pers. comm.), so it is of some significance that it is present at this site on Ben Ledi. It is a diurnally active moth and the larvae are dependant upon their host plant *Kelleria villosa*.

2.5.2 Herpetofauna:

Skink numbers on the property (as recorded during the inspection in January 2002) were generally low, except on the Maerewhenua Spur between 1000-1350m where they were moderately abundant around the edge of stable screes. Skinks sighted were the common skinks, *Oligosoma polychroma* and McCann's Skink, *O. maccanni*. Both species are common and widespread in Otago.

Despite intensive searching, no geckos or gecko sign was seen on the property.

2.5.3 Avifauna:

The following birds are present on the property: skylark, pipit, harrier, New Zealand falcon, grey warbler, spur-winged plover, silver-eye, yellowhammer, redpoll, bellbird, welcome swallow and paradise shelduck.

Significance:

The Falcon is a category B threatened species (Molloy, J. *et al.* 2001).

2.5.4 Aquatic fauna (Freshwater Fish):

Two sites on the south branch of the Maerewhenua River were fished with a backpack electric fishing machine on 7 February 2002 (site 1 at GR I41 095 747 and site 2 at GR I41 081 734). When fished, the river level was high after recent rainfall, but the water was clear. In the sections fished the river was 3-4m wide and up to 1m deep, with the average depth around half a metre. The sections comprised run-riffle sections with predominantly cobble substrate.

The first site contained only brown trout. At the second site, brown trout and one galaxiid were found. The galaxiid has subsequently been identified as *Galaxias vulgaris* (commonly called the Canterbury galaxiid). Upland bullies have also been found in the Maerewhenua River on other occasions.

The invertebrate community contained mayflies, caddis and the stonefly *Zelandoperla maculata* (site 2). Although numbers were low (as one would expect in a trout stream), the

presence of these species indicates good water quality. Riparian grasses and scrub occur at both sites.

There were no significant aquatic species found during the survey.

2.6 HISTORIC

On Ben Ledi the main historic features are the long water races either side of Maerewhenua Spur which provided water for the Livingstone Goldfield which dates from the late 1860s. Water was a problem on this gold field hence the long races from the headwaters of the river. The main period of mining was between 1870 and 1910. There was a brief revival in the 1930s.

2.7 PUBLIC RECREATION

2.7.1 Physical Characteristics:

The property is bounded on the northern end by the metalled Danseys Pass road. Access to the homestead area is along the formed Duthies Road.

Access within the property is available along formed unmetalled farm tracks, which provide routes both up the south branch of the Maerewhenua River and the full length of the Maerewhenua Spur (a distance of around 11 km). These tracks are well formed but can be difficult for vehicles in wet or icy conditions.

There is no formed track along the Kakanui Ridge crest between the southern corner of the property and Mt Nobbler. However the track up the Maerewhenua Spur does continue, through adjoining properties, down the western face of the Kakanui Mountains, as well as in a southerly direction along the ridge crest toward Mt Pisgah.

This ridge crest is strategically important. The range is unusual in that it starts at the sea at Shag Point, and provides a key part of a continuously mountainous route right through to the West Coast.

2.7.2 Legal Access:

Both the formed Danseys Pass Road and Duthies Road are legal. The only other legal road traverses the top of the Kakanui Range, the portion on Ben Ledi being unformed.

Marginal strips exist along both the North and South Branches of the Maerewhenua River, to within 2 – 3 km of the Kakanui Mountains crest. No other marginal strips are likely to result from the implementation of this review.

2.7.3 **Activities :**

Historically Ben Ledi has been used for horse trekking and four wheel driving with occasional hunting, mainly of wild pigs. The range crest of the Kakanui Mountains has also been traversed by skiers when snow conditions allow.

In the future, if there is a large area of public land resulting from the tenure review of Ben Ledi and other properties on the Kakanui Range, there will be a significant opportunity for public recreation.

PART 3

OTHER RELEVANT MATTERS & PLANS

3.1 Consultation:

An NGO early warning meeting was held on the 8/10/01 with interested groups. The following views were expressed:

The top block was considered as suitable for retention by the Crown.

Access up the Maerewhenua Spur was seen as strategic and already used by horse riders.

The broadleaf forest in the Maerewhenua River needs to be looked at.

A written submission was received from Dr Alan Mark that suggested that the identified RAP at the back of the property should be protected. Also walking access at least should be secured up the Maerewhenua Spur. (attached as Appendix 7)

A further written submission was received from Federated Mountain Clubs. They provisionally suggested that an area approximating the top wether blocks should be returned to Crown ownership. They also suggest that the formed road along the main Kakanui Range be aligned with the legal road (*erroneously as there is no formation*). Also the Maerewhenua Spur should be made available for walking, bike and possibly horse access. (Attached as Appendix 6)

3.2 Regional Policy Statements & Plans:

Under the Canterbury Regional Land Plan (Vegetation Burning) any burning would be subject to performance standards relating to topdressing and spelling from grazing. The burning of wetland vegetation is not permitted.

3.3 District Plans:

The property is located within the Rural Scenic zone of Waitaki District Plan. In general, the proposed Waitaki District Plan (amended to incorporate Council decisions) does not act as a trigger for the protection of tussock grasslands and smaller wetlands and forest areas. No indigenous vegetation clearance or exotic tree planting is allowed within 20m of a water body or in any wetland. There are effectively no provisions that protect scenic values.

There are no registered archaeological sites, or areas of significant indigenous vegetation and habitat of significant indigenous fauna as set out in the appendices of the plan. Protection is limited to the controls set out above.

3.4 Conservation Management Strategies & Plans:

The CMS recognises the Kakanui Mountains as one of Otagos 41 special places (14 – Kakanui) and sets specific objectives for the area as follows:-

To maintain the natural resources contained within the existing protected areas on the Kakanui Mountains while taking opportunities that may arise through pastoral lease tenure review to negotiate protection of and access to areas of high natural and recreational value.

3.5 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 habits 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, etc.

PART 4

MAPS ETC.

4.1 Additional information:

4.1.1 References:

- Barratt, B.I.P. 1994. *Mecodema laeviceps* Broun: An Assessment of the Priority for Conservation. Department of Conservation, Wellington. Conservation Advisory Science Notes. No. 74. 20pp
- Bishop, D G 1974. Stratigraphic, structural and metamorphic relationships in the Danseys Pass area, Otago, New Zealand. *New Zealand Journal of Geology and Geophysics* 17 (2) : 301-35.
- Butcher, M.R. 1984. A revision of the genus *Holcaspis* (Coleoptera: Carabidae). *Journal of the Royal Society of New Zealand* 14: 47-99
- Comrie, J. 1992: Dansey Ecological District. Survey Report for the Protected Natural Areas Programme. Department of Conservation, Wellington.
- Cotton, C A 1917. Block Mountains of New Zealand. *American Journal of Science*, 44 (4th series): 249-293.
- Field, L.H. 1980. Observations on the biology of *Deinacrida connectens* (Orthoptera: Stenopelmatidae), an alpine weta. *New Zealand Journal of Zoology* 7: 211-220
- Gleeson, D.M. 1996. Onychophora of New Zealand. *New Zealand Entomologist* 19: 51-55
- MacDonald et al; Soil and Water Conservation Plan No 12, Waitaki Catchment Commission.
- McGuinness, C.A. 2001. The conservation requirements of New Zealand's nationally threatened invertebrates. Department of Conservation, Wellington. Threatened Species Occasional Publication. No. 20. 657pp.
- Morris, S.J. 2002. Identification guide to grasshoppers (Orthoptera: Acrididae) in Central Otago and Mackenzie Country. Department of Conservation, Wellington. DOC Internal Series. 26. January 2002. 17pp
- Mutch, A. R. 1963. Sheet 23 Oamaru. Geological map of New Zealand 1:250,000. Department of Scientific and Industrial Research, Wellington.
- Patrick, B., M, 1982. Lepidoptera of Danseys Pass, Otago. *New Zealand Entomologist* 7: 332-336
- Patrick, B., M, 1991. Insects of the Dansey Ecological District. Department of Conservation, Wellington. Science and Research Series. No. 23. 21pp.
- Watt, J.C. 1992. Tenebrionidae (Insects: Coleoptera): catalogue of types and key to taxa. DSIR Plant Protection. Auckland. 69pp.

4.1.2 Appendices

- A1 Invertebrate Collection Sites**
- A2 List of invertebrates found at inspection**
- A3 Description of RAP 8**
- A4 Description of RAP 9**
- A5 Description of RAP 10**
- A6 FMC draft report**
- A7 Alan Mark submission**
- A8 Photos**