Toitu te whenua
Land Information
New Zealand

Crown Pastoral Land Tenure Review

Lease name : MT DASHER

Lease number : PO 030

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.

They are released under the Official information Act 1982.

March 05

DOC CONSERVATION RESOURCES REPORT ON TENURE REVIEW OF MT DASHER PASTORAL LEASE (P 30) UNDER PART 2 OF THE CROWN PASTORAL LAND ACT 1998.

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PART 1

INTRODUCTION

1.1 Background

The lessee of the Mt Dasher Pastoral Lease has applied to the Commissioner of Crown lands for a review of the property's pastoral lease tenure.

Mt Dasher Pastoral Lease covers an area of approximately 7134 hectares on the Kakanui Mountains in North Otago and is leased by Mt Dasher Ltd. It lies between the South Branch Kakanui River and its major tributary Deep Creek in the north and west, the summits of Obi and Siberia Hill in the south, and the main north ridge of the Siberia Hill complex in the east. The lease covers the volcanic summits of Mount Dasher, Kattothyrst and Siberia Hill, rising to an altitude of over 1400 m, and the deeply incised upper catchment of the South Branch Kakanui River, descending to an altitude of 300 m at the northern corner of the property.

1.2 Ecological Setting

Mt Dasher Pastoral Lease adjoins The Dasher Pastoral Lease to the south, Shingley Creek Pastoral Lease to the southwest, Islay Downs Pastoral Lease to the west, Balmoral Pastoral Lease to the northwest and privately-owned land to the north and east. Areas of public conservation land adjacent or near to the property are Kakanui Peak Conservation Area (Conservation Unit I41 089; 690 ha) just west of (but not adjoining) the property in the head of the Swin Burn, Deep Creek Marginal Strip (Conservation Unit I41 082; 40 ha) alongside Deep Creek, and Kakanui River (South Branch) Marginal Strip (Conservation Unit I41 083; 15 ha) alongside the South Branch Kakanui River downstream from Quinns Creek. An area of approximately 1001 ha north of Siberia Hill is subject to a Queen Elizabeth the Second National Trust covenant which allows continued pastoral farming at low stocking rates.

The property lies almost entirely in Dansey Ecological District, within Kakanui Ecological Region (McEwen, 1987). The northeast corner of the property lies in Duntroon Ecological District (Kakanui Ecological Region). Dansey Ecological District was surveyed as part of the Protected Natural Areas Programme (PNAP) in 1989/1990 (Comrie, 1992). Two areas on Mt Dasher Pastoral Lease were recommended for protection as a result of that survey: part RAP 4 Hectors and part RAP 5 Dasher. RAP 4 proposes protection for areas of broadleaved forest in the Hectors Stream catchment at the southeast corner of the property and on adjoining land. RAP 5 proposes protection for shrubland, tussockland and cushionfield on schist and volcanic substrates on the southwest part of the property and on the adjoining The Dasher Pastoral Lease. Relevant extracts from the PNAP report are attached as Appendix 1.

PART 2

INHERENT VALUES: DESCRIPTION OF CONSERVATION RESOURCES AND ASSESSMENT OF SIGNIFICANCE

2.1 LANDSCAPE

2.1.1 *Landscape Context*

The Kakanui Mountains, upon which Mt Dasher Pastoral Lease is located, form the northern margin to the Otago block-mountains. The Kakanui Mountains are significant as they are part of a major South Island divide that slopes down towards the east coast. Mt Dasher Pastoral Lease makes an important contribution to the overall landscape identity of the Kakanui Mountains. The Kakanui Mountains can be divided into five broad landscape character types (Petrie, 1990):

- Mountainlands (steeplands): located along the main axis of the Kakanui Mountains.
- High hills (dissected): located principally along the eastern flanks of the Kakanui Mountains and typified by long back slopes separated by deep V-shaped valleys.
- Foothills: transitional hill country that wraps around the base of the Kakanui Mountains.
- Plateaux: located at the eastern end of the Kakanui Mountains just before the mountains dip down towards the Horse Range.
- Downlands: an intermediate landform located between the foothills and the valley systems (e.g. Kakanui Valley).

Within this broad physical framework, Mt Dasher Pastoral Lease incorporates a balance of plateau country and high hills. The 1990 landscape study cited above not only identified the types of landscape contained within Dansey Ecological District, but also subdivided each generic type into landscape units based on significant physiographic changes and visual catchments. From this local-scale subdivision it was concluded that the plateau on Mt Dasher Pastoral Lease had high natural landscape values. The surrounding high hills helped to augment the district's character, primarily through repetition of similar landforms, drainage pattern and cultural overlay (e.g. extensive grazing).

2.1.2 *Landscape Description*

For the purposes of this landscape assessment Mt Dasher Pastoral Lease is divided into five landscape units (LU's), reflecting changes in landform and ground cover. The extent of these units is shown on Map 4.2.2. The criteria used to assess and evaluate the landscape values of each unit are based on the following attributes:

1. Naturalness: an expression of the indigenous content of the vegetative cover and the extent of human intervention.
2. Legibility: an expression of the clarity of the formative processes and how striking these processes are.

3. Aesthetic value: the memorability and naturalness of the area, including factors which can make a landscape vivid, such as simplicity in landform, muted colours and fine-textured ground cover.

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

2.1.3 LU 1

LU 1 incorporates the entire upper catchment of Deep Creek and is bounded in the south by the wide-crested ridge that rises gently towards Obi (1425 m). Other boundaries of LU 1 are the ridge between Deep Creek and the Shag Valley in the west, Deep Creek in the northwest, and the edge of the Siberia Hill-Mount Dasher plateau in the northeast.

The unit is characterised by an assemblage of spectacular landforms derived principally from volcanism. The most impressive volcanic landforms are the narrow cone of Kattothyrst (1293 m) and the neighbouring truncated cone of Mount Dasher (1304 m). Radiating out from these eruptive centres are boulder 'streams' which commonly extend to the base of the cones. The southern boundary of the unit is dominated by Siberia Hill (1272 m), a summit that is principally a jumble of basalt blocks. Siberia Hill also features a number of boulder 'streams' that 'flow' down the hill slopes and across the abutting plateau. This plateau (commonly referred to as Hectors Plateau) is typified by its subdued physical relief. Projecting out from the volcanic area is a series of razor-edged spurs that feature exposed rocky strata on the steeper darker faces. Separating the spurs are deep V-shaped gullies, each containing a tributary of Deep Creek.

Dominant vegetative cover is a mixture of narrow-leaved snow tussock and modified slim snow tussock, with the inter-tussock spaces frequently occupied by exotic grasses notably browntop and sweet vernal. The natural depressions contain red tussock and sedges.

There are few built elements present except for a traditional musterers' hut (Mitchells Hut) on the northeast slopes of Siberia Hill. The access tracking generally follows the dry ridges and gentler side slopes.

Landscape Values

LU 1 has high inherent landscape values due to the distinctive landforms and processes that are associated with volcanism. The attributes that make a contribution to the importance of this unit include:

- The visual legibility of volcanism in the form of conical vents, boulderfields and boulder 'streams'.
- The complexity and juxtaposition of landforms derived from various geological processes, including volcanic vents, razorback ridges and deeply dissected valleys.
- The general uniformity of the vegetative cover, dominated by tall tussock (the simplicity in the ground cover is however gradually changing due to stock pressure).
- Striking contrasts in colour and texture between the golden tussocklands and the black boulder 'streams'.

Visual Values

LU 1 has high visual resource values due to the distinctive and recognizable silhouettes of Obi, Kattothyrst, Mount Dasher and Siberia Hill, all of which are visible from the Kakanui Valley and the coastal downlands and are well known landmarks of the North Otago district.

Potential Vulnerability to Change

Land-use changes and activities, including those listed below, have the potential to affect LU 1:

- Further modification and fragmentation of tall tussocklands by subdivision and intensive farming practices.
- Change to drainage patterns in depressions and wetlands, which could adversely affect wetland communities and red tussocklands.
- Further earth disturbance, such as bulldozed fence lines.
- Spread of wilding pines.
- Disturbance to boulderfields, such as bulldozed fence lines.

2.1.4 LU 2

LU 2 comprises the northwest-facing slopes overlooking the mid section of Deep Creek. Deep Creek forms the boundary of LU 2 and the property. The crest of Half Moon Spur forms the southeast boundary of the unit.

Dominant landforms of LU 2 are long planar slopes. These slopes are frequently indented by shallow depressions containing permanent watercourses that flow into Deep Creek. Steep rocky walls bound Deep Creek. A noticeable feature of the long colluvial slopes is the lack of exposed rock, except close to the crest of Half Moon Spur.

Vegetative cover is dictated by altitude and stock pressure, with the bottom section of the landscape unit dominated by pasture grasses, with occasional snow tussocks. Above 900 m altitude narrow-leaved snow tussock becomes dominant, with native inter-tussock species including false speargrass and golden speargrass.

A well-maintained track follows the crest of Half Moon Spur, while a traditional corrugated-iron musterers' hut is located in a saddle on the spur.

Landscape Values

The upper section of LU 2 has high landscape values due to the intactness of the tall tussocklands that provide this part of the unit with a sense of uniformity and coherence. Furthermore, this area makes an important contribution to the natural setting and landscape integrity of the outstanding natural features contained within LU 1.

The mid and lower sections of LU 2 form part of the wide band of dissected hill country that envelopes the eastern flanks of the Kakanui Mountains. This hill country could be described as transitional between the upper unmodified high country and the more modified lower country.

Visual Values

LU 2 has only limited visual resource values due to the contained nature of Deep Creek. Most views are channeled along the stream corridor, and Kakanui Peak terminates the view when looking upstream.

Potential Vulnerability to Change

Land-use changes and activities, including those listed below, have the potential to affect this landscape unit:

- Increased grazing pressure on the tussocklands, especially on the sunnier slopes.
- Further track construction, especially on sunnier slopes where rehabilitation is generally more difficult to implement.
- Spread of wilding pines.

2.1.5 LU 3

LU 3 encompasses the catchment of Quinns Creek and the upper section of the South Branch Kakanui River. The narrow twisting Grassy Ridge separates the two valleys. The boundaries of LU 3 are defined in the south by the wide flat crest of the Siberia Hill plateau (described for LU 1), in the east by the Scout Hill-Siberia Hill ridge, and in the west by Half Moon Spur.

Deep V-shaped valleys that penetrate into the upper rim of the plateau typify both catchments. The slopes of the upper valleys are over-steep and dissected, and feature rock outcrops and the occasional boulder 'stream'. The mid and lower sections of the two valleys become more splayed and open in character with slopes of a constant grade. The steeper shady slopes of Half Moon Spur feature extensive buttresses of exposed rock.

Modified tussocklands dominate the vegetative cover. The upper section of the landscape unit is covered in a mixture of narrow-leaved snow tussock and slim snow tussock, with exotic grasses dominating inter-tussock spaces. There is an occasional hard edge in the composition of the vegetation due to the subdivision fencing and grazing pressure. Below 900 m altitude the snow tussock changes to pasture with scattered tall tussocks.

Landscape Values

LU 3 contains moderate inherent landscape values, due to the level of modification of the tussocklands. The area is representative of similar ridges and valleys that project out from the eastern flanks of the Kakanui Mountains. These long ridges and dissected valleys could be described as the high country's 'middle ground', as they form the transition area between the more inherently intact high altitude country and the lowlands.

Visual Values

The upper section of LU 3 has moderately high visual resource values. Most of the plateau country is highly visible from the Kakanui Valley and coastal downlands. This plateau country forms the foreground to the distinctive Siberia Hill, a recognizable landmark in the North Otago district.

Potential Vulnerability to Change

Land-use changes and activities, including those listed below, have the potential to affect this landscape unit:

- Further patch burn-offs, especially on dry slopes.
- Further earth disturbance, such as track construction.
- Spread of wilding pines.
- Further intensification of land use.

2.1.6 LU 4

This small discrete landscape unit comprises the headwaters of Hectors Creek, a tributary of the Kauru River. The boundaries of LU 4 are the property boundary on the plateau in the south, the Scout Hill-Siberia Hill ridge in the north and west, and the straight-line property boundary in the east.

Relatively steep slopes typify the head of Hectors Creek. These slopes are intermittently broken by side spurs and gullies that feature rock outcrops, most conspicuously on the darker slopes. Hectors Creek winds around the base of the interlocking side spurs, with its channel constricted by rocky walls.

The vegetation on the darker faces is principally modified narrow-leaved snow tussock, while the sunnier faces are more lightly clad in a mixture of fescue tussock and exotic pasture grasses. Discontinuous remnants of broadleaved forest are present along the valley floor and frequently surrounded by regenerating shrublands.

Landscape Values
LU 4 has moderately high inherent landscape values, principally due to the presence of low-altitude broadleaved forest remnants. Regeneration of forest through the adjoining shrublands has the potential to eventually create a corridor of forest along Hectors Creek. Such a natural feature is scarce on the eastern flanks of the Kakanui Mountains where semi-intensive farming has converted much of the ground cover into pasture.

Visual Values
LU 4 has relatively low visual values as Hectors Stream is contained and most views are directed along the creek.

Potential Vulnerability to Change
Land-use changes and activities, including those listed below, have the potential to affect this landscape unit:

- Grazing of palatable species, hindering natural regeneration.
- Further fragmentation of forest remnants.
- Invasion of the forest remnants by woody weeds.

2.1.7 LU 5

LU 5 comprises the long ridge (back slope) that extends from the dissected high hills in the centre of the property out towards the downlands in the northeast. The western boundary follows the South Branch Kakanui River, and the eastern boundary follows the straight-line property boundary which crosses a number of small side gullies of the Scout Hill-Mole Hill ridge. Similar to most long ridges in the area, the side slopes are constant and only broken by shallow indentations. A large proportion of LU 5 is at low altitude and readily accessible. Extensive areas have been converted to pasture. The main access track through the property follows the ridge crest within LU 5.

Landscape Values
LU 5 has relatively low inherent landscape values, having been transformed primarily into semi-intensive farmland with associated infrastructure such as farm sheds and stock-yards.

Visual Values
LU 5 has limited visual resource values due to the rolling hill country merging with similar hill country in the area.

2.1.8 Significance of the Landscapes

LU 1 makes a significant contribution to the eastern South Island high country due to the assemblage of a diverse range of landforms, especially those derived directly from volcanism. These outstanding natural features include conical vents with boulderfields radiating out from their eruptive centres, and jumbled piles of black basalt that appear to flow like streams across the adjoining plateau. These vivid natural features are set off within an expansive plateau that is clad in tall tussockland, combining to create a memorable high country landscape.

The upper sections of both LU 2 and LU 3 play a fundamental role in the importance of LU 1, as both express a high degree of naturalness that helps provide the volcanic landscape

with its uniqueness. Furthermore, all of LU 1 and the upper sections of LU 2 and LU 3 convey a strong sense of place. This is attributable mainly to the overall impression of spaciousness and sense of remoteness, with this latter quality augmented by the lack of 'built' elements.

2.2 LANDFORMS AND GEOLOGY

Mt Dasher Pastoral Lease covers mountain and hill country on the eastern side of the Kakanui Mountains. The Kakanui Mountains are an uplifted and tilted block lying between the Waihemo and Waitaki fault systems, with steep scarps sloping to the southwest and gentler ridges sloping to the northeast (Comrie, 1992). The gentler back slopes of the Kakanui Mountains are deeply incised, though general summit accordance indicates they are remnants of the Otago Peneplain (Forsyth, 2001).

Mt Dasher Pastoral Lease covers three main ridges (Half Moon Spur, Grassy Ridge and the Siberia Hill-Mole Hill ridge) that extend northeast from the volcanic cones and surrounding plateaux of Mount Dasher and Siberia Hill. The property spans an altitudinal range of 1100 m, from 300 m altitude in the north at the South Branch Kakanui River to over 1400 m altitude in the south at Obi. It includes the upper eastern tributaries of Deep Creek, the upper tributaries of the South Branch Kakanui River (including Quinns Creek) and the upper reaches of Hectors Creek, all tributaries of the Kakanui River. The property is characterised by a broad high-altitude plateau, volcanic summits, broad-crested ridges, moderately-steep valley sides and deep valleys.

Basement rocks of Mt Dasher Pastoral Lease are predominantly Rakaia terrane semischist, comprising schistose to non-schistose quartzofeldspathic sandstone (greywacke) interbedded with mudstone (argillite). Areas of Dunedin Volcanic Group basalt are present at the high summits of Mount Dasher, Kattothyrst, Siberia Hill and Scout Hill. Kattothyrst is composed of columnar-jointed lava, whereas Mount Dasher and Siberia Hill are formed from basalt flows, the latter representing a relatively long period of volcanic activity that produced flows of distinctly different composition. A thin interval of Onekakara Group marine sandstone and mudstone lie between the semischist and basalt at Siberia Hill (Forsyth, 2001).

The volcanic landforms on Mt Dasher Pastoral Lease are spectacular. The summits of Mount Dasher and Kattothyrst stand out from the broad plateau that surrounds them, and black basalt boulderfields dominate the flanks of Mount Dasher and Siberia Hill. The extent of the boulderfields and the lack of vegetation on the dark basalt boulders provide impressive examples of the streams of basalt that flowed from these vents during the Miocene. These volcanic summits represent one of the most extensive areas of volcanic rock in the South Island high country. The Siberia Hill-Mount Dasher volcanic complex, within RAP 5 Dasher, is a listed geopreservation site (No. 296 Dasher) of regional significance. The significance of the site is the range of relatively unmodified soils and soil-vegetation associations, including soils derived from volcanic rock (Arand *et al*, 1991) (attached as Appendix 2).

Soils at higher altitudes (above 900 m) on Mt Dasher Pastoral Lease are predominantly Kaikoura yellow-brown earths on mountain slopes and Kirkliston yellow-brown earths on rolling land. Soils at lower altitudes (below 900 m) are Hurunui yellow-brown earths on mountain slopes and Kakahu yellow-brown earths on ridge crests. Saddle Hill brown granular loams are present on basalt substrates (Comrie, 1992). Soil fertility is moderate and drainage is generally good (Leathwick *et al*, 2003).

2.2.1 *Significance of the Landforms and Geology*

Landforms and geology on the property represent one of the most extensive exposures of the Dunedin Volcanic Group in northeast Otago and one of the largest exposures of volcanic rock in the South Island high country. Siberia Hill is significant as a volcanic vent formed from successive basalt flows of different composition. Volcanic substrates on the property are regionally significant for the range of relatively unmodified soils, soil-vegetation associations and soils derived from volcanic rock.

The geopreservation site at RAP5: Dasher is of regional importance as it contains a moderately wide range of relatively unmodified soils and soil-vegetation associations; soils derived from volcanic rock and a relatively unmodified vegetation cover which are uncommon in the South Island (Arand *et al*, 1991).

2.3 CLIMATE

Mt Dasher Pastoral Lease has a sub-humid climate with cool winters and mild summers (Comrie, 1992). Higher altitude parts of the property receive relatively low annual and winter solar radiation and have slight annual water deficits (Leathwick *et al*, 2003). Predominant winds are from the northwest, though northeast winds frequently affect the property. Annual rainfall ranges from 600 to 800 mm (Tomlinson, 1976). Cool foggy conditions are common during northeast winds. Snow is common in winter and may lie for several months in some locations.

2.4 VEGETATION

2.4.1 *Ecological Context*

Comrie (1992) suggests the original (pre-human) vegetation of Dansey Ecological District was predominantly podocarp hardwood forest at lower altitudes and tall tussockland and shrubland at higher altitudes. Forest was dominated by mountain totara, matai, rimu and kahikatea, over a canopy of lowland ribbonwood, broadleaf, kowhai and marbleleaf. McGlone (2001) suggests that the pre-human vegetation of northeast Otago comprised a mosaic of forests with widely spaced podocarp dominants over low variable angiosperm canopies, with extensive scrub and grassland patches. Pinney (1981) notes that in the early days of pastoralism on the Mt Dasher property "there use to be plentiful totara on the hills".

These vegetation descriptions are broadly similar to those proposed by Leathwick *et al* (2003) in their analysis of the Level III Land Environments on the property. Land Environment N3.1, covering the broad-crested ridge at the northern end of the property (4% of the property), is described as originally supporting forest dominated by totara, matai, broadleaf, lowland ribbonwood, narrow-leaved lacebark and kowhai. Land Environment Q2.1, covering mid-altitude areas (30% of the property), is also described as originally supporting podocarp hardwood forest, but with additional dominant species (rimu, miro, kahikatea, pokaka and tarata). Land Environments Q1.1 and Q1.2, covering most higher-altitude areas (64% of the property), is described as originally supporting low forest dominated by mountain totara and toatoa. Land Environment Q3.3, covering a small area northeast of Siberia Hill (2% of the property), is described as originally supporting tussockland and cushionfield (Leathwick *et al*, 2003).

It therefore appears likely that the former vegetation of Mt Dasher Pastoral Lease was podocarp hardwood forest at lower altitudes, mountain totara forest on higher slopes, and scrub, tussockland, cushionfield and boulderfield at higher altitudes. The extent to which forest prevailed in the area prior to human settlement may have been influenced by natural fires (Walker *et al*, 2003), especially in the west where tussockland and scrub may have occupied formerly forested sites for relatively long periods. In any case, areas above the natural timberline of c. 1000 m (Allen *et al*, 1988), and particularly areas on the broad high-altitude summits, are likely to have supported extensive tussockland with areas of boulderfield, scrub and cushionfield.

The level to which the Land Environments of the property are represented within existing protected natural areas is shown in descending order of their extent on the lease, below on Table 1. Please note that this data should be interpreted with caution, as the predicted extent and suggested vegetation types for each Land Environment have been extrapolated from limited field data.

Table 1: LENZ environments and the extent to which they are protected nationally.

LENZ environment	National area (ha)	Protected area (ha)	Percentage of national area protected
Q1.1	662,313	149,285	23%
Q2.1	409,287	27,161	7%
N3.1	456,106	2778	0.6%
Q3.3	280,633	39,401	14%
Q1.2	253,051	127,324	50%

2.4.2 *Plant Communities*

The vegetation of Mt Dasher Pastoral Lease has been investigated in previous surveys. Remnant mixed broadleaf forest in Hectors Creek was surveyed by Bruce (1986) and then by Comrie (1992) as part of the PNAP. Plant communities on volcanic substrates were surveyed by Allen *et al* (1988) and by Comrie (1992). The results of these surveys, including the PNAP plot data, have been included in the vegetation descriptions presented below.

The most extensive indigenous plant community on Mt Dasher Pastoral Lease is tall tussockland, which is present throughout the southern half of the property and ranges in condition from virtually intact to highly modified. Other indigenous plant communities include red tussockland, cushionfield, broadleaved forest, and shrublands associated with boulderfields and stream sides. These plant communities are described below for each main part of the property.

2.4.3 *Mount Dasher-Siberia Hill volcanic complex, Half Moon Spur and Upper Deep Creek catchment*

This area makes up the southern half of Mt Dasher Pastoral Lease and supports the least modified indigenous vegetation on the property. The area includes three distinct landforms, although tall tussockland forms an almost continuous cover broken only by areas of cushionfield and the volcanic boulderfields of Mount Dasher and Siberia Hill. The volcanic complex in this area was included in RAP 5 Dasher by Comrie (1992). High altitude (above c. 1000 m) plant communities in this area are highly representative of the pre-human vegetation, whereas plant communities at lower altitudes (notably tall tussockland) are mostly induced though retain high naturalness values.

Narrow-leaved snow tussock is dominant at lower altitudes and on hill slopes while slim snow tussock is more important on ridge crests and at higher altitudes. There are extensive areas where the two species are co-dominant, such as on the volcanic plateau, and in these areas the two species hybridise.

The tussock is generally below one metre tall and ranges in cover from c. 25% in more modified areas or where cushionfield vegetation becomes important on ridge tops, to c. 90% in sheltered areas not affected by burning and grazing. Along the main ridge to Obi and at some higher altitude sites in the upper Deep Creek catchment, slim snow tussockland is particularly heavily grazed. Some slim snow tussocks were observed to be close to senescent along the ridge near Obi. Introduced species such as browntop, sweet vernal, and mouse-ear hawkweed are well established in some areas, particularly at ridge-top stock camps and on lower-altitude slopes, but these areas are generally not extensive.

Narrow-leaved tussockland

Narrow-leaved snow tussock is dominant and ranges in cover from c. 40% to c. 90% in these communities. Important species include blue tussock, fescue tussock, mouse-ear hawkweed, snowberry, sweet vernal, *Pentachondra pumila*, *Raoulia subsericea*, browntop and golden speargrass. Common species include *Ranunculus multiscapus*, red woodrush, tauhinu, various moss (mostly *Polytrichum juniperinum* and *Racomitrium* sp.) and lichen species, mouse-ear chickweed, *Anisotome aromatica*, *A. flexuosa*, *Celmisia gracilenta*, patotara, *Carex breviculmis*, *Lycopodium fastigiatum*, *L. scariosum*, *Brachyglottis bellidioides*, *Geranium sessiliflorum*, bog rush, *Helichrysum filicaule*, catsear, Yorkshire fog, *Acaena caesiiglauca*, sheep's sorrel, white clover, inaka and *Kelleria dieffenbachii*. These species are present at varying densities at different sites.

Other less-common species recorded include *Stelleria gracilenta*, *Coprosma atropurpurea*, *Anemone tenuicaulis*, *Oreomyrrhis colensoi*, *Lagenifera petiolata*, *Pimelea oreophila*, *Pimelea pseudolyallii*, *Acaena inermis*, king devil, tussock hawkweed, *Geranium microphyllum*, *Celmisia lyallii*, *C. haastii*, *C. densiflora*, *C. angustifolia*, *C. sessiliflora*, *Gonocarpus aggregatus*, *Blechnum penna-marina*, *Brachyscome sinclairii*, *Thelymitra* sp., *Gentiana bellidifolia*, *Viola cunninghamii*, *Anaphalioides bellidioides*, *Scleranthus uniflorus*, snow totara, *Hebe rakaiensis*, *H. odora* and *Plantago lanigera*. Scattered coral broom is also present in tall tussockland on the western slopes of Half Moon Spur and in the upper Deep Creek catchment.

Slim snow tussockland

Slim snow tussock is dominant and ranges in cover from c. 25% to c. 80% in these communities. On colluvial slopes, important species include blue tussock, *Kelleria dieffenbachii*, browntop, *Raoulia subsericea*, *Pentachondra pumila*, *Polytrichum juniperinum* and sweet vernal. Common species include *Anisotome flexuosa*, *A. aromatica*, *Geum leiospermum*, snowberry, *Plantago lanigera*, *Helichrysum filicaule*, mouse-ear hawkweed, *Celmisia gracilenta*, catsear, various moss (mostly *Racomitrium* sp.) and lichen species, *Pimelea pseudolyallii*, inaka, *Lycopodium fastigiatum*, tauhinu, golden speargrass, sheep's sorrel, *Raoulia grandiflora*, *Phyllachne colensoi*, *Acaena caesiiglauca*, *Carex breviculmis*, *Ranunculus enysii* and *R. multiscapus*. These species are present at varying densities at different sites. Other species occasionally present include Yorkshire fog, mouse-ear chickweed, *Celmisia densiflora*, *C. haastii*, *C. lyallii*, *C. sessiliflora*, South Island edelweiss, *Oreostylidium subulatum*, *Gnaphalium mackayi* and *Ranunculus cheesemanii*.

Around rock outcrops and in other rocky areas species recorded include *Aciphylla montana* var. *gracilis*, *Pimelea traversii*, *Gaultheria crassa*, prickly shield fern, *Blechnum penna-marina*, *Leucopogon suaveolens*, *Ourisia caespitosa* var. *gracilis* and native broom. On higher altitude broad ridge tops and near flushes, some cushion and wetland species become important such as bog rush, *Luzula pumila*, *Carex gaudichaudiana*, *Dracophyllum*

muscoides, *Scleranthus brockiei*, comb sedge, *Coprosma atropurpurea*, *Abrotanella caespitosa*, *Colobanthus buchananii* and *Neopaxia australasica*.

Red tussockland

Small patches of red tussockland are present throughout the more gently sloping areas of the volcanic complex. These patches are dominated by red tussock though some are quite modified by stock trampling and introduced pasture species such as browntop, sweet vernal and white clover. However, other areas of red tussockland are only lightly modified. Indigenous species associated with red tussockland include bog rush, sphagnum moss, rautahi, *Carex gaudichaudiana*, *Juncus gregiflorus*, *Hydrocotyle novae-zelandiae* var. *montana*, *H. sulcata*, *Viola cunninghamii*, *Geum leiospermum*, *Leptinella pusilla*, *Celmisia haastii*, *Oreomyrrhis ramosa* and *Ranunculus glabrifolius*.

Cushionfield and wetland

Cushionfields and associated sedgelands are present on the broad ridge tops, volcanic plateau areas and on Siberia Hill among tall tussockland and red tussockland. Cushionfields are dominated by comb sedge. Common species include *Abrotanella caespitosa*, *Celmisia gracilenta*, *Carex echinata*, *C. gaudichaudiana*, *Phyllacne colensoi* and *Plantago triandra*. Other species present include *Coprosma atropurpurea*, sweet vernal, *Anisotome flexuosa*, *Plantago lanigera*, *Ranunculus enysii*, *Raoulia grandiflora* and *Gnaphalium mackayi*.

Comrie (1992) also recorded *Luzula leptophylla*, *Carex sinclairii*, *Juncus novae-zelandiae* and *Celmisia alpina* in these communities. The exotic rushes *Juncus effusus* and *J. articulatus* are present in cushionfield-tarn vegetation on Half Moon Ridge. Allen *et al*, (1988) recorded *Myriophyllum propinquum* in tarns.

Other wetland areas between Mount Dasher and Kattothyrst include flushes containing sphagnum moss and sedges (Allen *et al* 1988). Bog rush is extensive around the mid slopes of the volcanic complex (Comrie, 1992).

Shrubland

Areas of shrubland are present alongside lower-altitude streams, around rock outcrops and on the extensive volcanic boulderfields on the slopes of Mount Dasher and Siberia Hill. Dominant shrub species are snow totara, *Coprosma ciliata*, inaka, porcupine shrub and *Hebe rakaiensis*. Shrub species commonly present include *Olearia bullata*, *Gaultheria crassa*, snowberry, *Pimelea pseudolyallii*, *Hebe buchananii*, *H. pinguifolia*, *Coprosma rugosa*, and *Myrsine nummularia*. Other shrub species occasionally present include *Helichrysum intermedium*, *Pimelea traversii*, *Aristotelia fruticosa*, toatoa and *Brachyglottis cassinioides*.

Common species associated with boulderfields or rock outcrops include golden speargrass, scrub pohuehue, *Celmisia hookeri*, *C. densiflora*, *C. lyallii*, *C. angustifolia*, *Astelia* sp., narrow-leaved snow tussock, blue tussock, South Island edelweiss, *Blechnum penna-marina*, *Anaphalioides bellidioides*, *Brachyglottis bellidioides* and *Colobanthus acicularis*. A number of other species more typical of tall tussockland communities are also present.

The scattered shrubland present along streams is dominated by matagouri, *Coprosma rugosa* and *Olearia bullata*. Other shrub species present are inaka, *Gaultheria crassa*, *Coprosma pseudocuneata*, tauhinu, *Hebe odora*, *H. rakaiensis*, *Coprosma intertexta* X *rugosa* (a range of forms appear to be present), *Coprosma serrulata* and *Helichrysum intermedium*. Also common are whaririki, tutu and prickly shield fern.

2.4.4 Scout Hill

A small area of shrubland associated with basalt boulderfields is present above the road on Scout Hill. Dominant shrubs include matagouri, *Coprosma rugosa*, *C. ciliata*, porcupine

shrub and native broom. Common species include scrub pohuehue, prickly shield fern, blue tussock, golden speargrass and *Anaphalioides bellidioides*. Other species occasionally present include *Celmisia hookeri*, giant speargrass, *Pimelea pseudolyallii*, *Asplenium flabellifolium* and *Oreomyrrhis ramosa*. A number of native grassland species are also present at the margins of boulderfields, including *Acaena caesiiglauca*, *Celmisia gracilenta*, patotara, harebell, *Scleranthus uniflorus*, *Carex breviculmis* and *Geranium sessiliflorum*. The boulderfield is surrounded by highly modified tall and short tussocklands.

2.4.5 *Upper Hectors Creek*

The part of Hectors Creek on the property is a steep gully containing remnant broadleaved forest. This forest is highly representative of the pre-human vegetation of the area and was included in RAP 4 Hectors by Comrie (1992).

Dominant species are broadleaf, kowhai, three finger, ti rakau, marbleleaf, kohuhu and lancewood. Other woody species present include mingimingi, *Myrsine divaricata*, wineberry, *Coprosma linariifolia*, *C. crassifolia*, *C. rotundifolia*, *C. colensoi*, koromiko, native broom, tree nettle, climbing fuchsia, tarata and Hall's totara. Non-woody species present include *Astelia fragrans*, *Scandia geniculata*, *Rubus cissoides*, *Clematis paniculata* and *C. marata*. Ferns present include kiokio, prickly shield fern, thousand-leaved fern, hound's tongue fern, *Blechnum chambersii* and *Asplenium hookerianum*.

Riparian areas and shrublands associated with forest remnants include other species including *Coprosma rugosa*, *Olearia bullata*, *Gaultheria crassa*, toetoe, whaririki, inaka, *Coprosma* sp. 't', tutu, native iris, *Asplenium appendiculatum* and *Celmisia hookeri*. The exotic tussock hawkweed is also present.

Most of the other vegetation in this area is moderately modified tall tussockland. Tall tussockland is dominated by narrow-leaved snow tussock with some slim snow tussock and fescue tussock. Tussocklands are dense on east-facing slopes and include extensive areas of kiokio and whaririki. Tussocklands are more modified on sunnier slopes where the inter-tussock flora is dominated by sweet vernal and browntop. Volcanic boulderfields at the head of Hectors Creek contain plant species typical of the boulderfields described earlier.

2.4.6 *South Branch Kakanui River*

Small areas of mixed shrubland and tall tussockland are present in the incised valley of the South Branch Kakanui River. The most extensive area is at the confluence of the river and Quinns Creek, and on a dry spur between these two tributaries. This area adjoins remnants of broadleaf forest and *Coprosma*-matagouri shrubland on Balmoral Pastoral Lease. The tussockland is dominated by narrow-leaved snow tussock. Fescue tussock, silver tussock, sweet vernal, browntop and a range of native inter-tussock species are present, and mouse-ear hawkweed is common on the crest of the dry spur.

Shrubland and low forest vegetation is dominated by broadleaf, with native broom, koromiko, inaka, matagouri, bush snowberry, snowberry, mingimingi, porcupine shrub, *Olearia bullata* and *Coprosma rugosa*. Other species present include whaririki, patotara, *Pimelea oreophila*, *Anisotome brevistylis*, tutu, narrow-leaved snow tussock, kiokio, giant speargrass, bracken, prickly shield fern and *Clematis marata*. Also present on the dry spur are *Celmisia hookeri*, golden speargrass, *Gaultheria crassa* and a species of sun orchid. Two native aquatic plants (*Potamogeton* sp. and *Azolla* sp.) were recorded in a section of Quinns Creek.

2.4.7 *Northern part of Mt Dasher Pastoral Lease*

The plant communities on the northern part of the property (other than those described above) consist mostly of moderately- to highly-modified tall and short tussocklands dominated by exotic pasture species. In some places the cover of exotic pasture species is complete, while in others scattered shrubs are present in gullies or on rock bluffs. The extent of modification generally increases towards the northern end of the property, on ridge tops and on slopes with a northerly aspect. On slopes with a more southerly aspect and in the middle of the property (particularly Half Moon Spur), there are areas where narrow-leaved snow tussock retains a high cover. However, these areas generally have a highly modified inter-tussock flora consisting mostly of exotic pasture grasses and mouse-ear hawkweed. Some steep rocky slopes and stream sides also retain patches of shrubland but these are generally small and isolated.

2.4.8 *Significance of the Vegetation*

Mt Dasher Pastoral Lease supports a comprehensive range of indigenous vegetation types present in the Dansey Ecological District. Of these, remnant podocarp-hardwood (broadleaved) forest, boulderfield and riparian shrubland, red tussockland, cushionfield and higher altitude tall tussockland are all representative of the pre-human vegetation of the district. The extensive areas of montane and subalpine tall tussockland retain high naturalness values. Forest remnants and shrublands are also relatively intact, though substantially reduced from their original extent.

The property supports some of the best examples of plant communities that are rare in the Dansey Ecological District. Wetlands are uncommon in the ecological district being recorded in just two other catchments outside this area (Comrie, 1992). Cushionfield vegetation of the volcanic complex on the property is unique in the ecological district (Allen *et al*, 1988). Likewise, red tussockland communities are uncommon in the ecological district and those present on the volcanic complex are the most extensive (; Comrie, 1992).

Notable plant species recorded from the property are listed in Table 1 below. Threat categories are those proposed by Hitchmough (2002).

Table 2 Threatened plant species recorded from Mt Dasher Pastoral Lease, 2003.

Plant Species	**Known Distribution on Property**
Gradual Decline	
Carmichaelia crassicaule (coral broom)	occasional in tall tussockland in southwest parts of the property
Range Restricted	
Aciphylla montana var. *gracilis*	rare in volcanic boulderfield
Hebe buchananii	occasional in volcanic boulderfield
Sparse	
Anemone tenuicaulis	occasional in tall tussockland
Celmisia hookeri	scattered in boulderfield and on sheltered rock bluffs
Clematis marata	common in low-altitude shrubland
Coprosma intertexta	occasional in shrubland and tussockland
Olearia bullata	common in low-altitude shrubland, patchy in sheltered or damp areas of tall tussockland
Pimelea pseudolyallii	common in tall tussockland and around rock bluffs

Data Deficient	
Vittadinia australis	occasional in tall tussockland

In addition to the species listed by Hitchmough (2002), other notable species include *Hebe pinguifolia* at its southeast distributional limit (scattered in boulderfield), two species that are uncommon in the ecological district: *Brachyglottis cassinioides* (rare in boulderfield) and toatoa (small patches on Mount Dasher and Siberia Hill), and Hall's and snow totara which both have limited distributions in the ecological district. Also, a number of typically low-altitude species are present in the forests in Hectors Creek, including tarata, tree nettle and *Scandia geniculata*.

2.4.9 *Problem Plants*

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

Wilding conifers

Scattered wilding conifer trees are present in the upper Deep Creek catchment, and one wilding tree was observed near Mitchells Hut. Most wilding trees in the area appear to have spread from plantations at Naseby Forest (Department of Conservation, 1998). These plantations pose on ongoing threat to areas of low-stature vegetation on Mt Dasher Pastoral Lease, including the important high-altitude plant communities. Removal of wilding trees, and regular checks for new infestations, will be required to protect conservation values on the property.

Willow

Isolated willow trees (presumably grey willow) are present alongside Quinns Creek and near Mitchells Hut. Although this species does not appear to be spreading aggressively, it would be prudent to remove these few trees before any spread becomes more extensive.

2.5 FAUNA

Refer to Section 4.1.1 for a full species list of all fauna recorded during the tenure review inspection.

2.5.1 *Invertebrate Fauna*

Terrestrial invertebrates were sampled from five main areas on Mt Dasher Pastoral Lease. Species observed are described for each of these five areas. Freshwater invertebrates observed during the fish surveys are also described.

Obi and the east ridge of Obi

Grazed tussockland, schist slabs, rock outcrops and boulderfields are present in this area. 11 species were collected. The mountain stone weta (*Hemideina maori*) was common under slabs of schist around rocky outcrops. This species was not known from the Kakanui Mountains until it was recently collected from the Cayenne Spur area. The presence of

mountain stone weta on Mt Dasher Pastoral Lease represents a continuation of the only known population of this species in the Kakanui Mountains. Atypical specimens of *Oregus aereus*, a ground beetle, are present here and elsewhere on the lease. These specimens differ from the typical *Oregus aereus* in some characters, but this species has greater morphological variability than other species in this genus (Pawson *et al*, 2003).

A form of the ground beetle *Mecodema impressum*, was observed. This beetle is known from the Buller, Central Otago, Dunedin, Fiordland, Otago Lakes and Southland collecting areas (Larochelle and Lariviere, 2001; Walker and Crosby, 1988). The large and attractive *Megadromus haplopus* ground beetle was also observed. This species is confined to upland sites in the Kakanui Ranges, and is uncommon (P. Johns, *pers. comm.*). The widespread alpine grasshoppers *Sigaus australis* and *Sigaus campestris* were present throughout the property. The small carabid beetles *Demetrida moesta atra* and *Scopodes fossulatus* were also observed.

Siberia Hill slopes

Tussockland and volcanic boulders are the most widespread habitats in this area. Ten species were collected from these habitats. The large speargrass weevil *Lyperobius patricki* was found here at 1122 m altitude, close to its southeast distributional limit at Cayenne Spur. Individuals present in the Siberia Hill area will be part of the same meta-population as those on Cayenne Spur, the type locality for the species. This weevil species is likely to be present in similar habitats elsewhere on the property. Larvae of the common grassland cicada were observed in cavities in the dirt under stones. No adults were seen or heard, possibly indicating a late season for insect emergence. The presence of the spring porina *Wiseana mimica* in upland areas also suggests that it has been a late season for insect emergence.

Wetlands west of the summit of Siberia Hill have been previously identified as key sites for the conservation of insects (Patrick, 1991).

Mt Dasher slopes

Tussockland, pasture and shrubland are the most widespread habitats in this area, though rock outcrops, volcanic boulderfields and seepages are also present. 18 species were collected from these habitats. The diurnal geometrid moths *Notoreas paradelpha, Dasyuris transaurea* and *D. leucobathra* were collected from tussocklands. *Notoreas paradelpha* is widespread in alpine grasslands and its larvae feed on *Kelleria* species. The two *Dasyuris* species have localised distributions restricted to alpine grasslands, where their larvae feed on *Anisotome aromatica*. Also present was the very common leaf miner moth *Caloptilia elaeas* whose larvae feed on tutu (*Coriaria* sp.). The small carabid beetle *Notagonum* sp. was observed. This uncommon species has been collected previously only from Temple Basin (Arthur's Pass National Park).

Half Moon Spur and northern slopes

Tussockland with speargrass and alpine daisies (*Celmisia* spp.) is the main habitat in this area, though rock outcrops, schist slabs and the occasional seepage are also present. 16 species were collected from these habitats. The diurnal moth *Prepalla austrina* is locally common in open areas. It is a widespread species and its larvae feed on *Leucopogon* sp. The same form of *Oregus aereus* ground beetle present in the Obi area was also found here.

Quinns Creek Catchment

Shrubland, bracken fernland, tussockland and rock outcrops are the main habitats in this area. Eight species were collected from these habitats, including the *Oregus aereus* ground beetle. The diurnal moth *Arctesthes catapyrrha*, which is locally common in open and alpine areas, was observed. The nocturnal litter moth *Leptocroca aspaltis* is widespread in shrubland and forest areas. Also present was the very common leaf miner moth *Caloptilia elaeas*.

Freshwater Habitats

Freshwater invertebrates are described below for the four habitats sampled.

Ephemeral streams, while only having a few species present, had good water quality as indicated by the presence of *Stenoperla prasina*, *Zelandoperla* sp., *Eriopterini* sp. and the *Deleatidium lillii* and *myzobranchia* groups. Small open streams surveyed had moderate to poor water quality, indicated by the presence of Nematode and Oligochaete worms and the Platyhelminthes flatworm.

Large streams and rivers surveyed had good water quality, indicated by the presence of cased caddisflies (*Olinga feredayi*, *Pycnocentria aeris* and *Helicopsyche albescens*), uncased caddisflies (*Hydrobiosis parumbripennis*, *H. charadraea*, *Costachorema xanthopterum*, *Neurochorema confusum* and *Aoteapsyche colonica*), dobsonfly (*Archichauliodes diversus*) and the mayflies (*Neozephlebia scita*, *Coloburiscus humeralis*, *Nesameletus* sp. and the *Deleatidium lillii* and *myzobranchia* group).

2.5.2 *Significance of the Invertebrate Fauna*

The majority of the invertebrate species collected on the property are widespread and common. No rare or threatened invertebrate species were observed. However, the large speargrass weevil (*Lyperobius patricki*) was recorded at its distributional limit and near its type locality, the presence of the mountain stone weta (*Hemideina maori*) extends the known range of the Kakanui Mountains population of this species, and the presence of the carabid beetle (*Notagonum* sp.) is a significant extension of the known range of this species.

Mt Dasher Pastoral Lease has a diverse range of microhabitats within a relatively small area, particularly in the vicinity of Obi, Siberia Hill and Mount Dasher. Damp grassland, small wetlands, rock faces, dry tussockland, volcanic boulderfield and shrubland are all present, and provide a range of habitats for invertebrates. The late season for insect emergence resulted in the collection of fewer insects than expected. The range of carabids collected and their atypical nature indicate that this is a significant and interesting area for this beetle group (J Townsend, *pers. comm.*).

2.5.3 *Avifauna*

Bird records are generally scarce from the region, though some bird surveys were undertaken in 1989/90 as part of the PNAP survey of Dansey Ecological District (Comrie, 1992). Additionally, the fauna values of the neighbouring pastoral leases (Shingley Creek and The Dasher) were assessed during January and February 2003 (Department of Conservation, *unpublished reports*).

These surveys recorded New Zealand pipit, New Zealand falcon, paradise shelduck and nesting southern black-backed gull on the flat topped summits of Siberia Hill and Mount Dasher. Silvereye, bellbird, South Island tomtit, grey warbler, South Island fantail and New Zealand pigeon were recorded in broadleaved forests and shrublands. Hectors Creek was the only location where New Zealand pigeon was recorded during the PNAP survey of the ecological district (Comrie, 1992). Australasian harrier and black shag have been recorded on adjoining properties (Comrie, 1992; Department of Conservation, *unpublished reports*, 2003) and are likely to be present on Mt Dasher Pastoral Lease as favourable habitats are present.

Birds observed on Mt Dasher Pastoral Lease are described below for the two main habitats surveyed. A total of 20 bird species were recorded on the property: 10 indigenous species (eight endemic species or sub-species, and three native) and nine introduced species (Table 3).

Forest and Shrubland

Two areas of broadleaved forest and associated shrubland were surveyed, one in Hectors Creek and the other at the confluence of Quinns Creek and the South Branch Kakanui River. Indigenous bird species observed were grey warbler, silvereye, South Island fantail, bellbird and South Island tomtit.

Tussockland and Rockland

Indigenous bird species observed in these habitats were Australasian harrier, southern black-backed gull, New Zealand pipit, South Island pied oystercatcher, New Zealand falcon and paradise shelduck. New Zealand falcon was recorded at four separate locations, though it is unclear how many individuals are present on the property.

Table 3 Indigenous bird species recorded from Mt Dasher Pastoral Lease.

Bird species (Common name)	**Scientific name**	**Known Distribution on Property**
Australasian harrier/kahu	*Circus approximans*	throughout
bellbird/korimako	*Anthornis melanura melanura*	forest and shrubland: Hectors Creek
grey warbler/riroriro	*Gerygone igata*	forest and shrubland: Hectors and Quinns creeks
New Zealand falcon/karearea	*Falco novaeseelandiae*	open habitats: four locations
New Zealand pipit/pihoihoi	*Anthus novaeseelandiae novaeseelandiae*	tussockland, boulderfield and cushionfield: Siberia Hill
paradise shelduck/putakitaki	*Tadorna variegata*	tussockland, boulderfield and cushionfield: Siberia Hill
silvereye	*Zosterops lateralis lateralis*	forest and shrubland: Hectors and Quinns creeks
South Island fantail/piwakawaka	*Rhipidura fuliginosa fuliginosa*	forest and shrubland: Hectors Creek
South Island pied oystercatcher	*Haematopus ostralegus finschi*	tussockland and boulderfield: Siberia Hill
South Island	*Petroica*	forest and shrubland: Hectors and

tomtit/miromiro	*macrocephala macrocephala*	Quinns creeks
southern black-backed gull/karoro	*Larus dominicanus dominicanus*	tussockland, boulderfield and cushionfield: Siberia Hill

2.5.4 *Significance of the Avifauna*

Only one of these species, New Zealand falcon, is classified being in "gradual decline" by Hitchmough (2002). Though not sighted during the inspection, the previous recording of New Zealand Pigeon is significant as this species is also classified as being in "gradual decline" and secondly, the location of this recording represents a distributional limit for this species in Otago.

2.5.5 *Herpetofauna*

Lizard records are generally scarce from the region, though fauna values of the neighbouring pastoral leases (Shingley Creek and The Dasher) were assessed during January and February 2003 (Department of Conservation, *unpublished reports*). Otago/Southland large gecko and McCann's skink were recorded on Shingley Creek and The Dasher pastoral leases, and green skink was recorded on Shingley Creek Pastoral Lease at a location very close to Mt Dasher Pastoral Lease. Jewelled gecko has been recorded approximately 30 km south of the property on Glencoe Pastoral Lease.

Three species of lizard were observed on Mt Dasher Pastoral Lease during the fauna survey (Table 3). McCann's skinks were recorded on the vehicle track adjacent to shrublands at Quinns Creek. Common skink, McCann's skink and Otago/Southland large gecko were observed in rock outcrops and boulderfields throughout the property.

Table 4 Lizard species recorded from Mt Dasher Pastoral Lease, 2003.

Lizard species (common name)	**Scientific name**	**Known Distribution on Property**
Common skink	*Oligosoma nigriplantare polychroma*	schist outcrops and boulderfields: throughout, valley floor shrublands and wetter areas
McCann's skink	*Oligosoma maccanni*	schist outcrops and boulderfields: throughout
Otago/Southland large gecko	*Hoplodactylus aff. maculatus "Otago/Southland large"*	schist outcrops and boulderfields: throughout

2.5.6 *Significance of the Herpetofauna*

The Otago/Southland large gecko is listed as threatened (gradual decline) by Hitchmough (2002). Examples of this species found on the property are a little more robust-bodied and somewhat genetically divergent from populations in schist tors to the south and west, though this form is likely to be widespread in the Kakanui Range-Mt. Pisgah area (R. Hitchmough, *pers. comm.*). Areas of suitable green skink habitat on the property and the presence of this species nearby on Shingley Creek Pastoral Lease suggest that green skink is likely to be present on Mt Dasher Pastoral Lease.

2.5.7 *Aquatic Fauna*

Mt Dasher Pastoral Lease covers several upper tributaries of the Kakanui River, including upper Hectors Creek, Quinns Creek, the headwaters of Deep Creek and the headwaters of the South Branch Kakanui River. Hectors Creek flows into the Kauru River, Quinns Creek flows into the South Branch Kakanui River, and Deep Creek flows into the North Branch Kakanui River. All eventually flow into the main Kakanui River. A distinguishing feature of these rivers is the lack of dams, which has two major effects on the fish communities. The first is that the fish communities are more likely to have diadromous species present (species with a marine phase in their lifecycle). The second effect is that fish are able to migrate between streams, allowing colonisation of previously dewatered streams.

The New Zealand Freshwater Fish Database has (at 8th January 2004) 79 records from the Kakanui River (McDowall and Richardson, 1983). Species recorded from the tributaries near Mt Dasher Pastoral Lease include Canterbury galaxias, longfin eel, upland bully and brown trout. The threatened lowland longjaw galaxias has been recorded in the Kauru River, an eastern tributary of the Kakanui River. Six different freshwater habitats are present on the property. These are classified by water source and the surrounding vegetation types. These habitats and the fish species observed are described below.

Ephemeral Pools and Tarns

Ephemeral pools and tarns are present on some ridges, particularly around Siberia Hill and along Half Moon Spur. Most are in tussockland or pasture, although some are bounded by seepage areas with mossfield. All are accessible to stock and many were affected by such stock access, though access may be restricted by snow during winter. Ephemeral pools and tarns on the property are all smaller than 20 m^2, but are often surrounded by up to 100 m^2 of wet seepage area. No fish were found during surveys of these habitats, and fish are not expected to be present as the ponds dry out regularly and are not connected to any other water sources.

Ephemeral Streams

Ephemeral streams are present on ridges, particularly around Siberia Hill. Most flow through tussockland or pasture, with some bulldozed and excavated areas where they are crossed by the main vehicle track. All are accessible to stock. These streams generally flow into the substrate at boulder fields, often where several ephemeral streams converge. The ephemeral streams are smaller than one metre wide - often much smaller - and generally less than 100 mm deep. No fish were found at the one site where this habitat was surveyed, and the stream appeared to be in the late stages of drying up.

Small Open Streams

Small open streams are common on the property, comprising the majority of streams in each catchment. Most flow through tussockland or pasture, though woody vegetation is also present along some stream margins, and some are crossed by vehicle tracks. All are accessible to stock, though access may be restricted by snow during winter. Small open streams are all less than three metres wide, and less than one metre wide in some locations, with an average depth of approximately 150 mm. This habitat was surveyed at one site, and low numbers of Canterbury galaxias found.

Small Gorgy Streams

Small gorgy streams are present in most catchments, usually as small gorges near the headwaters of the tributaries or in the lower sections of the catchments. Most flow through tussockland or pasture, except upper Hectors Creek which flows through broadleaved forest. All except the steeper gorged parts of this habitat are accessible to stock. Small gorgy streams are all less than two metres wide and between 100 mm and 500 mm deep. This habitat was surveyed at two sites and no fish were found. The lower reaches of this habitat may be used occasionally by longfin eel.

Large Streams

Large streams are present in the lower reaches of the catchments on the property. Most flow through tussockland or pasture, though areas of scrub or regenerating forest are present alongside these streams at some locations. All are accessible to stock, and some are crossed by vehicle tracks. Large streams are up to five metres wide and have an average depth of approximately 500 mm, with pools up to two metres deep in places. This habitat was surveyed at three sites. Canterbury galaxias were observed at all three sites and longfin eel observed at one site. It is likely that longfin eels are more widely present in this habitat than indicated by the survey results.

Rivers

River habitats are present in the South Branch Kakanui River and the lower parts of Quinns Creek. Most parts of these rivers flow through scrub or regenerating broadleaved forest, with some areas of tussockland or pasture. All are accessible to stock, though access is restricted in places by riparian vegetation. The South Branch Kakanui River is approximately 11 metres wide, and Quinns Creek approximately five metres wide. Both rivers have an average depth of approximately 200 mm. This habitat was surveyed at two sites. Canterbury galaxias and upland bully were found at both sites, and brown trout observed in Quinns Creek. Longfin eels are also expected to use this habitat and, given the similarity of the sites, brown trout are expected to occur in the South Branch Kakanui River.

Table 5 Fish species recorded from Mt Dasher Pastoral Lease

Fish species (common name)	**Scientific name**	**Known Distribution on Property**
brown trout	*Salmo trutta*	South Branch Kakanui River
Canterbury galaxias	*Galaxias vulgaris*	throughout, except in ephemeral systems on ridges
longfin eel	*Anguilla dieffenbachii*	Quinns Creek
upland bully	*Gobiomorphus breviceps*	South Branch Kakanui River and Quinns Creek

2.5.8 *Significance of the Aquatic Fauna*

The only threatened species found during this survey was the native longfin eel, listed as 'gradual decline' by Hitchmough (2002). The Kakanui and Hectors Creek catchments on the property contribute to the flow regime, water quantity and water quality for a population of the threatened (nationally critical) lowland longjaw galaxias that is present in reaches downstream.

There are two other significant features of the fish fauna on the property. Firstly the limited distribution of longfin eel suggests that this species may be naturally uncommon on the property, as it would normally utilise most of the habitat types surveyed. Secondly the limited occurrence of brown trout suggests that natural barriers restrict its distribution, leaving most freshwater habitats on the property unaffected by this introduced fish.

2.5.9 *Problem Animals*

Introduced animals that may have an important effect on indigenous plant or animal communities on the property, and that can be controlled or contained, are listed and discussed below. Other ubiquitous naturalised species for which containment or control are probably impractical (such as rodents and mustelids), or domesticated animals that are grazed on the property, are not discussed here.

Feral pig
Pig rooting was observed in most areas of tussockland visited on the property and in areas of cushionfield on the volcanic plateau and Half Moon Spur. Control of pigs will be required to protect conservation values on the property.

Brushtail possum
Possum droppings were observed at all sites on the property that were surveyed for lizards, and in areas of shrubland and forest. Possums are known predators of lizards. Control of possums will be required to protect conservation values.

Rabbit and Hare
Rabbits and hares were observed on the property. Control of these species may be required to protect conservation values.

2.6 HISTORIC

Mt Dasher Pastoral Lease was originally part of a much larger property known as The Dasher. In 1919 the property was divided into two and balloted. The area drained by the South Branch Kakanui River, comprising approximately 7134 ha, was drawn by Robert Spenser Mitchell and initially named Black Rock (Pinney, 1981). Mitchell occupied the property till 1953, and then John Wardell occupied it from 1953 to 1992 when the property passed to the present owner, Wayne Sim.

Two huts on the property are of historic interest as examples of early musterers' huts. Mitchells Hut on the northeast slopes of Siberia Hill is a six-bunk corrugated iron-clad hut with a lean-to. Half Moon Hut on the northeast ridge of Mt Dasher (upper Half Moon Spur) is a small two-roomed corrugated iron-clad hut with a concrete floor and tongue-and-groove timber lining. Both huts are in good condition.

2.7 PUBLIC RECREATION

2.7.1 *Physical Characteristics*

Mt Dasher Pastoral Lease lies within the 'backcountry' recreation opportunity setting, as defined in the Department's Otago Conservation Management Strategy (CMS) (1998). This recreation opportunity setting is characterised by a feeling of relative remoteness from

populated areas. Three classes of backcountry opportunity are identified in the CMS: 'drive-in' where good road access is present; '4 x 4 drive-in' where four-wheel-drive vehicle tracks provide the main access; and, 'walk-in' where access is only possible on foot. The latter two backcountry opportunity classes are present on Mt Dasher Pastoral Lease. The physical characteristics of these recreation opportunity classes are described below.

Broad Ridges

Four-wheel-drive vehicle tracks provide relatively easy access to the main high ridges on the property, including the Mole Hill-Scout Hill ridge, Grassy Ridge and Half Moon Spur. The Mole Hill-Scout Hill ridge track continues south onto the high summits of Siberia Hill and Obi. The Half Moon Spur track crosses the South Branch Kakanui River at the confluence of Quinns Creek and also provides access to Deep Creek at a point northwest of Mount Dasher. Vehicle tracks on the property are generally well-formed, though are not negotiable in wet conditions.

These parts of the property are characterised by a transition from pasture and modified tussockland at lower altitudes to extensive tall tussockland, boulderfield and cushionfield at higher altitudes. Views from the upper ridges and summits are expansive and spectacular, and enhanced by the distinctive volcanic landforms in the vicinity of Scout Hill, Siberia Hill, Kattothyrst and Mount Dasher. The exposed ridges and summits are similar in character to the broad ranges of Central Otago and, while not as extensive, are still subject to the extreme weather conditions that affect those ranges.

Two huts are present in this recreation setting: Mitchells Hut on the broad slopes northeast of Siberia Hill and Half Moon Hut on upper Half Moon Spur northeast of Mount Dasher. Both are in good condition and have considerable potential for recreational use.

Valleys and Summits

Most parts of the main valleys and higher summits are not traversed by vehicle tracks, and are therefore less accessible. These 'walk-in' recreational settings are characterised by modified tall tussockland, scrub and broadleaved forest remnants at lower altitudes, and extensive tall tussockland, boulderfield, cushionfield and rock outcrops at higher altitudes. The valleys are deeply incised, though of moderate relief and readily accessible on foot. The un-tracked summits are of relatively gentle relief and dominated by the broad plateau, volcanic cones and basalt boulderfields of the Siberia Hill-Kattothyrst-Mount Dasher volcanic complex.

There are no facilities within this recreation setting, though Mitchells Hut and Half Moon Hut lie at the edge of the volcanic plateau and could provide suitable bases for recreational use of the higher altitude parts of the area. The most distinctive features of this recreation setting are the spectacular volcanic landforms, including the prominent cones of Mount Dasher and Kattothyrst, the extensive basalt boulderfields and the broad poorly-drained plateau that surrounds these features. Remnant and regenerating forest, shrubland and tussockland are features of recreational interest in the main valleys.

2.7.2 Legal Access

There is a legal road along the ridge crest between Scout Hill and Obi, though parts of this road lie outside the property. The parts of the legal road that are on the property do not coincide with the existing formed vehicle track in a number of places. Legal foot access

(practicality unknown) is provided via marginal strips along the South Branch Kakanui River and Deep Creek.

Mole Hill Road (a legal road) runs to the northern corner of the property on the Mole Hill-Scout Hill ridge (grid reference: I41: 207-696). This road is maintained twice-yearly by the Waitaki District Council, though the actual formation deviates from the legal road in places.

2.7.3 Activities

The most important existing recreational use of the property is hunting and scenery appreciation. The existing vehicle tracks provide relatively easy access to high summits with spectacular volcanic landforms and expansive views. These vehicle tracks provide opportunities for four-wheel-drive vehicle use, mountain-biking, horse riding and walking.

The property has considerable potential for backcountry tramping, horse-riding, nature study and photography. Interesting and challenging tramping trips could be undertaken, particularly if access could be gained to areas on adjoining properties. The volcanic plateau and higher summits may also provide opportunities for snow-based recreation such as cross-country skiing for short periods during the winter months.

PART 3

OTHER RELEVANT MATTERS AND PLANS

3.1 CONSULTATION

An early-warning consultation meeting was held at Alexandra on 24th September 2003. Representatives from the following interest groups provided these comments about Mt Dasher Pastoral Lease:

Roval Forest and Bird Protection Society

- Access through the lease to Obi is important.
- A likely boundary between the area to be retained by the Crown and freehold land is from Deep Creek to Half Moon Hut and to The Dasher homestead.
- The boulder 'streams' are a unique and significant feature.
- The Crown needs to start considering the tenure review outcomes in the Kakanui Mountains-Horse Range area as a whole entity.
- The significance of RAP 5 is enhanced as it is situated in an area with a wetter climate and correspondingly different vegetation than areas to the north.
- The inlet for a rural water supply that feeds Dunrobin is located behind Mitchells Hut. The legality of this scheme will need to be determined as part of tenure review.
- The Kakanuis are noted in the Otago CMS as a Special Place.

Public Access NZ

- The Kakanui tenure review outcomes need to be considered as one large reserve/conservation area.
- The area west of Half Moon Hut should probably be retained by the Crown.

- The landscape is unique, and with greater public knowledge would be more widely appreciated.
- Vehicle access up the formed track to Mitchells Hut is a desirable outcome.

Federated Mountain Clubs of NZ
- There is (possibly) a steep foot access route from the yards/airstrip into the South Branch Kakanui River which could provide access to Half Moon Spur.
- Vehicle access up the formed track to Mitchells Hut is a desirable outcome.

High Country Landscape Group
- The volcanic area and plateau around Mitchells Hut have significant landscape values.

A DOC/NGO report-back meeting was also held at Alexandra on 12th May 2004. Representatives from the following interest groups provided these comments about Mt Dasher Pastoral Lease:

Royal Forest and Bird Protection Society
- Marginal strips don't adequately protect riparian shrubland areas.
- Scout Hill, given its position as an outlier of the areas volcanic activity, should be included as a significant inherent landscape value.
- The lease contains a multitude of values and the areas proposed to be retained by the Crown should be part of the Kakanui Mountain conservation park.

Federated Mountain Clubs of NZ
- Jointly Siberia Hill, Mt Dasher, the Kattothyrst, the boulder streams and the Hectors Plateau together have special landscape properties that collectively warrant these areas retention in full Crown ownership.
- The formed track that runs beneath Scout Hill to Mitchells Hut and beyond should be legalised.

Public Access NZ
- Mt Dasher is a special property which warrants a high level of Crown control. Conservation Parks e.g. Te Papanui, have not delivered on securing public access to and through such areas. Scenic Reserve status over the area might therefore provide for more secure public access. An essential tenure review outcome should be secure and unlimited public access to the boundary of such an area.
- Public access easements aren't satisfactorily securing public access to some protected areas, as these give DOC too much power that can be used in an unjustifiable manner, to temporarily close such easements. Legalisation of existing road formations would be a better mechanism for securing public access.
- The Kakanui Mountains have sufficient snow cover 1 in 7 years to provide for decent skiable terrain.
- Requested that in future NGO/DOC meetings both the extent of present marginal strips and waterways that may qualify for a strip, are clearly identified.

Central Otago 4WD Club
- The area is popular with the Dunedin and Otago clubs and this use should be permitted to continue in the future. 4WD does need controlling i.e. through gates at the entrance to any protected area.

Jenny Simmons: Central Otago Scout leader
- Queried what the future of the Mitchells and Half Moon Spur huts would be if they came under DOC control.

Federated Mountain Club (FMC) and the New Zealand Deer Stalker's Association (NZDA) have also produced written submissions. FMC's key recommendations (abbreviated) are listed below. A full copy of this submission is attached as Appendix 3.

1. Although the current recreational use of the Kakanui Mountains is relatively light, there is considerable potential for increasing recreational use of the range and the Hectors Plateau. Potential as well as actual use should be considered as part of this review.
2. The significant area of improved pasture land below 1000 m (being Hurunui Steepland and Kakahu Yellow Brown Earth, LUC IV and VI) is probably capable of being managed in an ecologically sustainable manner and is therefore likely to be suitable for freeholding.
3. Secure public access to the Hectors Plateau (including Mt Dasher and Kattothyrst) and the Kakanui Mountains via the legal road between Mole Hill and Obi (Trig B) needs to be confirmed through this review. The preferred solution would be formal recognition of the actual road as the legal alignment.
4. Some 1600 ha of the Hectors Plateau was recognised by the PNAP survey as Dansey RAP 5, two thirds of which is within the Mt Dasher lease. Because of its soil type (LUC VIIe) it can not be managed in an ecologically sustainable manner, whilst the significant inherent values within the area warrant its return to full Crown ownership and subsequent management for conservation and recreation purposes.
5. The area west of the RAP is characterised by Kaikoura Steepland soils which have severe limitations for pastoral use. This area therefore can not be managed in an ecologically sustainable manner, whilst the significant inherent values within the area warrant its return to full Crown ownership and subsequent management for conservation and recreation purposes.
6. This review should be carried out with full consideration given to the tenure reviews proceeding on adjoining properties, as it is important that an overview is developed now for the entire network of recreational opportunities on the Kakanui Mountains and the Hectors Plateau. The decisions taken for this review must be appropriate in relation to recreational opportunities which may become available through these other reviews.
7. The objective in the Otago CMS for the Kakanui Mountains Special Place "*to maintain the natural resources contained within the existing protected areas of 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*", demonstrates DOC's commitment to tenure review and shows that this objective could be significantly advanced by the negotiation of good outcomes on Mt Dasher.

NZDA key recommendations are listed below. A full copy of their submission is attached as appendix 4.

1. As DOC benefits from hunters having secure and free access to the DOC estate, securing such access through tenure review is important.
2. In addition, securing vehicle access to and through the DOC estate via tenure review is also important as this allows hunters extra time to hunt.
3. NZ Deerstalkers Association members have the added benefit of a $5 million public liability insurance cover which includes fire suppression.

3.2 DISTRICT PLANS

Mt Dasher Pastoral Lease is located within the Rural Scenic Zone of the proposed 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 tussocklands, smaller

wetlands and forest areas. No indigenous vegetation clearance or exotic tree planting is allowed within 20 m of a water body or in any wetland. There are effectively no provisions that protect scenic values. The appendices to the plan do not list any registered archaeological sites, areas of significant indigenous vegetation or habitats of significant indigenous fauna on Mt Dasher Pastoral Lease. Protection is limited to the controls described above.

3.3 CONSERVATION MANAGEMENT STRATEGIES AND PLANS

Mt Dasher Pastoral Lease lies within the Coastal Zone of the Otago Conservation Management Strategy. General objectives for this zone that are relevant to Mt Dasher Pastoral Lease are listed as:

- To foster public appreciation of notable geological features, while protecting significant sites from damage
- To protect the natural and historic resources of North Otago, including ecosystems and species, while encouraging appropriate public enjoyment and use

Mt Dasher Pastoral Lease also lies within the Kakanui Mountains Special Place, which recognises the value of the "significant and visually striking area of extinct volcanic cones and basaltic boulderfields" most of which lie on the property, and the extensive tussockland, shrubland and cushionfield plant communities.

Objectives for the Kakanui Mountains Special Place are:

> "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".

3.4 NEW ZEALAND BIODIVERSITY STRATEGY

The New Zealand Government is a signatory to the Convention on Biological Diversity. In February 2000, Government released the New Zealand Biodiversity Strategy 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, and threatened terrestrial and freshwater species management.

PART 4 ATTACHMENTS

4.1 ADDITIONAL INFORMATION

4.1.1 *Scientific Names of Species*

Plant Species

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

Common name	Scientific name
blue tussock	*Poa colensoi*
bog rush	*Schoenus pauciflorus*
bracken	*Pteridium esculentum*
broadleaf/kapuka	*Griselinia littoralis*
browntop*	*Agrostis capillaris*
bush snowberry	*Gaultheria antipoda*
catsear*	*Hypochoeris radicata*
climbing fuchsia	*Fuchsia perscandens*
comb sedge	*Oreobolus pectinatus*
coral broom	*Carmichaelia crassicaule*
false speargrass/taramea	*Celmisia lyallii*
fescue tussock	*Festuca novae-zelandiae*
giant speargrass/taramea	*Aciphylla scott-thomsonii*
golden speargrass/taramea	*Aciphylla aurea*
harebell	*Wahlenbergia albomarginata*
hound's tongue fern	*Microsorum pustulatum*
kahikatea	*Dacrycarpus dacrydioides*
king devil*	*Hieracium praealtum*
kiokio	*Blechnum montanum*
kohuhu	*Pittosporum tenuifolium*
koromiko	*Hebe salicifolia*
kowhai	*Sophora microphylla*
inaka	*Dracophyllum uniflorum*
lancewood	*Pseudopanax crassifolium*
lowland ribbonwood	*Plagianthus regius*
marbleleaf	*Carpodetus serratus*
matagouri	*Discaria toumatou*
matai	*Prumnopitys taxifolia*
mingimingi	*Coprosma propinqua*

miro ..... *Prumnopitys ferruginea*
mountain totara ..... *Podocarpus hallii*
mouse-ear chickweed* ..... *Cerastium fontanum*
mouse-ear hawkweed* ..... *Hieracium pilosella*
narrow-leaved lacebark ..... *Hoheria angustifolia*
narrow-leaved snow tussock ..... *Chionochloa rigida*
native broom ..... *Carmichaelia petriei*
native iris ..... *Libertia ixioides*
patotara ..... *Leucopogon fraseri*
pokaka ..... *Elaeocarpus hookerianus*
porcupine shrub ..... *Melicytus alpinus*
prickly shield fern ..... *Polystichum vestitum*
rautahi ..... *Carex coriacea*
red tussock ..... *Chionochloa rubra* ssp. *cuprea*
red woodrush ..... *Luzula rufa*
rimu ..... *Dacrydium cupressinum*
scrub pohuehue ..... *Muehlenbeckia complexa*
sheep's sorrel* ..... *Rumex acetosella*
silver tussock/wi ..... *Poa cita*
slim snow tussock ..... *Chionochloa macra*
snowberry ..... *Gaultheria depressa* var. *novae-zelandiae*
snow totara ..... *Podocarpus nivalis*
South Island edelweiss ..... *Leucogenes grandiceps*
sphagnum moss ..... *Sphagnum* sp.
sun orchid ..... *Thelymitra* sp.
sweet vernal* ..... *Anthoxanthum odoratum*
tarata ..... *Pittosporum eugenioides*
tauhinu ..... *Ozothamnus leptophyllus*
thousand-leaved fern ..... *Hypolepis millefolium*
three finger ..... *Pseudopanax colensoi*
ti rakau/cabbage tree ..... *Cordyline australis*
toatoa ..... *Phyllocladus alpinus*
toetoe ..... *Cortaderia richardii*
totara ..... *Podocarpus totara*
tree nettle ..... *Urtica ferox*
tussock hawkweed* ..... *Hieracium lepidulum*
tutu ..... *Coriaria sarmentosa*
whaririki ..... *Phormium cookianum*
white clover* ..... *Trifolium repens*
willow* ..... *Salix* sp.
wineberry ..... *Aristotelia serrata*
Yorkshire fog* ..... *Holcus lanatus*

Animal Species

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

Common name ..... Scientific name

Australasian harrier/kahu .....*Circus approximans*
bellbird/korimako .....*Anthornis melanura melanura*
black shag/koau .....*Phalacrocorax carbo novaehollandiae*
brown creeper .....*Mohoua novaeseelandiae*
brown hare* .....*Lepus europaeus occidentalis*
brown trout* .....*Salmo trutta*
brushtail possum* .....*Trichosurus vulpecula*
Canterbury galaxias .....*Galaxias vulgaris*
common skink .....*Oligosoma nigriplantare polychroma*
European rabbit* .....*Oryctolagus cuniculus cuniculus*
feral pig* .....*Sus scrofa*
green skink .....*Oligosoma chloronoton*
grey warbler/riroriro .....*Gerygone igata*
hare* .....*see* brown hare
jewelled gecko .....*Naultinus gemmeus*
large Otago/Southland gecko .....*Hoplodactylus* aff. *maculatus* "Otago/Southland"
large speargrass weevil .....*Lyperobius patricki*
longfin eel .....*Anguilla dieffenbachii*
lowland longjaw galaxias .....*Galaxias cobitinus*
McCann's skink .....*Oligosoma maccanni*
mountain stone weta .....*Hemideina maori*
New Zealand falcon/karearea .....*Falco novaeseelandiae*
New Zealand pigeon/kereru .....*Hemiphaga novaeseelandiae novaeseelandiae*
New Zealand pipit/pihoihoi .....*Anthus novaeseelandiae novaeseelandiae*
paradise shelduck/putakitaki .....*Tadorna variegata*
possum* .....*see* brushtail possum
rabbit* .....*see* European rabbit
silvereye .....*Zosterops lateralis lateralis*
South Island fantail/piwakawaka .....*Rhipidura fuliginosa fuliginosa*
South Island fernbird/mata .....*Bowdleria punctata punctata*
South Island pied oystercatcher .....*Haematopus ostralegus finschi*
South Island tomtit/miromiro .....*Petroica macrocephala macrocephala*
southern black-backed gull/karoro .....*Larus dominicanus dominicanus*
upland bully .....*Gobiomorphus breviceps*
white-faced heron .....*Ardea novaehollandiae novaehollandiae*

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4.1.3 Appendices

Appendix 1:	Extracts from Dansey Ecological District Survey: Report for the PNAP (Comrie, 1992): RAP 4 Hectors and RAP 5 Dasher.
Appendix 2:	Extracts from Inventory of Soils Sites of International, National and Regional Importance (Arand *et al*, 1991): Geopreservation Site No. 296 Dasher.
Appendix 3:	Federated Mountain Club submission.
Appendix 4:	New Zealand Deer Stalker's Association submission.

4.2 MAPS

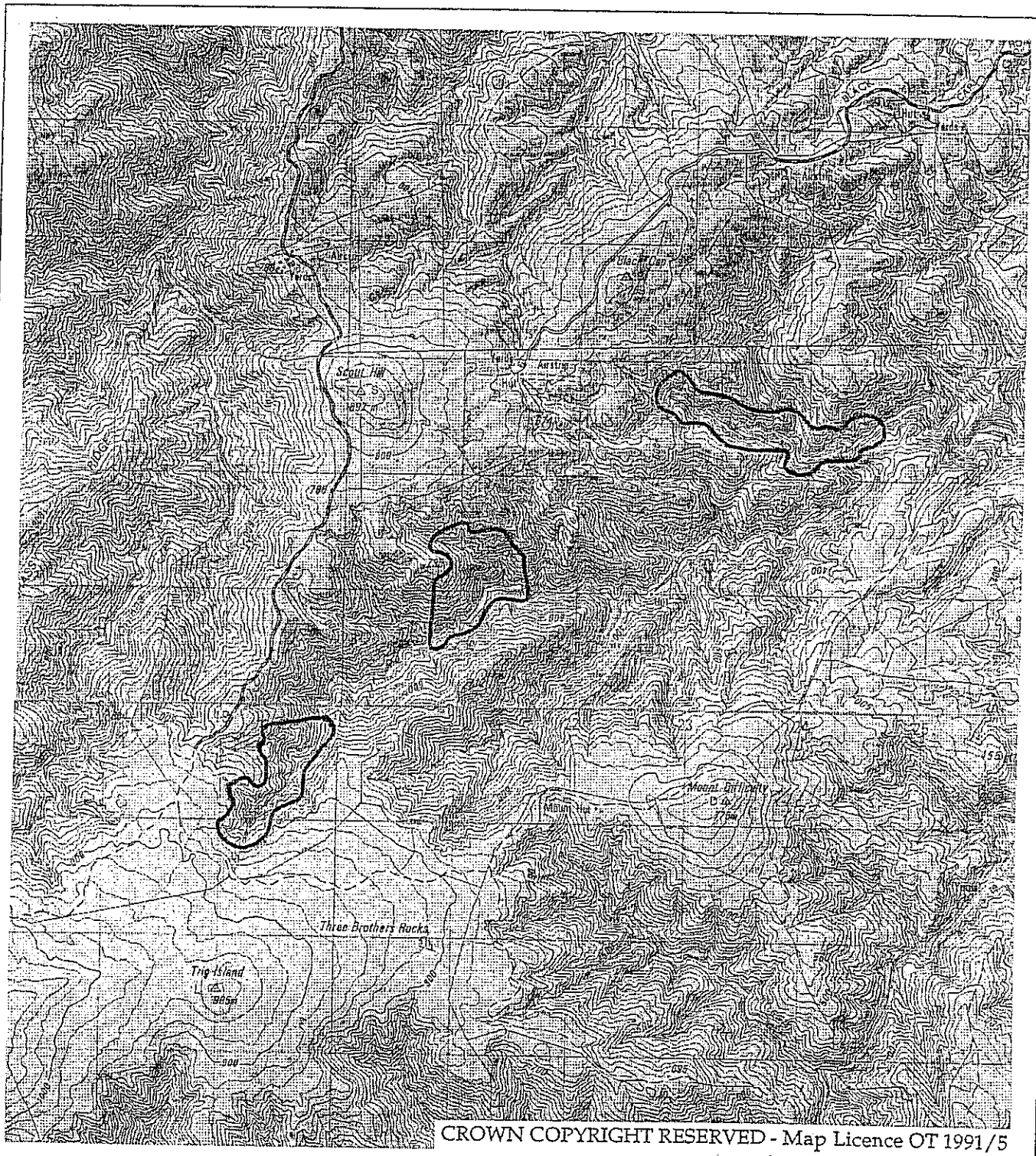
4.2.1 Topographical and Cadastral Boundaries

4.2.2 Landscape Units and Significant Landscape Values

4.2.3 Significant Ecological and Recreation Resources

Appendix 1: Extracts from Dansey Ecological District Survey: Report for the PNAP (Comrie, 1992): RAP 4 Hectors and RAP 5 Dasher

Dansey RAP 4 - Hectors



GR Centre:	:	NZMS 260 I42 225612
Area	:	160 ha
Altitude Range	:	200 - 700m
Tenure	:	Pastoral Lease (Mt Dasher), Renewable Lease (The Hectors)
Sample Sites	:	HEC 01 - 06