Toitu te Land whenua Information New Zealand

Crown Pastoral Land Tenure Review

Lease name : LOWER CASCADE

Lease number : PH 002

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 THE REVIEW OF LOWER CASCADE PASTORAL LEASE

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PART 1: INTRODUCTION

1.1

The lessee of the Lower Cascade pastoral lease has applied to the Commissioner of Crown Lands for a review of the property's pastoral lease tenure.

The 1376 hectare pastoral lease comprising developed pasture, rough pasture, wetlands, shrublands, beech–podocarp forest and numerous small waterways is situated on the southern side of the Cascade River flood plain. The Cascade River with its well defined meanders forms the northern boundary of the lease. A separate block adjacent to the Jackson River Road comprising some 10 hectares forms a forest covered enclave into the Upper Cascade pastoral lease. A hut traditionally used by the holders of the Lower Cascade lease is located nearby, within the Upper Cascade pastoral lease boundary.

The lease area appears to have decreased considerably due to movement and erosion by the Cascade River. Actual area is probably closer to 1000 ha. A significant portion of the property is occupied by the Cascade River when in flood.

The pastoral lease is run in conjunction with an area subject to a Department of Conservation grazing licence on the northern side of the Cascade River. Interestingly land lost from the pastoral lease due to river movement has been accredited to this area.

Access is via a road completed from the Arawhata Bridge to the Martyr Homestead in 1980 (21km). From this point it is a further 5km travelling on a 4 wheel drive track before crossing the Cascade River to the lease boundary. There is no formal legal access through the Upper Cascade pastoral lease.

Altitude on the bulk of the lease area located on the Cascade River flats ranges between 8 and 15 m.a.s.l rising to ~ 20 m.a.s.l in forested country along the southern boundary in the vicinity of the Barn Bay Road.

The pastoral lease is located in the Cascade Ecological District (ED). No Protected Natural Areas Survey Programme (PNAP) has been conducted for this ecological district although two in depth ecological studies have been completed previously by DOC (Woolmore 1989) and the former DSIR (Johnson 1977). Considerable ecological inventory and research work had been conducted on surrounding lands administered by the Department of Conservation.

The Lower Cascade pastoral lease is mostly surrounded by public conservation land. There is support within the public arena for a section 8 National Parks investigation for these lands. The Red Hills addition to Mt Aspiring National Park lies approximately 15km to the south. All the surrounding land is part of the South West New Zealand World Heritage Area which incorporates New Zealand's largest remaining lowland forest wilderness. The lease bounds the Upper Cascade pastoral lease to the east. The nearest freehold land is a small block surrounding the Martyr Homestead adjoining the Upper Cascade pastoral lease.

No parts of the pastoral lease area are currently subject to protection for conservation purposes.

An inspection of the property was undertaken between 22-24 April 2003 by a multi-disciplinary team.

Resource information gathered from a previous inspection has also been drawn upon.

Photo One. Green line depicts approximate boundaries of the Lower Cascade Pastoral Lease which is nestled amongst New Zealand's largest wild and remote landscape.

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

2.1 Landscape

This section includes a description of the methodology, an assessment of the landscape character, a description of visual and scenic values and an evaluation summary. This is followed by the identification of important landscape values.

Landscape Context
The Lower Cascade Pastoral Lease is situated in South Westland between Jackson Bay in the north and Fiordland in the south. It is one of two pastoral leases within the Cascade river valley and is surrounded by forested mountain lands and lowland forest.

The Cascade is a remote valley forming part of the wet south west wilderness area that extends from the sea to the main divide and from Jacksons Bay to the south west tip of Fiordland. It comprises dense lowland rain forest, cleared mainly open grassy flats and remnant wetlands/backwaters, and a mid zone of mixed shrubland kahikitea and associated wetland plant communities.

The Cascade Valley is wedged between the Red Hills ultramafic area to the east and the distinctive Cascade Plateau to the west. This plateau extends from Cascade Point and slopes away on an even incline to the northeast.

Methodology
The pastoral lease is divided into defined landscape units (LUs). These units reflect areas of similar landscape character. Landscape character is the quality that makes an area different from another and can be defined as follows:
'Landscape character results from a particular combination of characteristics formed by the interaction of natural processes and cultural (human) activities.' (NZ Institute of Landscape Architects).

For each unit, a landscape character description is included followed by a description of the key visual and scenic attributes. An evaluation summary is then presented using a range of criteria to assess each unit and assist with determining important landscape values. The criteria include:

- Intactness: - refers to the condition of the natural vegetation, patterns and processes and the degree of modification present.
- Legibility: - refers to expressiveness - how obviously the landscape demonstrates the formative processes leading to it.
- Aesthetic Factors: - include criteria such as *distinctiveness* - the quality that makes a particular landscape visually striking. Frequently this occurs when contrasting natural elements combine to form a distinctive and memorable visual pattern. A further criteria assessed under aesthetic factors is *coherence.* This is based on characteristics including intactness, unity, continuity, and

compatibility. Intrusions, alterations, disruptions tend to detract from coherence.

- Historic Factors - refers to historically valued attributes.
- Visibility - refers to the visibility from public places such as highways, waterways or local vantage points.
- Significance - is the significance of the characteristics and features, or combination of characteristics and features within individual units. If they are locally, regionally or nationally significant.
- Vulnerability - is a measure of each landscape unit's susceptibility to further ecological deterioration, which would impact on landscape values.

Landscape Units
The Lower Cascade Pastoral Lease is part of one landscape unit that includes all of the Cascade floodplain and enclosing ranges. However within this unit there are three landscape subunits or types found (refer Map 4.2 (d). These are:

- **Open river flats (LT1)**
- **Wetland belt (LT2)**
- **Lowland Forest (LT3)**

Photographs of each landscape type are appended (see Appendix 1).

(a) Landscape Type 1 – Open River Flats

Landscape character Description
The open river flats landscape unit includes three separate areas. These are generally modified open flats with predominantly exotic pasture grasses, rushes, some sparse forest remnants and wetlands.

Open River Flats
The eastern end is the most modified zone on the lease. This is an expansive open floodplain edged with dense lowland forest on one side and the Cascade River on the other. Views out are of forested mountain slopes and distant moraine landforms. Pasture and rushes dominate apart from in backwater areas, small wetlands and watercourses which are often associated with riparian shrublands (notably flax and coprosma) and native sedges. Forest remnants of beech/kamahi forest also occur though often in a debilitated condition. Pugging and pedestaling of the ground surface is a feature. Man made features include the Lower Cascade hut, the airstrip, stockyards, access roads and some fencing.

Oxbows
This area is mainly open pasture, and patchy shrubland associated with a cluster of meanders and oxbows of the Cascade River. It is variable in terms of the level of modification with the least modified area being within the western meander. A greater degree of modification occurs within meanders to the east.

Doolans Block
The Doolans block is cleared pasture. The northern portion of this landscape unit has been cleared for some time whilst the balance has been cleared more recently. Blackberry and groundsel is common on windrows. The recently cleared area has a raw scruffy appearance. Conversely the area cleared earlier has developed a greater level of maturity. Here scattered

remnant trees and pasture combine to create a park like appearance. The Doolans Block is almost entirely enclosed by bush. Close to the bush edge shield fern is prevalent within pasture areas.

Visual & Scenic Values

Visual and scenic values on the open river flats are identified primarily within the wider context of the Cascade valley i.e. the expansive views to forested mountain slopes, distant moraines, and the distinctive Cascade Plateau rising to the north. The river has a powerful and dominating presence in the valley. Views are more restricted within the Doolans Block because of the enclosed nature of this area.

The rich and diverse forest/shrubland and wetland margins that occur on the river flats and riparian vegetation associated with wetlands and watercourses are important natural features which give identity to the landscape.

Evaluation Summary

Table 1

Criteria	Value	Comment
Intactness	Low	Highly modified but with significant pockets of indigenous vegetation
Legibility	High	Post glacial fluvial processes highly legible
Aesthetic Factors	Medium	Power and dominance of wider landscape contributes to high level of visual coherence. Conversely damage to wetlands and poor health and condition of some forest remnants disrupts coherence
Historic Factors		Not significant. Cultural values associated with cattle grazing in the Cascade Valley
Visibility	Low	Visible from Barn Bay Cascade Road
Significance	High	Part of a large tract of largely unmodified south west wilderness area
Vulnerability	Medium	

(b) Landscape Type 2 – Wetland Belt

Character Description

This type refers to a wet section aligned north west through the middle of the lease. It is essentially shrubby with a mix of flax dominant shrubland and mixed dense shrubland including flax, cabbage tree, matipo, manuka, carex, kahikitea and hebe. Natural values within this type are high with little visual evidence of stock intrusion.

Visual & Scenic Values

This type has inherently high visual values derived from the diversity and richness of the vegetation and its setting within the spectacular Cascade Valley. The distinctive colour and textural contrasts of the wetland vegetation and the high level of intactness contribute to visual qualities

Evaluation Summary

Table 2

Criteria	Value	Comment
Intactness	High	Natural patterns and systems intact
Legibility	Low	Vegetation masks underlying landform
Aesthetic Factors	High	Distinctive and coherent wetland area
Historic Factors	Low	
Visibility	Low	
Significance	Medium	Part of the overall biodiversity of the Cascade
Vulnerability	Medium	Vulnerable to landuse changes

(c) Landscape Type 3 – Lowland Forest

Character description

Landscape type three includes the forested zones within the lease. It includes a forested margin on the southern boundary and a substantial area of forest on the south west of the lease. It comprises toe slopes and outwash flats and supports dense beech, kamahi, rimu, kahikitea lowland rainforest and associated understorey. The forest edge in from the southern boundary is particularly species rich and includes wetland areas. Kahikitea is a dominant canopy species with flax, coprosma and sedges. Birdlife is abundant. The Barn Bay Cascade Road follows the edge of the southern edge of the lease through the forest zone.

Visual & Scenic Values

Within the forest canopy the detail of the forest provides visual interest. Viewed from a distance the forest has high visual values and contrasts with open grass covered flats and wetlands and provides unity within the wider landscape.

Evaluation Summary

Table 3

Criteria	Value	Comment
Intactness	High	Forest structure intact
Legibility	Medium	Species reflect underlying landform, and topography
Aesthetic Factors	High	Visually coherent and striking
Historic Factors	Low	
Visibility	Low	
Significance	High	
Vulnerability	High	Vulnerable to further clearing

Significance of Landscape Values (Refer Map 4.2(c)

The pastoral lease contains a mix of essentially intact natural landscapes and highly modified areas. The modified areas together with the adjoining Upper Cascade Pastoral Lease represent isolated pockets within a largely natural landscape that extends from Jackson Bay to southern Fiordland.

Category One – Important Natural Landscape values
Category One includes all of the intact lowland forest (LT3) and the extensive wetland belt (LT2) as well as the oxbows and meanders on the north west of the lease. The significance of these areas is derived from

- The intactness and naturalness of the forest and wetland systems
- The highly distinctive vegetation of forest and wetland including form, textural qualities and colour
- The distinctive and memorable views from the river flats to the Red Hills, Cascade Plateau and surrounding forested ranges and foreground views of wetlands and open river flats.
- The distinctive appearance of the Cascade River meanders, oxbows and their associated vegetation patterns
- The remote wilderness values associated with the whole of the lease (and Cascade Valley)

Category Two - Important Landscape Values
Category two includes the eastern 'pasture zone' of the lease and the Doolans Block. The significance of these areas is derived from

- The location and setting within the Cascade Valley (and within the greater South West New Zealand Wilderness Area)
- The quality and distinctiveness of the views to the wider Cascade area including Red Hills, the Cascade Plateau and surrounding ranges, forests and wetlands
- The wetland and watercouses and associated riparian vegetation within the area
- The remote, wilderness values associated with the Cascade (and South West NZ Wilderness Area

2.2 Landforms and Geology

The lease area is predominantly comprised of post glacial alluvial outwash from the Cascade River of mixed composition, reflecting the contrasting geological makeup of the river's headwaters. The Red Hills on the western side of the catchment are composed of ultramafic material (iron and magnesium rich), volcanic rocks and serpentine – collectively these materials are termed ophiolites. Ophiolites form where the collision of two continental plates crush a section of sea floor between them resulting in the exposure of a rock layer which normally lies beneath some 3km of unconsolidated sediments and sedimentary rocks. The Olivine Mountains on the eastern side of the Cascade catchment are comprised of Haast Schists.

The south-western corner of the property comprises a large outwash fan which has formed where this steep catchment enters the flat Cascade Valley floor. Over time the stream bed has

ranged over an area of some 400 hectares depositing schist gravels of a more free draining nature than the peaty substrate which covers much of the Cascade Valley floor.

Two striking land form features are a series of well developed meanders in the Cascade River in the north-west corner of the lease, and a number of truncated meanders which are now occupied by ox-bow lakes and ephemeral tarns.

2.3 Land Environments of New Zealand (LENZ)

The majority of the pastoral lease area is classified as imperfectly drained Western South Island recent soils (Environment M1) in level II of the land environments of New Zealand (LENZ) classification (Leathwick et al 2003). This environment is found on river flats and floodplains along the West Coast of the South Island. At LENZ level IV the lease is distinguished from other imperfectly drained valley floors by warmer winter temperatures, higher solar radiation and higher vapour pressure deficits (Leathwick et al 2002).

2.4 Climate

Climate is typical of enclosed valleys in South Westland. Annual rainfall is approximately 4000mm with a spring maximum. Winters have a tendency to be drier with frequent frosts.

The Cascade Valley is also distinguished from other South Westland valleys by climate modelling which predicts warmer winter temperatures, higher solar radiation and higher vapour pressure deficits (Leathwick et al 2002).

2.5 Vegetation

Description

The lease includes three major vegetation types:

- **Tall Forest on Fans and River flats**
- **Mixed Shrubland-Flaxland-Sedgeland Wetlands on Poorly Drained River Flats**
- **Grasslands with Scattered Shrubland on Moderately Drained River Flats.**

The tall forest communities were well described by Woolmore (1989), and this description is summarised below. The vegetation survey undertaken as part of the tenure review inspection concentrated on the river flats, isolated forest remnants, wetlands, and shrublands.

A full list of vascular plants recorded on the property is presented in Appendix 2.

1. Tall forest

Most of the forest areas are on fans associated with Dee Creek and the hillslopes along the southern boundary of the pastoral lease. Kahikatea (*Dacrycarpus dacrydioides*) dominates

the canopy on the Dee Creek fan (1a on map 4.2(d). Rimu (*Dacrydium cupressinum*) is often codominant and matai (*Prumnopitys taxifolia*) is occasional. Kamahi (*Weinmannia racemosa*) and scattered miro (*Prumnopitys ferruginea*) dominate the subcanopy. The tree ferns wheki and *Cyathea smithii* and the shrub *Coprosma rotundifolia* are common understorey species, with the ground tier including *Leptopteris superba, Metrosideros diffusa* and *Nertera villosa* (Woolmore 1989).

Dead standing trees are common at the western margin of the lease where Dee Creek has deposited fresh silt and opened new channels. In this environment the lower forest tiers are more open with the shrubs *Coprosma rotundifolia,* pepperwood (*Pseudowintera colorata*), the tree fern *Cyathea smithii* and bush rice grass (*Microlaena avenacea*) being the most common species.

Windthrown logs were extracted in 1998 from two main areas within the Dee Creek fan forest. Skid tracks were established to gain access to the logs. About 100 logs were removed. The logs were mainly kahikatea with a few rimu. The site was inspected in July 2003. There was vigorous and dense regeneration of understorey species throughout the logged areas. Wineberry and tree ferns were particularly conspicuous, along with abundant ferns and saplings of most plants common in the surrounding forest. There were also numerous seedlings and saplings of canopy-forming tree species - particularly silver beech and kahikatea, but also miro, totara and occasional rimu

Another large windstorm in early 2003 blew over about 50 mature kahikatea trees in the same areas as the previous storm. These trees will be removed over the next few months, using the 1998 skidder tracks. Based on the observations following the 1998 logging, the forest will remain relatively intact and will quickly regenerate.

Rimu, southern rata (*Metrosideros umbellata*) and silver beech (*Nothofagus menziesii*) are more important than kahikatea in the canopy towards the upper end of the Dee Creek fan. Prickly shield fern (*Polystichum vestitum*) is a dominant ground tier cover (Woolmore 1989). The beech mistletoe *Peraxilla colensoi* is common where silver beech is present.

Kamahi dominates the forested colluvial slopes along the southern boundary of the lease (1b on 4.2(d). Miro and rimu are occasional emergents. The understorey includes the small trees fuchsia (*Fuchsia excorticata*), marbleleaf (*Carpodetus serratus*), pate (*Schefflera digitata*) and the tree ferns wheki and *Cyathea smithii*. The lianes *Metrosideros diffusa, Muehlenbeckia australis,* and *Ripogonum scandens* are common throughout.

Overall, the forest block is in a natural condition, with areas modified by logging or grazing being restricted to small, localised areas that will quickly recover.
Woolmore (1989) also found that the impact of cattle on forest areas was minimal, but noted that any increase in stocking rates could lead to increased impacts, particularly in the wetlands. Cattle were accessing the small forest remnants on the river flats, and impacting on the understorey by trampling and browsing. They have also historically had access to areas on the Dee Creek fan outside the pastoral lease and have impacted on the natural succession towards kahikatea forest that is occurring on the exposed silts (Woolmore 1989). A few stock were present here during a recent site visit, despite the presence of fencing to prevent this.

Photo Two. Emergent kahikatea near western extremity of the property.

2. Mixed Shrubland-Flaxland-Sedgeland Wetlands on Poorly Drained River Flats

Wetlands are a prominent feature of the lease. They are either associated with streams (riverine) or located in small depressions or on poorly drained flats behind levees (palustrine). They are part of a complex of wetlands known as Hermitage Swamp. This complex which covers the whole of the lower Cascade Valley comprises both fertile (swamps) and less fertile (fens/bogs) areas (Johnson and Lee 1977). Isolated wetlands are also found scattered throughout the lease area, some of which are ephemeral.

The dominant structural classes associated with these wetland types are as follows:

Forest, treeland and scrub (swamp and fen)
Kahikatea-silver pine (*Manoao colensoi*) forest occurs as an ecotone between alluvial fans or colluvial surfaces and poorly drained river flats (2a on 4.2(d). Examples of this vegetation type can be found near the southern edge of the lease and along the northern edge of the Dee

Creek fan. On better drained sites within wetland complexes, pokaka (*Elaeocarpus hookerianus*), weeping matipo (*Myrsine divaricata*) and *Neomyrtus pedunculata* are common understorey species whilst in wetter areas common shrub species include *Coprosma propinqua, C. rigida,* and manuka (*Leptospermum scoparium*), with occasional *Olearia laxiflora*. The fern *Blechnum novae-zelandiae* is common, particularly along water margins (Woolmore 1989), as are *Baumea tenax* and *Carex sinclairii* . Young kahikatea trees are often common in the lower tier.

A small patch of the rare herb *Gratiola nana* was found under kahikatea forest at the eastern edge of the Dee Creek fan growing with *Nertera depressa* and the adventive *Ranunculus flammula*. There was heavy stock tracking in this forest patch.

Mixed shrubland-flaxland-sedgeland (swamp and fen)
Much of the central and north western portion the lease area comprises a fertile wetland with a mixed shrub-flax-sedge cover (2b on map 4.2(d). Dominant species are flax (*Phormium tenax*), manuka (*Leptospermum scoparium)* (ranging from 2-4 metres in height) and four sedge species (*Carex virgata, C. secta, C. sinclairii and C. gaudichaudiana*). Other indigenous species include *Juncus planifolius, Baumea tenax,* cabbage trees (*Cordyline australis*), the shrubs *Coprosma* aff. *intertexta, C.* aff. *parviflora , C. propinqua, Hebe paludosa*, and the grass *Rytidosperma gracile.* The threatened sedge *Carex tenuiculmis* is scattered throughout an area of flax-*Carex* wetland near the eastern margin of the Dee Creek fan.

Exotic species present in the main wetland complex include Lotus (*Lotus pedunculatus*), tall fescue (*Schedonorus phoenix*), Yorkshire fog (*Holcus lanatus*), *Glyceria striata, Juncus canadensis, J. articulatus, Carex ovalis, Galium palustre* and creeping buttercup (*Ranunculus repens*). Exotics represent a greater portion of the flora than in similar wetlands in the Cascade Valley to the west of the lease area. This situation can probably be attributed to grazing (Sorrell and Partridge (2003)). However despite the presence of exotics this wetland is in good condition, with cover dominated by native species and little evidence of recent use by stock.

Ephemeral wetlands and shallow water
Ephemeral wetlands are scattered throughout the river flats on this lease. They are most frequently found in closed depressions lacking a surface outlet, along abandoned stream and river channels and on the margins of ox-bow lakes. Ox-bows are labelled as 2c on map 4.2(d), other ephemeral wetlands are too small to map individually. A recent report by Johnson and Rogers (2002) highlighted the importance of ephemeral wetlands in terms of biodiversity and described their vulnerability to the impact of trampling and grazing.

Pedestals of the sedge *Carex secta* are common, although not always present in these sites. Other common species include *Carex gaudichaudiana, Eleocharis acuta* and tall fescue (*Schedonorus phoenix). Potamogeton cheesemanii* and, more rarely, *Eleocharis sphacelata* grow in permanent pools along with *Myriophyllum propinquum* and turf species including *Lilaeopsis novae-zelandiae* and *Ranunculus limosella.*

A sizeable population of the threatened grass *Deschampsia cespitosa* was occupies an abandoned channel near the north-western boundary of the lease. An estimated 500 tussocks are present, scattered amongst *Carex gaudichaudiana* and tall fescue, with occasional

Coprosma propinqua. There is no evidence that stock have browsed any of the *Deschampsia cespitosa* despite grazing having been suggested as a threat to this species continued survival (Heenan et al 1997). The main threat to this grass in the Cascade appears to be competition by exotic herbs and grasses.

Abandoned river channels are a feature of the Cascade Flats. Dominant species in these areas include *Carex gaudichaudiana, Eleocharis acuta, Potentilla anserinoides* and the weeds *Juncus articulatus*, tall fescue (*Schedonorus phoenix*) and creeping bent (*Agrostis stolonifera*).

The adventive grass *Glyceria striata* is common in some of these ephemeral wetlands. This species has few West Coast records and was not recorded by Johnson and Lee (1977) during their survey of the lower reaches of the Cascade River catchment.

Myriophyllum triphyllum and the introduced *Ranunculus trichophyllus* are present in streams.

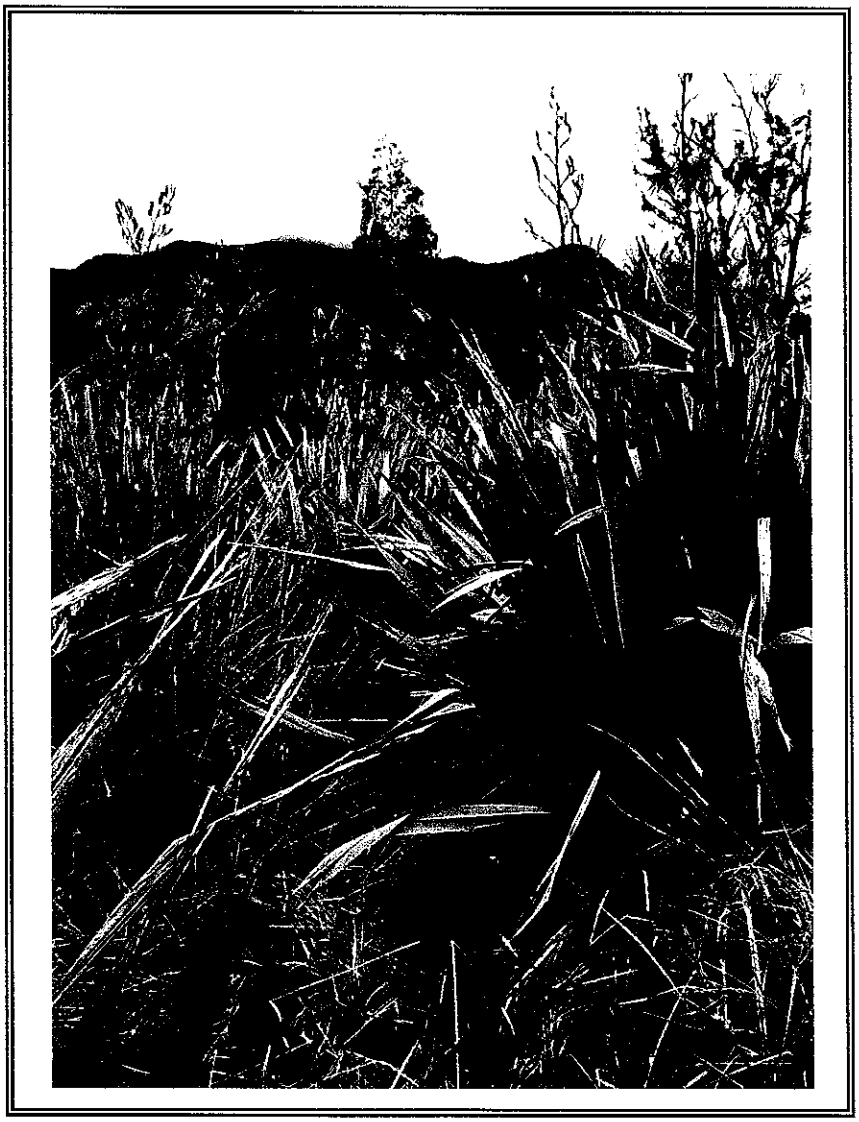

Photo Three. Mixed shrubland/wetland. Central lease area

3. Grasslands with Scattered Shrubland on Moderately Drained River Flats.

Vegetation makeup on the river flats reflects the age and development of soils. Very recent flats which comprise a mix of sand and gravels support little vegetation cover. *Raoulia tenuicaulis* is an early coloniser. Other species commonly present include *Muehlenbeckia axillaris, Coprosma acerosa, Epilobium brunnescens* and tall fescue (*Schedonorus phoenix*). Toetoe (*Cortaderia richardii)* is also sometimes present.

Less recently or frequently flooded flats with more developed soils are dominated by adventive grasses and herbs, particularly browntop (*Agrostis capillaris*), tall fescue , sweet vernal (*Anthoxanthum odoratum*), Yorkshire fog (*Holcus lanatus*) and clover. Approximately 30% cover comprises native species. These are shown as 3 on the vegetation map.

The natural cover of these river flats prior to clearance for farming was probably a mosaic of tall silver beech-kahikatea-rimu forest patches, shrubland, wetland and areas of native grassland on recent sands, silts and gravels (Holloway 1953).

The most recently developed area of pasture is on the Dee Creek fan. Here about half of the forest has been cleared. Most of the pasture-forest margin has been fenced, whilst developed pasture has been subdivided into paddocks. A scattering of tall trees have been left standing in cleared areas. Silver beech, often hosting the large mistletoe (*Peraxilla colensoi*), is the most common remnant species.

Shrubs are scattered throughout the open river flats, both as isolated individuals and as small stands. Stands are particularly common along permanently flowing and ephemeral stream channels. Stands of the nationally sparse shrub *Olearia lineata* are scattered across the river flats at the northern edge of the lease. Other species commonly present include *Coprosma propinqua*, lowland ribbonwood (*Plagianthus regius*), *Carmichaelia australis,* and the climbers *Muehlenbeckia australis* and *Rubus schmidelioides.*

The majority of the shrublands are heavily grazed and tracked by stock. Ground cover is typically dominated by adventive species, including tall fescue, browntop, selfheal (*Prunella vulgaris*) and creeping buttercup. The sub-ordinate native component comprises herbs such as *Leptinella squalida, Gonocarpus micranthus and Pratia angulata.* The tussock forming sedge *Carex flagellifera* is common amongst grass swards in damper areas.

Five individuals of the threatened shrub *Melicytus flexuosus* grow amongst rough pasture near the northern edge of the lease. A further 20 individuals occupy the margin of a small creek nearby. Individuals of the threatened shrub *Coprosma wallii* are scattered through remnant shrublands throughout the lease. The mistletoe *Ileostylus micranthus* is present on small-leaved *Coprosma* hosts.

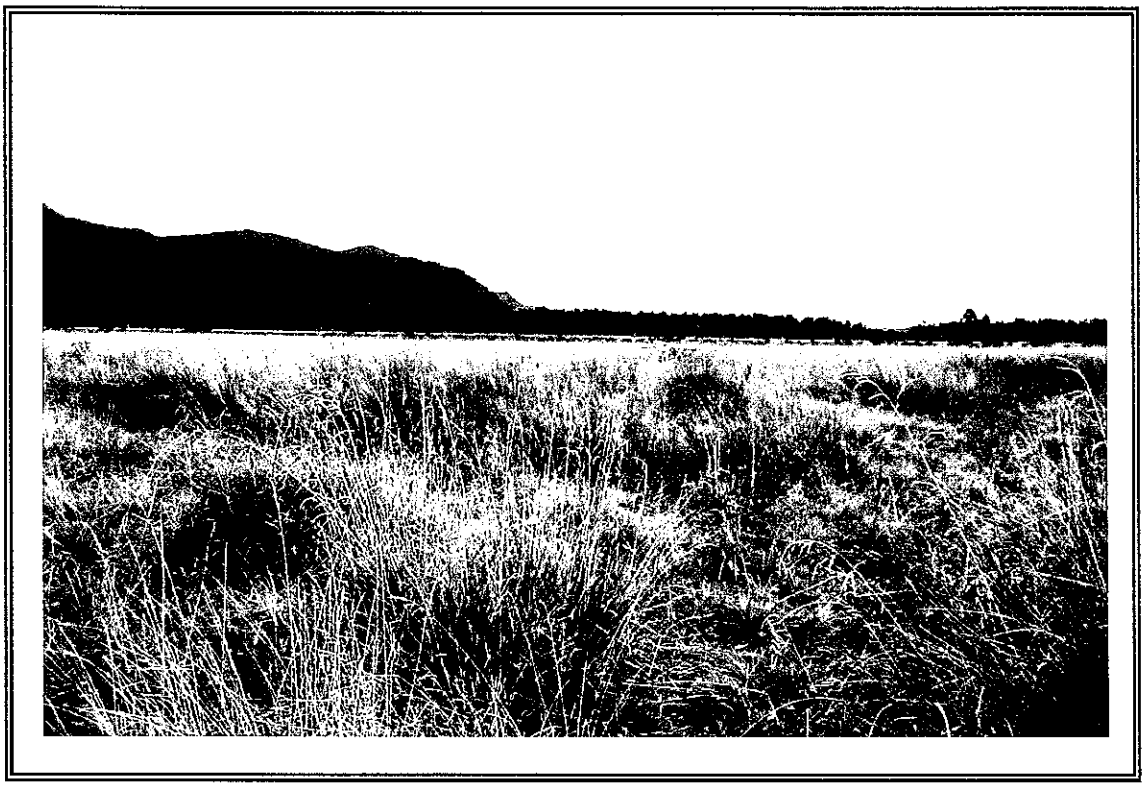

Photo Four. Ephemerally wet grasslands containing the threatened grass *Deschampsia cespitosa.*

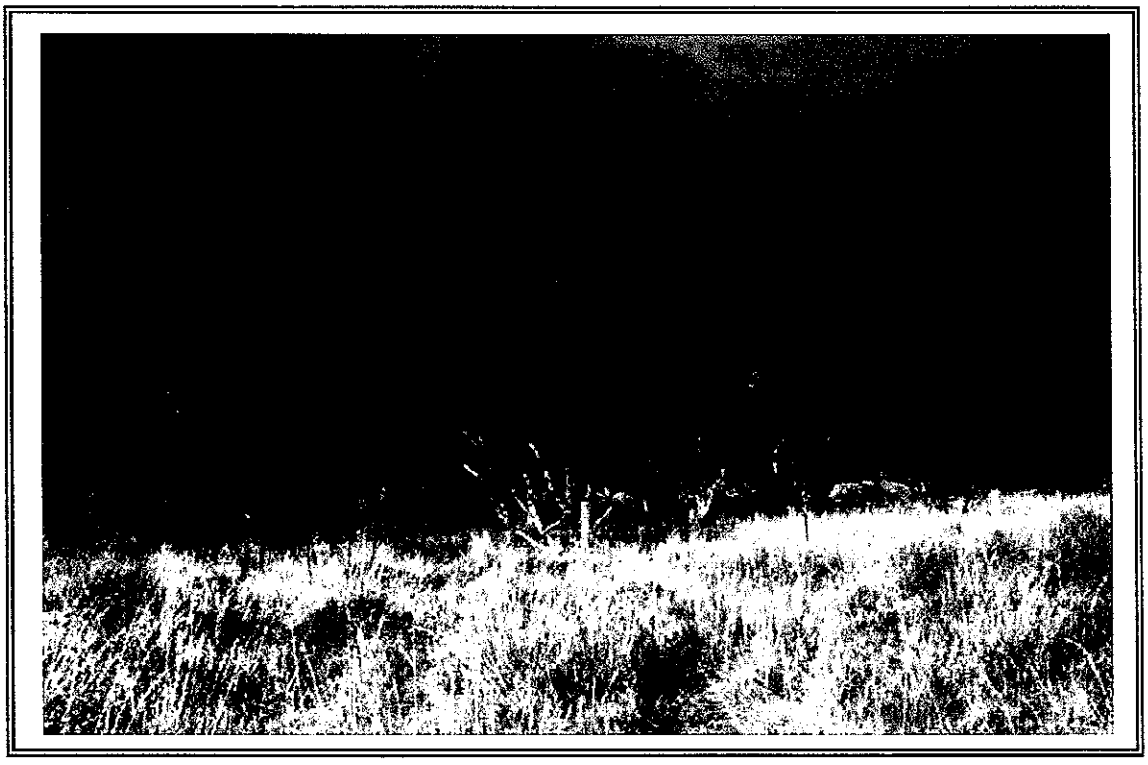

Photo Five. *Olearia lineata* shrublands amongst grasslands on the Cascade River flats.

Problem Plants

Adventive species dominate the river flats. These are mainly pasture grasses including browntop, and Yorkshire fog. Broadleaf weed species such as creeping buttercup, selfheal and tarweed are also common throughout the grazed area.

Patches of blackberry (*Rubus fruticosus*) occur throughout the modified areas of the lease, especially in recently windrowed areas where forest has been cleared.

No gorse was found during the site inspection. However, it is present, along with ragwort on skid tracks established in 1998 to remove logs, with seed probably brought in on machinery. These weeds have been largely eliminated by the leaseholder, and he plans to carry out a final control operation this year to ensure the species do not become established in the valley. Isolated broom (*Cytisus scoparius*) plants were sighted on the Dee Creek fan and adjacent to the Barn Bay Cascade Road at the south western corner of the property. Maintaining the flats in a gorse and broom-free state is a high priority from both a farming and conservation perspective.

Weeds such as lotus, *Juncus articulatus*, the grass *Glyceria striata* and creeping bent form a significant and permanent component of the flora in wetland areas. Despite the presence of a number of exotic species, the wetlands remain a predominantly indigenous system. Weeds typically form less than 5% of the ground cover.

Significance of Vegetation

The Lower Cascade pastoral lease in conjunction with the adjoining Upper Cascade pastoral lease is an enclave of modified land within a largely natural landscape extending from Jackson Bay to the north to southern Fiordland. Forests within the boundary of the lease are contiguous with New Zealand's largest remaining lowland forest wilderness. These areas of forest are unmodified by human activity (Woolmore 1989), and are therefore of conservation importance.

The green mistletoe *Ileostylus micranthus* is occasional on a range of hosts on the river flats. Whilst this species is no longer ranked as nationally threatened, it continues to decline in parts of its range such as on the Cascade River flats, where as hosts die there is no recruitment of suitable hosts.

Three small tree species of particular interest are present within shrublands on the grazed river flats:

Coprosma wallii is ranked as chronically threatened - gradual decline (Hitchmough 2002). This species is proving to be more widespread in Westland than was previously thought. Populations are now known from the Upper Cascade pastoral lease, and the Haast, Landsborough, and Windbag Valleys to the north. The main threats to *Coprosma wallii* are:

- habitat clearance and associated loss of natural disturbance processes,
- browsing animals eating young plants resulting in a lack of recruitment and
- competition by sward forming adventive grasses.

Melicytus flexuosus is also ranked as chronically threatened - gradual decline (Hitchmough 2002). This is the first record of this species from the Cascade Valley and is a significant

southwards range extension for the species. The nearest known Westland locality is Lake Matheson some 160km to the north-east. The threats to this species are similar to those for *Coprosma wallii*.

Olearia lineata is ranked as at risk – sparse (Hitchmough 2002). *Olearia lineata* is not common on the West Coast. The nearest record is from Big Bay (Wilson 1991). The threats to this species are similar to those for *Coprosma wallii* and *Melicytus flexuosus*.

Carex tenuiculmis is ranked as at risk – sparse (Hitchmough 2002). This is the first record of this species from the Cascade Valley and represents a very significant southwards range extension. The nearest known Westland locality is Kaniere. Competition with weeds such as creeping bent and wetland drainage are the main threats to this species (Heenan et al 1997).

The cosmopolitan grass *Deschampsia cespitosa* is ranked as threatened - gradual decline (Hitchmough 2002) in New Zealand, although it is secure overseas. It has recently been recorded from other South Westland sites including the Thomas Valley, Tawherakiri Lakes. A large population has long been known from Marks Flat in the Clarke Valley. Competition with weeds appears to the main threat to this species in the Cascade.

The presence of a large area of fertile wetland containing rare and threatened species distinguishes the Lower Cascade flats from many other large river valley flats in South Westland.

Photo Six. The shrub *Melicytus flexuosus* is ranked as chronically threatened - gradual decline. This is the first record of this species from the Cascade Valley and is a significant southwards range extension for the species.

2.6 Fauna

2.6.1 Aquatic Fauna

Context

Some migratory native fish movement occurs through these river sections due to the close proximity of the Tasman Sea and to the complex natural linkages to adjacent back channels, flood sumps, wooded wetlands, *Carex* swamps and minor tributary channels. Natural functioning of these linkages has been only moderately compromised by the loss of woody vegetation, drainage, soil change and cattle trampling.

Streams on the property, many if which drain wetlands flow into the Cascade River. Streams are small and slow flowing, and substrate is dominated by mud and other fine particles. Steeper gradient streams that drain the surrounding mountains were dry in the pastoral lease area at the time of the survey due to an extended period of fine weather. Riparian vegetation in areas inaccessible to stock was dominated by native plants typical of wetland areas and in pasture country by introduced grasses and herbs.

Methods

Four sites were fished using a combination of gee-minnow and fyke nets (Appendix 3). Traps were baited and left overnight. Fish captured in traps were identified and returned to the stream.

Two sections of one stream (Appendix 3, site three) were spotlighted over two nights. Spotlighting was carried out an hour after dark. Surveyors worked their way upstream using two spotlights to light the water column. Dip nets were used to capture fish which were subsequently identified and returned to the stream.

Habitat and vegetation data was recorded at each survey site using a NIWA freshwater fish database form.

Results

Four freshwater fish species were recorded from the five sites surveyed, three native and one introduced. Brown trout (*Salmo trutta*) and redfin bullies (*Gobiomorphus huttoni*) were found at three sites. The longfin eel (*Anguilla dieffenbachii*) was recorded from two sites whilst the giant kokopu (*Galaxias argenteus*) was found at only one site. No native fish species were captured at one of the sites surveyed, however brown trout and longfin eels were observed at this site. Brown trout were common in the streams where they were captured or observed. Longfin eel, redfin bully and giant kokopu were relatively uncommon at sites sampled with few individuals captured or observed.

Shrimp (*Paratya curvirostris)* were common at many of the sites surveyed.

See Appendix 2 for a summary of sites fished and species present.

Discussion

Composition and population size of aquatic fauna are affected by the clearance of riparian vegetation and damage by cattle grazing. Both change the structure of in-stream habitat and facilitate the invasion of exotic an exotic aquatic flora. Furthermore the introduction of brown trout to New Zealand waterways has impacted on the structure and functioning of native fish communities through competition for space and predation (McDowall 1990). As all of these have occurred within parts of the lease area, many streams and wetlands are likely to have once provided habitat for a much larger and more diverse aquatic fauna including large populations of galaxiids, (giant kokopu and inanga (*Galaxias maculatus*)), eels, bully species and lamprey (*Geotria australis*).

Significance of Aquatic Fauna

This survey revealed four freshwater fish species present in the streams flowing through the Pastoral Lease area. A number of other fish species are also likely to be present. Of the three native species, redfin bully are widespread and abundant throughout New Zealand. Giant kokopu are widespread though not common and are listed as a threatened species with a "gradual decline ranking" (Hitchmough 2002). They are of some conservation concern with much of their favoured habitat being degraded, for example through the drainage of wetlands (McDowall 2000). Longfin eels are presently widespread but there are currently some concerns about recruitment and absence of females in some catchments (Hoyle and Jellyman 2002). For this reason the species is now classified as threatened with a "general decline ranking" (Hitchmough 2003). Longfin eel are also of cultural importance to tangata whenua.

A report by Eldon (1987) highlighted the importance of the Cascade River with its large areas of lowland wetlands as arguably the most important whitebait fishery in New Zealand.

2.6.2 Herpetofauna

Context

The West Coast is an area of significant herpetological interest. This is because of the apparent endemism of a possible four *Oligosoma* skink species and genetic distinction amongst the forest gecko (*Hoplodactylus granulatus* n. sp. 'Cascade Forest gecko') noted in the West Coast Lizard Action Plan (T.Whittaker in prep). The Lower Cascade pastoral lease therefore demands strong consideration for potential herpetological biodiversity values.

Knowledge of the herpetology of the West Coast is only beginning to be accumulated and understood. From the Department of Conservation surveys that have been conducted in the region, we may conclude that lizard populations are highly localised and that densities are low when compared to other South Island regions.

It is therefore necessary to point out that any results generated from a 2 day survey of a property of 1375ha in size will be at best inadequate and at worst, misleading as a profile of lizard biodiversity.

The Lower Cascade property appears to have been under some form of pastoral management since 1885, and covers riparian habitats along the southern bank of the Cascade River, as well as developed pasture, forest remnants and significant areas of wetland.

During the inspection, an attempt was made to visit representative samples of all major habitats.

The herpetofauna of the West Coast is notable because of it's apparent high endemism, but more common species are also present. Van Mierlo (1998) notes the presence of *Oligosoma nigriplantare polychroma* (Pakihi NZMS 260 I34 22997 57927), *O. infrapunctatum* (Hokitika NZMS 260 J33 23452 58294) and most notable, the presence of *O. "Barn Bay"* (Barn Bay NZMS 260 E37 E37 21359 56704) and *O. "Open Bay Island"* both possibly new and endemic species to the region. *Hoplodactylus granulatus cf. 'Cascade forest gecko'* has been recorded in the Upper Cascade. *O. zelandicum* was also recorded by Van Mierlo but only north of Greymouth, which is probably the southern limit of this widespread species. *Naultinus spp.* has also been recorded from the Cascade region but their precise species remains uncertain. Given the descriptions of habitat provided by Van Mierlo, all the above species are potential inhabitants of the Lower Cascade pastoral lease. A more up to date appraisal of these taxonomic and geographic investigations may be shortly found in the West Coast Lizard Action Plan (T.Whittaker in prep).

The two skinks recorded as present in the proximity of the Lower Cascade property are the 'Open Bay Island' skink and the 'Big Bay Skink', the latter being locally common in cobble strands in northern Fiordland and at Barn Bay. The Barn Bay skink may be the species reported as relatively abundant in rocky areas on the Cascade Plateau. A brown striped skink of unknown identity has been observed in sphagnum swamp at Okuru.

Tenure Review Survey.

No lizards or signs of lizards were recorded on the Lower Cascade pastoral lease. This by no means should be interpreted as all lizard species being absent from the property. Refer to Appendix 4 for a detailed description of search efforts, techniques and location.

It must be stressed that a 2 day survey in variable weather conditions is not capable of identifying accurately the herpetofauna of the property. However, the examination of 1416 potential and likely micro habitats yielded no positive signs of occupation by reptiles so it would seem that if any *Oligosoma* skinks do exist on the properety, their distribution will be highly localised. *Naultinus spp.* are notoriously hard to spot in the wild and so the searches, although thorough, are far from conclusive evidence of their absence. It is also possible that the *Naultinus* geckos of the West Coast utilise the canopy of the mature forest as habitat, in which case they are likely to be widespread.

According to Tocher (1998), site A would seem a likely habitat for the 'Big Bay Skink' being dominated by boulder substrate with short vegetation. However, the habitat is enclosed by forest and presumably cleared by humans. Thus a continuous habitat to more natural open rock environments on the coast does not exist. The same can be said of the pasture area of the property. It appears to provide ideal habitat for the common skink and probably other members of the *Oligosoma* genus but it is obvious that none are widespread in the habitat. This again could be the result of the habitat being human induced in an area dominated by mature climax native forest. Few, if any routs of migration other than accidental transportation with agricultural materials exist for the colonisation of this habitat for *Oligosoma* skinks. The presence of *Naultinus spp.* and *Hoplodactylus granulatus* would seem highly probably given the condition of the climax forest surrounding the property.

No amphibians were observed or heard during the survey.

Significance of Herpetofauna

Few conclusions can be drawn from this report on the lizard fauna of the Lower Cascade pastoral lease. However, in light of the largely intact surrounding habitat, it would be beneficial if the potential for the introduction of alien species and open habitat to sustain them be minimised. The pastoral lease is presently free of rabbits, which are known to drive predator prey systems that impact significantly on native herpetofauna (Norbury 2001).

2.6.3 Avifauna

Birds

The bird fauna within the Lower Cascade Pastoral Lease has not been surveyed recently. For the purposes of this report, survey data from the South Westland Management Evaluation Programme (SWMEP) is used as it is synonymous with that further north in O'Donnell & Dilks' (1986) study area. O'Donnell and Dilks (1986) sampled the avifauna of the Cascade area. The study area extended from the Cascade River in the south to the Arawhata River in the north and was bordered by the coast to the west and roughly the Jackson River to the east. Results from this study have been augmented with observations from the 2003 tenure review survey.

O'Donnell and Dilks (1986) recorded a total of 44 species in the Cascade area: 21 native forest species, 8 introduced species and 15 coastal, wetland and open country species. Of these, 14 native and 4 introduced species were found in the forest at the south of O'Donnell & Dilks' (1986) study area. These were: kereru, kaka, kea, parakeet, shining cuckoo, long-tailed cuckoo, rifleman, brown creeper, grey warbler, fantail, tomtit, silvereye, tui, bellbird, song thrush, blackbird, chaffinch and redpoll. Other species recorded from the Cascade area and likely to be present on the open river flats of the Cascade River within the Lower Cascade pastoral lease include harrier, paradise shelduck, shags (black, little black, pied), grey duck, pukeko, SI pied oystercatcher, spur-winged plover, black backed gull, Caspian tern, skylark, welcome swallow and pipit.

The following bird species were recorded during the actual tenure review inspection: paradise duck, bellbird, kaka, grey warbler, tomtit, pukeko, kereru, banded dotterel, silvereye, brown creeper, New Zealand falcon, fantail, Australasian bittern, and kea.

Significance of Birds

Of the birds observed by O'Donnell and Dilks (1986) five species are listed in the Department of Conservation's Threatened Species Classification System (Hitchmough in prep.) (Table 4). Two species, the New Zealand Falcon and the Australasian Bittern which were recorded on the tenure review inspection are also listed. A further four threatened species are thought to utilise aquatic habitats on the property (Table 5).

Table 4

Bird Species	Classification
Kea	nationally endangered
South Island kaka	nationally endangered

Kereru	gradual decline
Yellow-crowned parakeet	gradual decline
long-tailed cuckoo	gradual decline
New Zealand falcon (Southern)	nationally endangered
Australasian bittern*	Nationally endangered

Table 5

Bird Species	**Classification**
Caspian tern	nationally vulnerable
little black shag	Sparse
black shag	Sparse
pied shag	Sparse

None of the species recorded by O'Donnell and Dilks (1986), observed on the tenure review inspection or species thought to occur at the Lower Cascade pastoral lease are endemic to South Westland. Most occur throughout forested and aquatic areas in the South Island (Bull *et* al, 1985). Of those species recorded by O'Donnell and Dilks, kaka and parakeet are obligate forest dwellers. Kereru, long tail cuckoo, morepork, rifleman, tui, brown creeper and tomtit are primary forest dwellers. Harrier, bellbird, kea, shining cuckoo, grey warbler, fantail and silvereye are all facultive forest dwellers (can survive outside of the forest). The retention of forest and wetland values is important for the majority of the avifauna found in the pastoral lease.

Maintaining the forest structure is important and the presence of large forest trees is important to several species of birds. Research has shown that hole nesting species are significantly more abundant in un-logged forest than logged forest. The large trees are also preferred as feeding trees. Provided the forest and wetland habitat within the Lower Cascade pastoral lease is not degraded further, then the avifauna of the area would not be *seriously* threatened by the current farming activities undertaken on the site.

Bats

Context

Both long-tailed *Chalinolobus tuberculatus* and short-tailed bats *Mystacina tuberculata tuberculata* occur on the West Coast. In the South Westland *Weheka* Area long-tailed bats have been recorded from several locations (eg Arawhata Valley, Haast Township, Fox Township, Landsborough Valley and Turnbull Valley) where as short-tailed bats have not been recorded (Department of Conservation (DoC) bat database).

Long-tailed bats prefer forest edge habitats whereas short-tailed bats prefer forested habitats. Both bat species prefer to utilise mature trees as roost sites during the day (O'Donnell *et al.* 1999; Sedgeley & O'Donnell 1999). The Lower Cascade pastoral lease area includes forest edge habitats and mature stands of forest apparently suitable for long-tailed bats.

Methods

Bush edge habitats adjacent to the Barn-Bay Road were surveyed overnight by Bat Box three automatic bat recorders (O'Donnell & Sedgeley 1994) on 22 – 23 April 2003. Bat boxes were set to switch on at 6:30pm and turn off at 7:00am. Recording frequency was set at 40

KHz for long tailed bats as forest edge habitats were being sampled. See Appendix 5 for map grid references of search sites.

The DoC bat database was searched for records of long-tailed and short-tailed bats occurring in the Cascade River area.

Results
No Bats were recorded on the two nights surveyed or in the DoC bat database.

Discussion
The lack of bats detected in the surveys could be attributable to several factors. Survey effort was limited in time (two nights with two bat box three automatic bat recorders operating each night) and in space (only four sites surveyed over a very large area). Bats are most likely to be active on warm nights (O'Donnell 2000); we survived in late April when nights were cold suggesting bat activity would be limited. Other surveys of the Cascade River area during warmer periods (December-January) also failed to detect bats (DoC bat database). This indicates that bat numbers in the area are potentially low or non-existant. However, O'Donnell *et al.* worked in the Eglinton Valley for two years before they found short-tailed bats and now they are thought plentiful (P. van Klink *pers. comm.*). The amount of survey conducted is small relative to the size of the area and therefore, it is feasible that a substantial population of bats may be present.

Providing that the mature forest adjacent to pastoral lease area is kept intact, it is unlikely that current farming practices will be detrimental to any bats present in the area.

Significance of Bats

Both species are listed as nationally endangered in the threat classification system (Hitchmough 2002).

A particular cause of concern is the loss of large old beech trees which bats use as roost sites. It appears from existing research that the loss of such trees which bats use for a specialised purpose is having a disproportionate effect on this species (O'Donnell 2001).

2.6.4 Invertebrate Fauna

Context

Weather conditions during the inspection period were mild with some periods of rain. Invertebrates were hand collected or collected under ultraviolet light at night. During late April, many insects are rarely found as adults and were not recorded during the survey. However, 43 invertebrate species were identified from an extensive range of wetland habitats and host plant associations. Information from other surveys in the region has also been utilised (P. Johns unpublished, R. Forster unpublished, E. Edwards unpublished and Johnson & Lee 1977, (see Appendix 6).

Patterning of communities through flood, flow and retention of water is a significant feature of the lease area. The insects noted are representative of complex low altitude habitats of stream, fan (at Dee Creek) and fertile river floodplain. Ecotones are a significant feature as there are numerous boundaries where different classes of habitat merge. Many insects present in the Cascade River flood plain are widespread in the South Island but of local occurrence. Some significant moths are of limited distribution or associated with rare plants or isolated habitats. A range of species occupying flood disturbed ecosystems at the Cascade River are possibly at their southern limit on the West Coast. Some areas of lowland forest support complex epiphyte-liane communities of significance as an invertebrate habitat.

Streams, rivers and small open water areas
Aquatic insects, common and widespread in natural stony streams are well represented within the pastoral lease. Less well known faunal habitats are associated with seepage and spring areas and ephemeral wet hollows. These are common in the open grazed flats and also occur inside the forest fringe north of the Barn Bay-Cascade Road, and in forest along the margin of the Dee Creek fan. These wet areas are moderately productive for a range of insects with aquatic life stages. For example, flies (eg. families Chironomidae, Sciaridae, Tipulidae) beetles (Hydraenidae, Dytiscidae) and caddis (Leptoceridae, Hydroptilidae) and also aquatic snails. The emergent vegetation is host to abundant leaf hoppers (families Cicadellidae, Delphacidae) and shield bug *Rhopalimorpha linearis*. Also on the emergent vegetation in these flush sites are wetland spiders *Dolomedes* sp. aff. *aquaticus* and *Tetragnatha* species. Blue damsels *Austrolesthes colensonis* and dragonflies *Procordula* species range over open wetlands.

Some areas of extensive turf and low rush habitats line two broad shallow oxbows on terraces adjacent to the Cascade River. These are rare shallow sump systems although the plant and insect inhabitants are well known from the shores of lakes and estuaries. In these shallow sumps, larvae of the moth *Eutorna symmorpha* eat *Sellieria radicans* and larvae of moth *Schrankia costaestrigalis* eat litter among short rushes.

Damp hollows and swamp vegetation
A pattern of damp grass and herb filled channels among rank grasses and scattered shrubs surrounds the airstrip and extends across Eel Creek and to the Cascade River. Moth *Asaphodes stephanitis* is locally common here with larvae feeding on *Rannunculus* species buttercups in damp hollows. These terraces, and a fan at Colin Creek, represent the south-western limit for this uncommon day flying moth of damp non-forest areas.

These areas appear to provide good habitat for the rare moth *Asaphodes stinaria* (threat of extinction, status Nationally endangered, Molloy et al 2000, Hitchmough 2002). While not recorded on the property, this moth is hosted on native buttercup *Ranunculus foliosus* or *R. reflexus* in shaded parts of fertile wetlands and has been recorded nearby at two other South Westland localities (Patrick 2000a).

A number of moth species are known from lowland grassy wetlands and many are present in the lease area. Moth *Tmetolophota sulcana* has larvae on *Microlaena* and moth *Protosynaema quaestuosa* has larvae on *Carex* sedges. Moth *Udea flavidalis* is among several moth species that are common inhabitants of herbs and grasses in wet areas. The species richness of sedges and herb associations in the grassland has significance for invertebrate species richness.

Swamp shrubland and shrubs of disturbed areas (flooded or farmed terraces) have representative insects associated with them. Recorded in the survey were the moths *Austrocidaria gobiata* and *A. praerupta* (larvae on *Coprosma* spp.) and moth *Eiphryne verriculata* (larvae on *Cordyline*). The cicada *Kikihia* species and *Amphipsalta strepitans* have nymphs among the roots of shrubs and stick insects *Argosarchus horridus* and *Acanthoxyla prasinia gesovii* feed in shrub canopies, while tiny moth *Stathmopoda plumbiflua* has larvae that eat dying flowers and fruits. These are representative and fairly widespread insects of native lowland shrubland. However, moth *Pasiphila cotinea* (known from *Olearia laxiflora*) recorded on the adjacent lease is part of a rich fauna of moths hosted on small-leaved *Olearia* (Patrick 2000b. Moth species with larvae restricted to feeding on species of small-leaved *Olearia* will almost certainly be present within the lease area. There are two moth species hosted on *Olearia lineata* trees and these two plus another five species are known from *O. laxiflora* trees (Patrick 2000b). Such moth populations are fragmented in distribution and are reliant on the survival and reproduction of their host plant.

Logs stranded on terraces and levees

Stranded logs provide both habitat and refuge for invertebrates of wood and open areas subject to periodic flooding. Stranded woody debris is a common habitat in parts of the South Island West Coast but generally rare in other parts of New Zealand.

Forests

A few common and widespread forest insects are recorded from the Cascade Valley. These are generally indicative of the areas intact natural character but are not indicators of the complexity of habitats present such as riparian zones , shrub-forest margins, infertile and fertile sites, well drained sites and wet sites. Key representative insects include a tree weta, cave weta and two ground weta known in the lower Cascade Valley. The ground weta *Hemiandrus* 'madisylvestris' (Peter Johns) is endemic to South Westland-northern Fiordland. The stick insect *Acanthoxyla prasina geisovii* inhabits totara, rimu and rata as well as some shrubs. The impressive stag beetle *Geodorcus helmsi*l inhabits a range of ecosystems and four fern feeding moth species *Ischalis gallaria, I. variabilis, I. fortunata* and *Sarisa murifera* are indicative of the importance of ferns. Moths with larvae on Mahoe and *Pseudopanax* and other forest elements are known in the valley and are likely to be present within the pastoral lease.

For practical reasons no insects were sampled from the canopy of tall podocarp trees. Old growth forest dominant trees present in South-Westland have been described as having crowns that are among the richest canopy communities known in New Zealand or elsewhere (Dickinson et al 1993, Hofstede et al 2001). These tree top communities are made up of vines, shrubs, orchids, ferns, mosses, lichens and plant litter (Hofstede et al 2001). Possum browsing is recent and minimal in the region and thus it is likely that complex tree canopy communities of fertile flats on the lease support an invertebrate fauna of high natural character and of national significance.

Mistletoes *Peraxilla colensoi* and *Illeostylus micranthus* are locally abundant and are elsewhere known to host four specialist mistletoe feeding moth species (Patrick and Dugdale 1997). Three or more species are likely to be present here (*Declana griseata* recorded). While not classed as threatened, these moths are affected by declining mistletoe populations and loss of habitat.

No insects were recorded from ribbonwood scattered on forest margins and along old channels across the terraces. However, at least seven moths with larvae specific to trees of *Plagianthus* or *Hoheria* can be expected to occur here. This includes moth *Heterocrossa* species (*maculata* group) with the threat of extinction status 'Sparse' (Molloy et al 2000, Hitchmough 2002).

Significance of Invertebrate Fauna

Very complex and nationally significant faunal habitats are encompassed within the pastoral lease area. Flood disturbed ecosystems and fertile lowland wetlands retain their significant natural character. Wet or silty flooded forest dominated systems both within canopy architecture and forest floor are of high physical and biotic integrity. Of equal significance is the range of shrub, sedge and turf-low herb habitats. These are less well represented in protected areas and are also nationally significant for invertebrates.

The moth *Asaphodes stephanitis* is locally common on the open terraces around hollows. This is an uncommon moth which is likely at it's south-western limit on the West Coast. The ground weta *Hemiandrus* 'madisylvestris' (Peter Johns) known from forest here is endemic to the region. The moth *Pasiphila cotinea* recorded upstream from the lease has larvae on *O. laxiflora*. This moth and others have populations as rare and fragmented as their small leaved *Olearia* hosts. Whilst the endangered moth *Asaphodes stinaria* (threat of extinction status Nationally endangered, Molloy et al 2000, Hitchmough 2002) was not found, it is likely to occur with larvae feeding on native buttercup *Ranunculus foliosus* or *R. reflexus* in fertile wetlands.

There are unrecorded but likely significant moth populations hosted on mistletoes and on ribbonwood.

2.6.5 Problem Animals

Possums, deer, stoats, rats and mice are present. The presence of weasels and ferrets is probable. Possum numbers are relatively low as this pest is a recent arrival. As is the case at most New Zealand mainland locations mustelids, possums and rats are a serious threat to several bird species. Rat, mice and mustelid numbers fluctuate in conjunction with beech seeding patterns.

2.7 Historic

Maori Sites

There are no known prehistoric sites within the boundaries of the leasehold land recorded on the New Zealand Archaeological Association site file.

European Historic Sites

There are no historic sites recorded on the New Zealand Archaeological Association site file within the boundary of the leasehold land.

History of the Area

Duncan Macfarlane, the Government resident agent at Jackson's Bay Special settlement made a reconnaissance trip to the Cascade in late July 1876. In his annual report to J. A. Bonar, (the Executive Officer of Westland Province), McFarlane described the area in complimentary terms. He estimated that there was '25,000 to 30,000 acres of really good land ... available for settlement in this block' and 'a good deal of cattle feed' lay in the open bush of the foot hills.[1] Macfarlane also presented a report on the geology of the area with rock samples, in the hope that valuable minerals would be identified.[2] As the government settlement at Jackson's Bay became established many prospectors used the Bay as their base as the search for gold first extended south to the Cascade area and beyond. Calls were also made to open up the country to the south by providing a horse track through the Cascade. [3]

In early 1884 chief surveyor Gerhard Mueller completed a reconnaissance survey between the Cascade and the Hollyford Valley in Fiordland. The purpose of this trip was to 'ascertain whether it was possible to get a practicable line for the extension of the main road to Martin's Bay Settlement'. The proposed line started in Jackson's Bay, crossed the Stafford Range, the Stafford River, then on to the Cascade Plateau before dropping down to the Martyr River, and crossing both this and the Cascade River at the head of the Cascade Valley. Once again agricultural potential of the land in the Cascade was commented on. These sentiments were echoed in early 1884 by A. Barron the Surveyor General after he visited Jackson's Bay. The settlers at 'the Bay' made comments to him regarding the need to construct a track between the Cascade and Barn Bay to facilitate access to 'auriferous country'. In his opinion this was a worthy venture, as was the stocking of the Cascade Run especially if gold miners took up residence in the area.[4]

In response to these reports the track from Jackson's Bay to the Cascade was started following Mueller's line, and by May 1885 it had been extended as far as Carmichael's Creek on the Cascade Plateau.[5]

In 1885 Duncan Macfarlane (the very same government agent who had praised the agrarian promise of the valley nine years earlier) took up the run in the Cascade Valley. In conjunction with his son Colin the land was stocked with sheep and cattle and a homestead built at the confluence of the Martyr and Cascade Rivers.[6]

Charlie Douglas was friends with the Macfarlane's and he spent December of 1885 helping them take up their run and looking after the homestead in Macfarlane's absence.[7]

Macfarlane continued to agitate for the opening up of country to the south of Jackson's Bay. By 1888 the road south initially surveyed by Mueller was in the course of construction. The

[1] AJHR 1877, H-28 pp6-8.
[2] AJHR 1879 H-9A pp102-103.
[3] AJHR 1878 D-6A p3-4.
[4] AJHR 1884 C-1, Appendices 4 and 5, pp.73-76.; see also "Cascade to Pyke Valley Road" map held at DoC Hokitika for route of the road.
[5] AJHR 1885 C-2, p.43
[6] See Minehan 2002; Peat 1979:66; see also Appendix 1 for a contemporary description.
[7] Langton 2000:54-55.

line over the Cascade Plateau was abandoned, and the track was continued on from a horse track constructed up the Jackson River, over the Martyr Saddle to the Cascade River. Three years later Charlie Douglas spent 4 months cutting the track from the Cascade to Barn Bay, and was often visited by Colin Macfarlane. There was trouble with completion of the track, but by 1898 this track had be formed to such a standard that it was described as '[a] 4 ft. metalled horse-track 60 chains long' .[8] The current track, bulldozed in the 1960s follows this historic track for some of its length.

From the turn of the century the brothers Paddy and Dinny Nolan took up the run. In the Depression the Cascade run provided work for many men from the district, chiefly employed clearing bush. The run also became inextricably linked to the legendary Nolan cattle drives where cattle were herded from the Cascade for 150 miles north to market in Whataroa.[9]

For an early account of the Cascade Valley see Appendix 7.

Historic Significance

There are no known extant historic features in this piece of land. The most apparent significant historical associations of the Cascade Run lie with its use in the past as access to the Hope River and Barn Bay for mineral exploitation. Other significant aspects are the association with early settlement of South Westland through the Macfarlanes, and the attempt to construct the 'Main South Road' road from Jackson's Bay to the Hollyford.

2.8 Public Recreation

2.8.1 Physical Characteristics

The property is located in a spectacular and remote location within the South West New Zealand Te Wähi Pounamu World Heritage Area which provides a dramatic setting for a range of recreational activities.

2.8.2 Legal Access

The pastoral lease has no legal access as road lines have not been legalised. There appear to be no marginal strips although the Cascade River and a number of smaller waterways clearly qualify.

2.8.3 Activities

Access

Public access over the Cascade Saddle is possible from the Haast-Jackson Bay Road to the McDonald's farm homestead, at the Martyr River. While this formed road is a well used access way it was never gazetted and is therefore not a legal public road. A surveyed (but again not gazetted) track continues from the homestead through the Upper Cascade pastoral

[8] AJHR 1888 C-5:29; C-6:10; Douglas 1892 MS papers; AJHR 1892 C-3A:33; AJHR 1893 C-3:xxxiv; Department of Lands and Surveys report 1897 to 1898 C-1
[9] Peat 1979:69; Nolan 1983:8;

lease to the Cascade River and beyond to Barn Bay via the Lower Cascade pastoral lease and public Conservation Land. Sections of surveyed road within public Conservation Land remain public Conservation Land and sections traversing pastoral lease remain within the lease. This track provides the traditional land access to the lower Cascade Valley, Barn Bay, Gorge River and other coastal areas. Four-wheel-drive vehicle access is possible on this route, provided river levels and track conditions permit passage. The section of the track located on the two cascade pastoral leases is maintained by the lease-holders and their permission is required prior to use.

Proposals have been put forward by the Westland District Council and business consortiums to establish a highway from Cascade through to the Hollyford for the purpose of carrying tourists from Southland through to the West Coast. This proposal has not been progressed to date although interest is still there.

The Cascade River is regularly used by jet boaters to access the river mouth where there is a well established white–baiting settlement.

Recreational Activities

Recreational activities undertaken in the Cascade Valley include boating, fishing, hunting, jet boating, mountain biking, white baiting, hunting, tramping, four-wheel-driving, picnicking, and occasionally horse trekking.

The Cascade River, and its tributaries, is popular for trout fishing (by reel or fly). Jet boating is also popular. These activities are mostly undertaken by private recreationists, although *Haast River Safaris Ltd* hold a concession to take commercial jet boat trips in the Cascade. Jet boat access to the Cascade is possible via the Martyr River although this route can be technically difficult, especially when water levels are low, so the majority of "boaties" access the river from the Barn Bay track.

Hunting is keenly pursued in the Cascade Valley. Populations of red deer are resident on the south side of the Cascade River, from the toe of the hill, and in small pockets on the north side of the river mouth.

The track to Barn Bay attracts four-wheel-drive enthusiasts from outside the district. While the track is now eroded in places, it allows for some challenging 4WD opportunities for groups, who manage to leave the track in varying states of disrepair.

Tramping is another activity practised in the Valley. The three-day 'Cascade to Big Bay' backcountry route travels along the 4WD track to Barn Bay and then down the coast through Gorge River and on to Big Bay. Other routes from here include a 4-5 day tramp to the Lower Hollyford, via the Pyke Valley, or a tramp to Martins Bay (1 day) and then on to the lower Hollyford road-end (3-4 days). DOC huts are available at Gorge River and Big Bay. Access to these walks is via the lower Cascade Valley and hence crosses the pastoral lease properties. Trampers heading into the Olivine Wilderness Area can travel through the Upper Cascade Valley and therefore do not need to pass through the Upper Cascade pastoral lease.

Picnics and day trips into the Cascade are commonly undertaken activities during the summer months. The Cascade Road has many attractive pull-offs by Jackson and Martyr Creeks. A Department of Conservation interpretation panel on the Red Hills is located at a roadside

viewpoint overlooking the Valley, and picnicking opportunities are situated within the Upper Cascade pastoral lease in the vicinity of the Cascade River.

Significance of Recreation:
The Lower Cascade pastoral lease is strategically located in terms of recreational access and activities. The area is of great importance to trampers, hunters, four wheel drivers, fishermen, mountain bikers, jet boaters and whitebaiters. The draft Conservation Management Strategy describes the Cascade as *one of the last great areas of lowland wilderness in New Zealand* (section 10.7.3). Backcountry hikers, hunters, and other recreationalists intentionally seek out destinations such as this to experience its solitude and natural diversity. Recreational demand is likely to increase in years to come, as is growth in commercial hunting and fishing charters in the area.

PART 3:OTHER RELEVANT MATTERS & PLANS

3.1 Consultation

Conservation resources on Upper Cascade pastoral lease were discussed at a meeting with "umbrella" recreation and conservation groups (NGO's) in Alexandra on 19 September 2002. As the NGO representatives were all Otago based knowledge of the property was limited.

Key points raised at the meeting were in relation to this property were:

- Portion of the Barn Bay Road lying on the property must be legalized as it provides access to Barn Bay/Big Bay. (identified as important 4WD route – Central Otago 4WD Club).
- Varying opinions as to desirability of future grazing (Forest and Bird against, PANZ more accommodating, FMC cannot see how grazing can be confined to modified areas).
- Purchase of entire property should be considered by the Crown (Forest and Bird/FMC).
- Position within South Westland World Heritage Area highlighted.
- Importance in terms of red deer hunting and hunting access noted (NZDA).
- Importance of bush remnants (noted observed cattle damage).
- Extent and quality of manuka noted (Forest and Bird).
- Consensus over exclusion of wetlands, forest and Cascade River.

Additional written comments/reports have been received subsequent to this meeting from NZDA (Dunedin and Southern Lakes Branch), Upper Clutha Branch of the Royal Forest (Appendix 8) and Bird Society and Federated Mountain Clubs (Appendix 9). These reports build on comment summarised at the NGO meeting and are appended to this report.

3.2 Regional Policy Statements & Plans

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

In respect of natural values the Regional Policy Statement includes the following policies:

- Preserve the natural character of the West Coast's wetlands, lakes and rivers and their margins and protect them, and outstanding natural features and landscapes, from inappropriate subdivision, use and development.
- Recognise and provide for the protection of significant indigenous vegetation and significant habitats of indigenous fauna.

- Promote, and where necessary require land use practices which avoid, remedy or mitigate offsite adverse effects on areas of significant vegetation and significant habitats of indigenous fauna and outstanding natural features and landscapes.
- To promote and encourage the restoration, where appropriate, of degraded wetlands, and where practicable, creation of artificial wetlands.

3.3 District Plans

Westland District Plan (2002)

The property is located within the Rural zone of the Westland District Plan. The Rural Policy Unit covers all non-urban land within Westland District. Given the over-riding emphasis on conservation orientated management within the District, the Plan's approach is to support sustainability managed development opportunities that can avoid, remedy or mitigate adverse effects on the natural environment. Emphasis is placed on retaining the sustainability of natural areas. Activities may then utilise the resource provided adverse effects can be remedied or mitigated and options for future use of the resource remain open. This approach places onus on developers and landowners to derive environmentally sound practices and methods of rehabilitation so that the full potential and benefits of resources to communities can be realised.

Areas of significant indigenous vegetation and significant habitats of indigenous fauna and outstanding natural features in the District will be protected. Council will, in particular, target those indigenous vegetation types occurring in alluvial and coastal areas. The continuity of the mountains to sea landscape in Westland, particularly in the south of the District, and significant landscape elements shall be protected by ensuring development takes into account the landscape setting. The contribution of indigenous vegetation to the landscape character of the district shall be recognised and its clearance controlled. South Westland has a greater vulnerability than North Westland to even small scale change.

Resource consent is required for subdivision and subsequent development, buildings, forestry above an altitude of 1000 m, clearance of indigenous vegetation and modification of natural wetlands.

3.4 Conservation Management Strategies & Plans

West Coast Conservation Management Strategy (1999 Draft)

The West Coast Conservancy of the Department of Conservation has prepared a draft Conservation Management Strategy (CMS) which is currently being reviewed. The draft CMS must be approved by the New Zealand Conservation Authority before it becomes a statutory document.

The draft of the CMS which is currently under review identifies eleven 'Places' in the West Coast Conservancy. The Upper Cascade pastoral lease lies within the 'South West New Zealand Te Wähi Pounamu World Heritage Area' Place Unit.

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

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4.2 Illustrative Maps

Map 4.2 (a) Topo/Cadastral
Map 4.2(b) Landscape Units
Map 4.2 (c) Vegetation Mapping Units
Map 4.2 (d) Important Landscape Areas
Map 4.2 (e) Values: ecological/Recreation