PART 1

1.1 INTRODUCTION

Birchwood pastoral lease covers 23,783 ha of land in the upper Ahuriri Valley upstream of Omarama in North Otago. In addition a 620 ha piece of Unoccupied Crown Land on the valley floor of the Ahuriri River has been included in this tenure review assessment as it is continuous with and utilised by the lessee.

Birchwood occupies the headwaters of the Ahuriri, Dingle Burn and Snowy Gorge Valleys and ranges in altitude from 762 metres near the homestead to 2505 m in the headwaters of the Ahuriri Valley (Mt Huxley). Much of the property is steep mountain slopes with large areas of bare ground in screes, bluffs, and mountain tops with limited areas of valley floor grasslands in the Ahuriri Valley and Dingle Burn.

Land adjoining to the west is Dingleburn pastoral lease, to the north-west Hunter Conservation Area, to the south is Ben Avon pastoral lease and to the east is Lake Ohau Station (freehold), and the Ohau Conservation Area (including the Ohau Crown Land Management Area, Ohau Forest, Maitland Forest and Temple Forest). Within the pastoral lease boundaries are four Conservation Areas – two parts of the Ahuriri Forest, as well as Stafford Forest Conservation Area in the upper Dingleburn and a string of marginal strips associated with the Ahuriri River.

Birchwood occurs in three Ecological Districts – part of Ahuriri, part of the Huxley District at the head of the Ahuriri River, and a small part of the Wanaka District covering the head of the Dingleburn Valley. These Districts are characterised by glaciated mountain ranges and river valleys with bedrock of schist and greywacke, and alluvium in flat valley floors; a mountain climate of moderately high rainfall and a covering of bare rock, scree, valley floor grassland, montane, subalpine beech forest, scrub, alpine tussockland and high alpine zones. Only the Ahuriri District has been surveyed as part of the PNA Programme (as part of the McKenzie Region survey). Five RAPs were identified on Birchwood – Ahuriri 1 (Shamrock Hut Flats), Ahuriri 2 (Upper Maitland), Ahuriri 4 (Ahuriri River), Ahuriri 5 (Firewood Bush) and Ahuriri 6 (Birchwood Lagoon).

PART 2

INHERENT VALUES: DESCRIPTION OF CONSERVATION RESOURCES AND ASSESSMENT OF SIGNIFICANCE

2.1 Landscape

2.1.1 Landscape Context

Birchwood straddles two distinct broad landscape character types:

The first is a *Upper Waitaki/Mackenzie Range and Basin Type*. This is characterized by broad expansive mountain and basin landscapes (typical of the Mackenzie Basin),

open tussock (or other grassland), scattered shrubland and little or no forest cover. On Birchwood this type includes Snowy Gorge Creek catchment and the southern end of the Barrier Range, and the flats below it to the Snowy Gorge Creek (southern boundary).

The second landscape character type is a *Western Mountains Type*. Characteristics of this type are glaciated U-shaped mountain/valley systems close to the Southern Alps with higher rainfall, significant beech forest, scrub, shrubland and tussock. On Birchwood this includes all of the Upper Ahuriri (from Birchwood homestead north), all three tributary catchments and the Upper Dingleburn.

2.1.2 Landscape Character Description

For the purposes of this landscape assessment four topographic units have been identified. They include the (1) Ahuriri Valley; (2) the tributary catchments of Watson Stream, Hodgkinson Creek and Canyon Creek; (3) the Upper Dingleburn; and (4) Snowy Creek Gorge. In more detail these areas are:

1. Ahuriri Valley (Western Mountains Type)

The Ahuriri Valley unit extends from the southern boundary to the head of the valley (referred to as the Upper Ahuriri). It is orientated north/south and extends into the Southern Alps. The lease excludes the main areas of beech forest.

The Upper Ahuriri Valley (and tributary catchments) are classic U-shaped glaciated valley systems. They have characteristics common to the whole of the Upper Ahuriri. These include:

- Rugged ice plucked high mountain peaks, extensive bare rock and scree slopes
- Ice sculptured landforms and features common throughout e.g. hanging valleys, cirques, ice scraped valley sides and lumpy ice- sculptured landform
- Steep valley sides with extensive beech forest extending from the toe of the slope to the treeline
- Open grassland on the valley floor comprising a mix of short tussock, other native grasses and herbs, and pasture grasses with an increasing shrubland component up valley. Elsewhere is beech forest, alpine vegetation, snow tussock and sub alpine scrub.
- The intersection of forest and grassland forms a natural wavy edge which is a dominant landscape pattern within the valley
- Glacial and fluvial features are characteristic on the valley floor, and include terrace formations, fans, moraines and wetland systems.
- A braided and meandering river pattern which in some sections, toward the head of the valley, occupies the whole of the valley.

Differences are also apparent. The main ones being the width of the valley and the rainfall gradient from north to south, which results in changes to vegetation. These differences are that:

- The valley becomes narrower and more enclosed at the head of the valley with smaller pockets of grassy flats and increasing encroachment of shrubland and forest. Above the Top Flat hut, sub-alpine scrub, herbfield and scree are predominant.

- Beech forest is more extensive on the wetter western side. On the east side, below Watson Stream, beech forest is patchy and is very much reduced compared to western slopes.
- Naturalness is high throughout but there is a higher level of vegetation modification at the lower end of the valley, especially the valley floor and the lower slopes on the east side from Watson Stream south.
- Matagouri shrubland (following watercourses and on fans) are characteristic at the drier southern end associated with open grassy flats.
- Shrubland (notably bog pine, celery pine and snow totara) occur along the forest fringe increasing towards the head of the valley.
- Talus formations at the base of Mt. St Mary are a distinctive feature opposite the Birchwood homestead.

The rich assemblage and variation of vegetation types within the Upper Ahuriri (and tributaries) has a major effect on landscape character, identity and pattern. Colour contrasts are significant and include the dominant dark green beech forest contrasting with broad expanses of yellow/green snow tussock, and alpine vegetation.

On the valley floor grassland is predominantly gold/yellow and shrubland ranges from olive green to brown and grey.

With the exception of around the station facilities, cultural features and changes are few on Birchwood. North of the homestead are hay paddocks, fences, yards, scattered willow, and holding paddocks. The large adjoining wetland has been drained and developed on its western side but appears largely intact nearer the river with ponds, oxbows and flushes. Wetland vegetation has, however, been impacted on by grazing and trampling.

Further up valley, cultural features are confined to the occasional fence, the access track which is visible up to about Shamrock Hut then disappears, and the Department of Conservation huts located at the bush edge.

Away from the station facilities and holding paddocks the visible effects of vegetation modification is confined to the valley floor and lower side slopes. North of Firewood Creek natural landscape patterns (predominantly vegetation patterns) are intact, although not regenerating or expanding in some areas.

Above Watson Stream little or no modification is apparent apart from the valley floor grassland.

2. Tributary Catchments (Western Mountains Landscape Type)

The tributary catchments of Watsons Stream and Hodgkinson Creek extend east into the Barrier Range. These are all glacial U-shaped valleys with very steep precipitous slopes and narrow valleys. Tussock, alpine and subalpine scrub, rock and extensive scree are the main components. Impressive peaks and the jagged backbone of the Barrier Range are distinctive features.

Canyon Creek is separated from the main valley by a very narrow gorge and dense beech forest. It extends up into a high alpine basin (hanging valley) and cirque below the Thurneyson Glacier and Mount Barth. Ice gnarled landforms, moraine, tussock and alpine vegetation are the main features.

All the tributary catchments have a very high level of naturalness and intactness.

3. Upper Dingleburn (Western Mountains Landscape Type)

The Upper Dingleburn (included within Birchwood pastoral lease) is similar in character to the upper Ahuriri Valley (i.e. western mountains landscape type). The valley is long and narrow and beech forest is a significant component.

The eastern slopes are less steep and have more open tussock country compared to western slopes and are predominantly snow tussock, *Celmisia* and short tussock.

Scree and rocky bluffs are extensive on the western slopes. Sub alpine scrub, scree and bare rock replace tussock at the narrow head of the valley.

4. Snowy Gorge Creek (Upper Waitaki/Mackenzie Range and Basin Landscape Type)

This topographic unit refers to the southern end of Mt. St Mary, Snowy Gorge Creek and the flats to the southern boundary. In visual terms, the area is part of the wider middle section of the Ahuriri Valley and is part of the Upper Waitaki/Mackenzie Range and Basin Landscape Type i.e. open broad, mountain/valley system of open grassland and little or no forest cover.

The southern end of Mt. St Mary is a prominent and distinctive landform feature viewed from the south. Steep tussock slopes rise above lumpy, glacial landform around the base. A terrace separates alluvial flats and Snowy Gorge Creek.

The lumpy landform and flats are modified but within the wider landscape context of the southern face of Mt. St Mary appear as a homogenous and continuous entity.

Snowy Creek Gorge is a very impressive open tussock landscape. At the lower end the creek is cut down within the valley landform and a series of spurs and gully's extend up to Mt. St Mary. The main basin at the head of Snowy Creek Gorge opens out to a broad tussock basin of glacial lumpy landform and wetlands. Snow tussock and scree are dominant components. Natural character is very high.

2.1.3 Visual and Scenic Values

The visual and scenic values on Birchwood are at the top end of the spectrum in terms of scenic quality and sheer alpine splendor. Like most glacial landscapes, the physical landscape is dramatic, impressive and unquestionably of high visual quality.

Landform and vegetation, as the major components of natural character, are for the majority of the lease, intact and natural. Naturalness, intactness, coherence as attributes of visual quality are high throughout. The most modified areas are close to the station facilities, including the lower wetland.

The Ahuriri Valley floor while ecologically modified, in visual terms has a high level of integrity and coherence.

The wetlands, glacial and alluvial landform features, and expansive grasslands enclosed by high mountains, forest, alpine scrub, shrubland and tussock compares with New Zealand's best alpine landscapes in terms of visual quality. The diversity of

vegetation type, clarity of landform and formative processes contribute to high visual values.

Snowy Creek Gorge also has very high visual values derived from the combination of the underlying landforms, the continuity and uniformity of the tussock cover, and the high level of naturalness present.

The flats and southern slopes below Mt. St Mary and Snowy Gorge Creek are also important as part of the wider landscape of the Ahuriri Valley (middle section).

In addition to the whole property as a entity having high visual values, there are a number of individually very impressive features such as the Thurneyson Glacier and the Canyon Creek cirque, the razor back ridge of the Barrier Range and the Mt. St Mary southern and west face to name a few.

Unlike other properties in the Omarama area, there are no access tracks scarring the high country and disrupting landscape values.

Birchwood is not visible from any major tourist road and can only be seen by those who use the public Birchwood Road, and who use the area for recreation, or viewed from the air.

2.1.4 Evaluation and Conclusions

On the basis of the assessment, it is considered that the landscape values on Birchwood are outstanding.

The Canterbury Regional Landscape Study (Boffa Miskell and Lucas Associates) also concluded that the Ahuriri Valley was regionally outstanding and the tributary catchments regionally significant.

The scale and grandeur of the landscape of Birchwood is immense. Its greatest value is its overall naturalness and intactness as an entity. Some areas clearly have a higher level of naturalness than others. However, apart from areas close to the homestead the level of modification is minor in a landscape sense. Landform and vegetation patterns, as components of natural character are intact. In areas that are modified vegetation has the capability to regenerate and expand.

The majority of the lease area is identified as having either Highly Significant Natural Landscape Values or, Significant Natural Landscape Values. The slightly lower category i.e. Significant Natural Landscape Value reflect areas where vegetation is more modified, but where the primary components of natural character (landform and vegetation) are intact. A small area close to the homestead is identified as having landscape values that reflect a more developed culturally modified landscape.

2.2 Landforms and Geology

The basement rocks on Birchwood are a mixture of greywacke and argillite and low grade schists. The main rocks on the higher altitude slopes of the Barrier Range, the head of the Dingleburn and the headwaters of the Ahuriri, including Canyon Creek, are greywacke and argillite while the lower altitude slopes of the Barrier Range are low grade schists. The eastern faces of the mountain range flanking the western side of the Ahuriri River up to about Hagens Hut are strongly schistose rock, while the

valley floor is mostly alluvium with fan skirts in the upper Ahuriri Valley, and large alluvial fans in the central valley. On the lower valley floor there are areas of outwash gravel, glacial till, and subdued morainic topography.

Landforms are dominated by steep mountain slopes and comparatively wide valley floors. Much of the lease is high, rugged, mountain country with Mt. Huxley (2695 m), at the head of the Ahuriri valley being the highest point. Another large mountain is Mt. Barth (2456 m), which lies at the head of Canyon Creek and has Thurneyson Glacier on its southern flank. Watson Creek, Hodgkinson Creek, Snowy Gorge Creek and Canyon Creek are all substantial tributary streams with relatively large catchments, the former three draining the Barrier Range along the eastern boundary, true left of the Ahuriri River and the latter draining from Mt. Barth on the west side or true right. Wide, grassy river flats extend almost to the head of the Ahuriri with smaller flats in the Dingle Burn. Most side streams have formed fans that flow out onto the main river terraces, many of them still quite active. On the often steep valley sides, truncated spurs show the effects of past glaciation, although erosion and valley fans have largely hidden the former classic U-shape of the valley.

2.3 Climate

The climate in the Ahuriri Valley is strongly influenced by the proximity to the Southern Alps and is characterised by a steep rainfall gradient related to distance from the main divide, prevailing north-west rain-bearing winds and altitude. Precipitation increases from 2800 mm at the south end of the valley near the homestead to an excess of 6400mm on the Barrier Range near Mt Huxley in the head of the Ahuriri Valley. Above about 1300m there is usually a heavy winter snow cover with some permanent snow and ice in the north-western end of the property. Most winters are cold with generally cool summers at higher altitudes, and warmer temperatures away from the main divide and at lower altitudes.

2.4 Vegetation

2.4.1 Introduction

The majority of this lease is still very much in its natural state. This includes most of the high country and some of the valley floors. Pastoral activity, including burning, over-sowing and top dressing as well as grazing and drainage has really only had an affect in the lower valley. Here the natural forest has been removed from the valley sides except for remnants left in the incised side streams and occasional patches remaining on rocky spurs where fire has failed to reach. On the eastern side of the valley, extensive areas of shrubland have replaced the former forest . Shrubland has colonised most fans and extends up stony gullies and along shingly stream-sides where recent clearing has not taken place. Much of the valley floor has been modified by fire and grazing and some parts have been developed for pasture. In places, developed areas extend well up slope, particularly on the sunny faces (western side of the valley).

North of Firewood Bush on the western side and Watson Creek on the eastern side of the Ahuriri, the natural bushline forms an almost continuous band of beech forest to near the head of the valley. This forest is all protected as Conservation Land. There is a small area of land in the head of the Dingle Burn also legally protected as Conservation land. No Conservation Area is fenced apart from a few small areas protecting bog pine on the Ahuriri valley floor. The Stafford Forest Conservation Area in the Dingle Burn is complicated by having straight-line boundaries which bear no

relationship to topography or vegetation. Parts of the true left (eastern) slopes of the Dingle Burn have had the forest and shrublands removed completely or been depressed by fire.

Near the heads of valleys where cold air drainage inhibits the growth of forest, subalpine shrubland covers the valley sides with snow tussock grassland above. The upper slopes are a mosaic of natural grasslands, scree slopes, boulder fields, bluffs, snowbanks and herbfields, all with their specialised plant communities. The highest altitude areas are bare rock, snow and ice with few plants. It appears that grazing has been light in much of the country at the head of the Ahuriri and parts of the upper Dingle Burn with the natural plant communities intact and little evidence of human impact. The forces of nature are much in evidence in the form of intense frost action, the effects of water run off and of avalanche.

2.4.2 The Plant Communities

Forest

Extensive areas of indigenous beech forest clothe the valley sides of the Ahuriri, Canyon Creek, upper Dingle Burn and lower Watson Creek. Most of this forest occurs in Conservation Area. It extends upwards to about 1150 m and to over 1200 m on favourable ridge and face sites but lower where cold air drainage prevents seedling establishment, such as at valley heads. In places large screes and avalanche chutes push through to the valley floor. Existing forest remnants show that this forest at one time formed a more or less continuous band on both sides of the valley, at least as far down as the Avon Burn junction (on the Ben Avon – Longslip Station boundary). In the Dingle Burn, forest was continuous from Lake Hawea to the valley head. Fire has removed the forest from the lower Ahuriri valley, particularly from the eastern side of the valley and from the eastern tributaries below and including Watson Stream. Small pockets of forest remain in sheltered gullies and along incised streams. Fire has removed forest from the Dingle Burn and depressed the tree line on the upper true left (eastern) side. Burnt logs lie in the grassland. The west trending fork in the Dingle Burn, Canyon Creek, the western side (true right) of the Ahuriri above Ahuriri Base hut and eastern side above Watson Stream have largely natural tree lines.

The forest is primarily mountain beech (*Nothofagus solandri* var. *cliffortioides*) with an open understorey except in damp gullies. Silver beech (*Nothofagus menziesii*) occurs occasionally at the bush line and is dominant in the upper Ahuriri from near Hagens hut, with mountain beech still prominent in places. Regeneration is good with numerous seedlings and young plants in light gaps and around the forest edges except in areas where stock shelter. These places are completely devoid of other plants. Young plants along the lower forest edges tend to be trimmed by stock and trampled but in other places, where stock pressure is less, a band of young beech can be seen around the forest edge. In the Dingle Burn and Canyon Creek, at least, the scarlet mistletoe (*Peraxilla tetrapetala*), is common around forest edges and on mid-slope sites. Cattle tracks are all through the Conservation Area and the under storey is much depleted to non-existent in contrast to the areas up slope where regeneration of beech is well developed.

Shrublands

Natural shrublands occur above the bush line where there has been no recent history of fire; on bluffs to lower levels; on alpine and sub alpine rocky faces and sites disturbed

by natural processes such as avalanche; scree and the shingle fans at the mouth of streams and gullies. Induced shrublands occur where fire has removed the forest or natural shrublands. They are generally not as diverse as the natural shrublands.

The natural subalpine shrublands at the head of the Ahuriri, Dingle Burn, Canyon Creek, above the bush line in places and on wet bluff and rock faces, are very diverse. Mountain toa toa (*Phyllocladus alpinus*) is often dominant. It is also found along the lower edge of the beech forest in the upper valley where it is associated with bog or mountain pine (*Halocarpus bidwillii*). Other shrubs in this community include *Dracophyllum longifolium, Brachyglottis cassinioides, B. rotundifolia, Podocarpus nivalis, Hebe subalpina,* Cassinia *(Ozothamnus vauvilliersii),* mountain wineberry *(Aristotelia fruticosa), Gaultheria crassa, Coprosma* sp. (t) (of Eagle 1986), *Coprosma serrulata* (wet bluffs), *Olearia cymbifolia, O. nummulariifolia, Pittosporum anomalum,* mountain ribbonwood *(Hoheria lyallii),* with the ferns *Polystichum vestitum* and *Histiopteris incisa* (figs 61,62). The robust speargrass *Aciphylla* sp."lomond" can be an important component and mountain flax (*Phormium cookianum*) and the large tussock, *Chionochloa conspicua* are common on damp sites. Matagouri (*Discaria toumatou*) is occasionally present, usually associated with the fresh gravels of river and stream edges, but it is much more common at lower altitudes and in induced shrublands.

Where these shrubs descend to the valley floor they are often trimmed by stock browsing. This was obvious on snow totara (*Podocarpus nivalis*) at the head of include such species as *Coprosma propinqua, C. ciliata, C. rugosa, Gaultheria antipoda, Hebe buchananii,* tutu *(Coriaria sarmentosa), Dracophyllum uniflorum, Pimelea traversii, Melicytus alpinus* and *Helichrysum intermedium.* Shrubs found scattered mainly through the tussock grasslands include *Coprosma cheesemanii* and *Leucopogon colensoi.* In the Dingle Burn, the rare and threatened small tree, *Pittosporum patulum* was seen in stable mountain toa toa shrubland at the top edge of the beech forest. Its survival in this area appears quite precarious. *Pittosporum patulum* has also been recorded in Hodgkinson Creek and recently in Canyon Creek. On upper rocky slopes, especially on cold, shaded faces, *Dracophyllum uniflorum* can form pure shrublands, often in association with *D. pronum. Dracophyllum pronum* covers large areas of the often rocky ridge tops in association with cushion vegetation.

Shrublands of the valley floor, colluvial slopes and valley fans are dominated by matagouri. Matagouri forms a fringe around the lower scree slopes and follows along the fresh gravel brought down by small streams, out on the river flats. Matagouri is the dominant shrub of the induced shrublands and grasslands of the lower slopes where the forest has been removed although in some places snow totara may be the main shrub species present, particularly on the more stable screes and rocky slopes. Other shrubs in this association are mountain wineberry (*Aristotelia fruticosa*), *Melicytus* sp., *Hebe rakaiensis, Coprosma ciliata, C. propinqua, Pittosporum anomalum* and *Olearia cymbifolia.* Where the ground is more moist, *Olearia bullata* and *Coprosma* sp. (t) can be found. Speargrass, either *Aciphylla aurea* (dry) or *A.* sp. "lomond" (moist) and the lianes, *Clematis marata* and *Muehlenbeckia complexa* are often present

Grasslands

A mosaic of short tussock and exotic grasslands cover the valley floors, fans and lower colluvial slopes in the Ahuriri, lower Snowy Gorge Creek, lower Watson Creek and flats and colluvial slopes below Top Hut in the Dingle Burn, where the forest has been

removed. Below the Watson Stream junction in the Ahuriri, this community varies considerably from largely adventive grasses, brown top (*Agrostis capillaris*) and sweet vernal (*Anthoxanthum odoratum*) with no hard tussock (*Festuca novae-zelandiae*); to scattered hard tussock and adventive grasses; to considerable areas of hard tussock dominated grassland, with blue tussock (*Poa colensoi*) and few adventive grasses or just patches of adventive grasses. Mouse-ear hawkweed *(Hieracium pilosella*) is common, particularly along tracks and bared ground. In all these grasslands the underlying or inter-tussock plants are primarily indigenous and includes the grasses *Rytidosperma pumilum* and *Deyeuxia avenoides,* as well as *Raoulia subsericea, Leucopogon fraseri, Luzula rufa, Pimelea oreophilla, Helichrysum filicaule, Celmisia gracilenta, Viola cunninghamii, Anisotome flexuosus, Ranunculus multiscapus, Coprosma petriei, Carex breviculmis, Geranium sessiliflorum* and harebell *(Wahlenbergia albomarginata)*, all common plants and all components of tall tussock grasslands.

Lichens and mosses are always present and often an important component, especially where the grass cover is open or where there is much bare ground. Shingle areas on the river bed or stream flood plains have species such as willow-herbs (*Epilobium melanocaulon, E. microphyllum),* the mat daisies *Raoulia tenuicaulis,* and *R. hookeri,* the bidibid *Acaena inermis, Parahebe decora, Gaultheria nubicola, Rytidosperma gracile* and *Muehlenbeckia axillaris*). On some of the colluvial slopes such as those in the Dingle Burn and lower Snowy Gorge Creek, narrow-leaved snow tussock descends almost to the valley floor at about 850 m, generally as scattered plants in the induced grassland.

Above the Watson Stream junction in the Ahuriri River valley and in the Dingle Burn the mountain form of hard tussock (*Festuca mathewsii*) is generally dominant although on some fans, blue tussock can be the dominant cover. The inter- tussock species are similar to those already mentioned. Adventive grasses are frequently present and occasionally dominant or co-dominant. Mouse-ear hawkweed is found on open shingle areas and fans and king devil (*Hieracium praealtum*) is occasionally present. The native grasses *Deyeuxia avenoides* and *Elymus solandri* are often present. In damp areas, a turf community can be found with species such as *Coprosma atropurpurea, Hydrocotyle montana, Ranunculus foliosus, Leptinella mediana, Gonnocarpus micranthus, Blechnum penna marina* and *Oreomyrrhis* sp. Various shrubs are scattered through the grasslands, particularly on stony valley fans. They include *Dracophyllum uniflorum, Leucopogon colensoi, Gaultheria crassa, Coprosma cheesemanii*, snow totara, mountain toa toa, matagouri and a few bog pine.

Silver tussock (*Poa cita*) occurs in places, usually along stream edges on fresh alluvial material. There is a good patch on the river flats near Canyon Creek.

Tall tussock grasslands

Tall tussock grassland forms the primary cover above the natural bush line and extending down slope in places such as areas where the bush line has been depressed. As a general rule the tussock is more dense and taller on the cooler east and south faces than on warmer north and west faces where it tends to be more open. In damp, sheltered gullies it can attain up to 100% cover with a thick litter layer and few other species present. Up to about 1500 m narrow-leaved snow tussock (*Chionochloa rigida*) provides the main cover with hard tussock, blue tussock and a number of the common small herbs, grasses and shrubs such as *Gaultheria novae-zelandiae, Kellaria dieffenbachii* and *Pimelea oreophila* as inter-tussock species. Scattered taller shrubs of

Dracophyllum longifolium, D. uniflorum, Ozothamnus vauvillersii, Leucopogon suaveolens and *Olearia cymbifolia* also occur throughout, especially at lower levels and where past fires have removed the forest or shrubland. The remains of burnt tussocks and tussock bases are sometimes visible. *Aciphylla* sp. "lomond" can be important on bouldery slopes, amongst the tussock and *Celmisia lyallii* also, particularly on areas degraded by fire and heavy grazing such as along main stock routes and around sheep camps.

At higher altitude and nearer the head of the valleys, where the climate is wetter, or on high altitude damp slopes, patches of curly tussock *(Chionochloa crassiuscula*) occur. In a few places such as at the head of Canyon Creek at 1280 m, mid-ribbed snow tussock (*Chionochloa pallens*) is found. This is a plant of the wetter mountains along the main divide. Other plants here and on similar areas in the pastoral lease include Hebe hectorii, Coprosma sp. (a) (of Eagle 1986), *Celmisia walkerii, Brachyglottis haastii, Celmisia verbascifolia, C. semicordata, C. lyallii, Anisotome haastii,* and *Aciphylla montana.*

Above about 1500 m and sometimes lower on cold sites (or higher on warm, sheltered sites), slim-leaved snow tussock (*Chionochloa macra*) becomes the dominant species. It is much more palatable to stock than narrow-leaved snow tussock and where stock camp, on high ridges and in high sheltered basins, the *Chionochloa macra* cover is usually reduced or, in places, has been completely depleted.

On many of the exposed ridge tops *Dracophyllum pronum* with *Chionochloa macra* is dominant with cushion plants and mosses where the cover is more open and with herbfields and snowbanks on lee slopes where snow accumulates.

Snowbanks

Snow banks occur below the ridge tops mainly on east and south faces where snow accumulates and lies for lengthy periods. As well as some of the ubiquitous plants which are found in a range of plant communities, snowbanks shelter plants that are not common in other communities such as *Carex pyrenaica* var. *cephalotes, Ourisia glandulosa, Coprosma perpusilla, Luzula pumila* and *Celmisia sessiliflora. Celmisia viscosa* is common along the edges of these areas and the snow patch tussock, *Chionochloa oreophila,* is likely to be present, but because of the limits of the inspection was not seen.

Cushionfields

Cushion vegetation is found on exposed ridges and summit areas which experience the extremes of wind and temperature and snow seldom lies for long. Plants found here include the moss (*Racomitrium pruinosum), Dracophyllum pronum, Phyllachne colensoi, Raoulia hectorii, Luzula pumila, Poa colensoi, Chionohebe densiflor*a and scattered slim-leaved snow tussock.

Cliff and bluff vegetation

Bluff vegetation tends to be a mixture of several other communities and will occasionally contain rare plants which can escape browsing animals here. Many of the shrubs already mentioned are found on these sites but other plants here include *Parahebe lyallii, Ourisia caespitosa, Celmisia discolor, Dolichoglottis lyallii, Ranunculus lyallii, Anisotome haastii, Geum parviflorum, Chionochloa conspicua,*

Phormium cookianum, Polystichum cystostegia and *Blechnum montanum.*

Wetlands

Wetlands occur on the river valleys, as seepages and flush zones at higher altitudes, and as stream bank vegetation throughout. There are numerous wetlands in the Ahuriri valley below the Watson Creek junction. They are in the form of old drainage channels, river cut-offs and oxbows. All are grazed with cattle pug marks throughout, and are in various stages of degradation. The largest are marked on topo maps as being just north of Canyon Creek and around the homestead, sometimes referred to as Birchwood Lagoon.

Indigenous and adventive species are generally inter-mixed in these wetlands. Native species present include *Carex coriacea, Carex kaloides, C. echinata, C. gaudichaudiana, C. sinclairii, C diandra, Schoenus pauciflorus, Isolepis aucklandica, Gonocarpus micranthus, Pratia angulata, Bulbinella angustifolia, Gnaphalium laterale, Ranunculus cheesemanii, R. brevis, Gentiana patula, Hydrocotyle sulcata and many other species including several mosses. Elaeocharis acuta, Limosella lineata, Myriophyllum pedunculatum* and *M. votchii* grow where the ground is periodically inundated with water. Adventive species include *Juncus articulatus, J. bufonius, J. conglomeratus,* Yorkshire fog (*Holcus lanatus),* white clover *(Trifolium repens)*, brown top and sweet vernal.

Similar species are found in alpine bogs and flush zones visible on many slopes with *Schoenus pauciflorus* dominant in the later. The greater proximity to water along streams encourages a more diverse range of plants than is found in adjacent tussock lands. *Lagenifera barkeri, Ranunculus glabrifolius, Epilobium macropus, Carex petriei* and *Gunnera monoica* are plants found in these situations in the Ahuriri as well as many of those already mentioned.

2.4.3 Discussion

Virtually the whole of the Birchwood Pastoral Lease is in a natural or near natural condition with significant inherent values. There is a large range of natural plant communities on differing aspects and excellent intact altitudinal sequences both in the Ahuriri and its tributaries and in the Dingle Burn. Because of the length of the Ahuriri valley occupied by the lease (nearly 30 km), there is a significant rainfall gradient, with the lower valley around the homestead, much drier than the head of the valley.

The grazed down slim-leaved snow tussock in places above about 1450 m and its almost complete disappearance in a few areas indicates that grazing is unsustainable, in the higher country if the natural plant cover is to be maintained. Removal of grazing and of periodic burning would allow these areas and the former beech forest areas, to recover to something like their natural state in time. Exotic species are present in most low altitude grasslands and on the valley floor but are only dominant in relatively small areas and on developed land. At higher altitudes, they are either not present or only a minor component of the tussock grasslands. Heavily grazed or burned and grazed areas tend to have a higher component of exotic species but even on these sites, especially where they are above about 1100 m, the impact on the native plant communities is only minor. Sheep camps on the upper parts of fans near the head of the Ahuriri show modification of the grassland and several native species which would normally occupy such sites and the adjacent shrublands, are missing but are found on nearby bluffs, out of reach of stock.

For the purpose of evaluating it's conservation values the property can be divided into five areas.

A. Upper Ahuriri Valley from Firewood bush west to the ridge above the Dingle Burn, then follow the divide northwards to Mt. Huxley, south down the lease boundary to take in the Watson stream catchment, west across the Ahuriri valley upstream of the Watson Stream junction and south along the bush edge to Firewood Bush.

B. The Dingle Burn Catchment embracing the whole of the head of the Dingle Burn along the lease boundary and the ridge separating it from the Ahuriri.

C. Birchwood Faces being the small area of the Ahuriri faces between the Dingle Burn and Ahuriri valley flats and north to Firewood Bush.

D. Ahuriri Valley Flats – all the valley river terraces and some valley fans and lower slopes from the southern boundary north to about a kilometre beyond the Watson Stream junction.

E. Barrier Range – The Barrier Range from the Snowy Gorge Creek north to area A (southern edge of Watson Stream catchment) then south along the foot of the steep slopes above the Ahuriri river flats.

Area A - Upper Ahuriri Valley

This area includes the Ahuriri Conservation Area (beech forests) already legally protected but not physically protected (stock grazing the forest edges and edge interior) and the upper valley grasslands and shrublands. This block includes a very large area of high mountain country with much rock and scree and permanent snow fields. Much of it is glacially steepened country with numerous bluffs and unsuitable for grazing. No doubt partly because of this, it is still largely in its natural state. Most of it is only lightly grazed or not grazed at all. There is a diverse range of plant communities including, valley floor grasslands and shrublands, mountain, silver and mixed beech forest, subalpine shrubland, tall tussock grasslands, herbfields, cushion plant communities, wetlands, snowbanks, boulderfields, scree and fellfield with a representative range of plant species. Intact altitudinal sequences from valley floor at 800 m to the alpine tops at over 2000 m (Mt. Huxley 2505 m) are included on a variety of aspects.

The majority of this block has excellent naturalness particularly above the valley floors with few adventive species. Although adventive species are a component of the valley grasslands in the Ahuriri and Watson Stream, they are generally only a minor part of the community. Some degradation of tall tussock grasslands in the area above Ahuriri Base hut and in the vicinity of the zig zag track to the Dingle Burn has occurred from grazing and probably also from fire, but this area also has a high degree of diversity with shrublands, wetlands, boulderfields, small screes and regenerating beech forest providing an interesting and diverse flora. The forest edge here shows the affect of past fires and there is a forest gap between here and Firewood Bush. Fire has depressed the beech forest in Watson Stream also and shrubland has replaced it on the shaded south-east faces (true right). The rest of Watson Stream is primarily natural. Canyon Creek is isolated by a gorge in its lower part and by beech forest and is almost completely natural.

Area B - Dingle Burn Catchment

This covers the Dingle Burn catchment down to the boundary of the lease and includes the Conservation Area which is legally protected but not physically. This block also has high natural values and the majority of it has little modification. There is a good diversity of plant communities on varying aspects and altitudinal sequences similar to area A above. Parts of the lower valley forest have been removed and the tree line depressed in places by fire. The beech forest on the true left bank has numerous cattle tracks through it and there is some degradation of the valley floor grasslands although native species dominate with very good *Festuca mathewsii* grassland in places. Similarly some of the lower colluvial slopes on the true left of the valley and down stream from Top Dingle hut, where the forest has been removed, are degraded with adventive grasses present, but native species dominate. A variety of native shrubs are scattered through this area with mountain toa toa prominent along the upper forest edge where the rare and threatened plant *Pittosporum patulum* is found. Some degradation has occurred along the ridge top and upper snow tussock slopes where the zig zag track crosses the ridge.

Area C - Birchwood Faces

This is a relatively small area of mountainside above and upstream of Birchwood homestead but south of Firewood Bush. There are extensive scree slopes in the upper part with good snow tussock grasslands. Remnant beech forest fills the bottom of the main streams draining these slopes and several eroding gullies on the front faces producing large, still active fans. Some of the front faces and fans have been oversown and top dressed, and shrubland cleared. The presence of adventive species, on the front faces in particular, reduce at higher altitudes and with distance from the river.

Area D - Lower Ahuriri Valley

In this area the adventive component of the grasslands and wetlands is higher than on other parts of the lease. Some areas have been cultivated and some oversown and top dressed. In places the native component is dominant and some of the wetlands have a diversity of species but these are interspersed amongst communities which are less natural or have been developed. Also in this area are patches of shrubland and snow tussock scattered across the slopes above lower Snowy Gorge Creek.

Area E - Barrier Range

This is a large block of high, steep and rugged mountain land drained by Hodgkinson Creek, Snowy Gorge Creek and numerous smaller creeks. Most of the upper slopes are rock and scree with scree slides extending right to the valley floors in many places. The upper snow tussock slopes are in good condition with extensive shrublands on some lower, rocky slopes such as seen in Hodgkinson Creek. The rare and threatened plant *Pittosporum patulum* has been recorded from this creek also. The beech forest has been removed from the steep front faces above the Ahuriri except for several remnant patches. The forest has been replaced by good, diverse shrubland in places. Adventive grasses form a part of the hard tussock grasslands of the lower slopes above the Ahuriri and the Snowy Gorge Creek but native species are dominant.

2.5 Fauna

2.5.1 Birds

A total of 52 species of birds have been recorded from Birchwood Station during the last 12 years comprising 36 endemic species, 9 native and 16 introduced (see appendix for a list of all the species). Most of these are found either in the riverbed, wetlands, or beech forest and scrub.

The Ahuriri Riverbed and associated wetlands are extremely valuable habitat for wildlife because of the low level of invasion by exotic species such as willow and lupin, and the variety and number of habitats they provide for birds feeding and breeding. The wetland and river bird species found on Birchwood, the majority of which are known to breed in this area include black stilt (category A threatened species), black-fronted tern (category B), Wrybill (category B), banded dotterel (category C), pied stilt, South Island Oystercatcher, marsh crake, New Zealand scaup, black-backed gull, black billed gull, black shag and little shag.

The beech remnants on Birchwood are regionally important as a habitat for bush dwelling species. Because of the remnant nature of the habitat, species diversity is less than larger patches such as that protected in the Ahuriri State Forest, but the following species can be found - rifleman, grey warbler, New Zealand falcon, fantail, brown creeper, bellbird, pigeon, South Island tomtit, Long-tailed cuckoo. The forest is also important habitat for yellow-crowned parakeet, kea and falcon which are threatened species.

Around the bare tops, and above the forest in subalpine scrub and herbfields are a wide range of specialised insect fauna and important habitat for rare bird species including kea and rock wren.

2.5.2 Fish

Detailed information on the fish, freshwater invertebrates and aquatic macrophyte communities within Birchwood lease are limited. Information available suggests that the fish and invertebrate communities are fairly typical of equivalent New Zealand systems with high quality water, although the extensive dams on the Waitaki System prevent recruitment of those fish species with sea going larvae. Native fish recorded in the lease area include alpine galaxias *(Galaxias paucipondylus)*, koaro *(Galaxias brevipinnis)*, common river galaxias, *(Galaxias vulgaris)*, upland bully *(Gobiomorphus breviceps)* and brown trout. Other species possibly present include common bully (*Gobiomorphus cotidianus)*, longfinned eel (*Anguilla dieffenbachii*), longjawed galaxias (*Galaxias prognathous*) and rainbow trout *Oncorhyncus mykiss*. None of the native fish recorded are rare or endangered; the trout species support a nationally important scenic recreational fishery.

During recent survey work by DoC staff – four species of endemic and one introduced species of fish were recorded in the rivers, streams and wetlands of this property. These were alpine galaxias *(Galaxias paucipondylus)*, koaro *(Galaxias brevipinnis)*, common galaxiad, *(Galaxias vulgaris)*, upland bully *(Gobiomorphus breviceps)* and the introduced brown and rainbow trout.

2.5.3 Reptiles

Three species of skink and two geckos have been recorded on Birchwood – the spotted skink *(Oligosoma lineoocellatum)* on screes and boulderfields, McCanns skink *(Oligosoma maocanni),* and common skink on rocky areas and grasslands; the common gecko on rocky areas throughout and the jewelled gecko on lower altitude bush and scrub. On Birchwood, the jewelled gecko is at its south-western limit of its range in Canterbury.

2.5.4 Invertebrates

Other animals recorded during fauna surveys were a number of freshwater molluscs including freshwater mussels, finger-nail clam, as well as freshwater snails and common snails found mainly in the Birchwood wetlands (although the common snail also occurs in other freshwater habitats). Low altitude wetlands also provide habitat for dragonflies and damselflies.

Other invertebrate species found on Birchwood include eight species of butterflies, seven endemic and one introduced species and grasshoppers – three species of short horned grasshoppers and one species of long-horned grasshopper were collected. A complete list of invertebrate species found in recent surveys appears in the appendix

2.6 Historic

The European history of Birchwood is documented in Robert Pinney's book "The History of North Otago Runs". That publication records that as a separate entity, the lease of the property was first sold to Archibald Macphail and Colin Brodie Jamieson in 1873. Macphail is believed to have left the property in 1878. By 1888 the property had become over-run with rabbits and by 1891 Jamieson was financially ruined and in such bad health he was forced to sell his interest in the property.

The next runholder was Edmund Hodgkinson, who assumed control in September 1892 but he proved to be incapable of beating the rabbits. When the lease term expired, the Station was offered for auction in 1896 but there was no bid so Hodgkinson was granted a five year lease from March 1897. Birchwood was offered for auction again in February 1901 before the end of the lease " because Hodgkinson was considered to have failed in the superhuman task of controlling the rabbits". In the event, when no new tenant came forward, Hodgkinson was granted a new lease for fourteen years. He subsequently transferred his interest to Tertius Martin Munro in 1904 who, in 1905, sold the lease to David Armstrong.

At the end of World War I the lease was sold to Florence May Moody, the wife of John Moody who was a Timaru wool merchant. The property was sold again in 1929 to Hugh Lowry who farmed Birchwood in partnership with Donald Grant. After Lowry's death, Grant continued to run Birchwood for the widow, until in 1940 it was formally transferred to him.

In 1942, Grant entrusted management to Edgar McPherson Williamson, with a share and the right to purchase. Prior to Grant's death in 1950, Williamson applied to buy the Station and formal transfer was completed by the executors of Grant's estate.

The present Crown pastoral lease under the Land Act 1948 was issued to Mr Williamson in 1951. Subsequently, in the early 1960's a family company was formed

by the Williamsons to run the property, and in 1964 the lease was formally transferred to Birchwood Run Limited.

The only known historic "site" on the property is the spade-line boundary which is faintly visible on the lower hillslopes approximately 1 km north of the homestead. The "spade-line" was dug in the early 1860's to mark the a straight line boundary between Canterbury and Otago. The line runs for about 25 kms from Lake Ohau over the Ohau Range towards Mt Aspiring and disregards terrain features. The spade line was dug across flats and mountain slopes, and in places a fence was also erected. Visible sections of the spade line, which is important in Provincial Government history, are rare.

2.7 Public Recreation

2.7.1 Physical characteristics

Much of Birchwood is steep mountainlands, with little apparent human modification. Most of the property is accessible only by foot, except for the Ahuriri that has a 4 wheel drive route along most of its length. Other than the Ahuriri Valley there is only one other mapped access route that crosses into the head of the Dingleburn from the Ahuriri. There is also an access track, marked with permalat, into Canyon Creek but this is neither mapped nor sign-posted. There are 5 DOC administered huts within the broader confines of the property boundary, either very close to, or are on, DOC land.

2.7.2 Legal access

Legal access is restricted principally to the main Ahuriri Valley with a legal road following the formed road from the southern property boundary to about 2 km before the Ahuriri Base Hut. The legal road splits into two at this point, one fork leads to Firewood Bush and State Forest, while the other heads north crossing and re-crossing the river up to the head of the valley, but not following any formed path. However, from very near where the legal road forks a Crown land strip follows the formed 4 wheel drive track until just north of Shamrock Hut – where the track meets the Ahuriri River, so legal access is available through most of the valley on formed tracks and to DOC land at Firewood Bush (not formed), Canyon Creek and on the true left of the river above Watson Creek. There is, however, no legal access to Conservation Area in the Dingleburn or to upper Snowy Gorge Creek (Ohau Conservation Area).

2.7.3 Activities

Because of its location, Birchwood pastoral lease has some of the best recreation opportunities in the Upper Waitaki Basin. The mountains, valleys and rivers provide a range of challenges for those who enjoy tramping, hunting, fishing and climbing.

Within the Ahuriri Valley is a network of mountain huts open to the public. They vary from 6 bunks at Base Hut, to the 2 bunk 'bivis' at Shamrock, Hagens and Top Hut at the head of the valley. There are also alternative shelters such as the 'bivi' rock in the head of Canyon Creek.

Alpine passes give tramping access to many adjoining valley systems such as the Dingleburn, Huxley, Maitland and South Temple. For climbers, Mt Barth and the steep south face of Mt Huxley provide plenty of challenging routes.

Thar, chamois and deer are scattered throughout the area and hunting is a popular recreation activity on this property. Fishing is already a popular activity in the upper Dingleburn Valley and also in the Ahuriri River.

A number of fine walks, suitable for all grades of experience and fitness can be found in the Ahuriri Valley. With its impressive gorge or canyon, the Canyon Creek track is one of the most popular and spectacular. The lookout site is fantastic.

The Dingle Saddle track, which gives access to the Dingleburn and Hunter Valleys also, provides great views of the Ahuriri Valley, its 'braided' river system and its mountain backdrop.

With the spectacular mountain scenery, a number of passive recreation opportunities also exist for artists/painters, photographers, amateur botanists and for those who just wish to picnic or laze around in a mountain environment.

PART 3

OTHER RELEVANT MATTERS

3.1 Consultation

Two meetings were held with representatives from Federated Mountain Clubs, Forest and Bird, NZ Deerstalkers Association, local tramping clubs and Fish and Game on 17 and 18 August 1999 to discuss a number of pastoral leases under tenure review including Birchwood. There were a number of issues raised on Birchwood and a number of recommendations.

The main issues could be grouped into an emphasis on Birchwood being a very important area for recreation, and the outstanding landscape and natural qualities of the property (words like stunning, superb, outstanding, gem). The Ahuriri River was recognised as a very important fishery with a beautiful alpine backdrop. Access was emphasised as being very important for tramping and fishing, particularly to the river, to the head of the valley, the Dingleburn, Canyon Creek, Watson Creek and Snowy Gorge. Other issues that were raised were the inappropriateness of grazing wetland areas and the importance of protecting these wetlands and their habitat for wildlife. Another recommendation that can across quite strongly in both meetings was for a whole property purchase – coming from all interests.

3.2 District Plans

Birchwood lies mainly in the Waitaki District, except for the Dingleburn catchment which lies in the Queenstown Lakes District. The Waitaki proposed plan was publicly notified in December 1996. Under this plan Birchwood is zoned RS (rural scenic). The Rural Scenic Zone contains areas of the District which have significant scenic values generally being the high country, rangelands and inland basin areas.

There are no significant sites identified on Birchwood by the Council in the plan (and very few anywhere else in the Waitaki District) i.e. none of the RAPs identified in PNA surveys or SSWI's in Wildlife Surveys have been recognised.

There are controls on buildings, earthworks, indigenous vegetation clearance and forestry – but only on areas within 20m of a lake, river or wetland, or above 900m. There are also controls on earthworks (including tracking) on slopes greater than 20° and controls on clearance of indigenous bush.

The Council has recently issued interim decisions, which have no legal status, but indicate what the final decisions are likely to say – and which are to be notified in September/October of this year. These decisions have sought the deletion of controls on activities on land over 900m, clearance of indigenous bush and earthworks. Some controls on earthworks are likely but are looser than shown above.

The final decisions on the Queenstown Lakes District District Plan have been notified. References to the Environment Court are currently in mediation to identify significant sites and include general indigenous vegetation clearance rules (which the Plan has none of). The only controls on forestry are on planting of *Pinus contorta*, Scotts pine, Douglas fir, European Larch and Corsican pine (discretionary activities). There are some controls on earthworks over 2m vertical height, 1000m^3, and 2500m^2, (limited discretionary activity)

3.4 Conservation Management Strategies

The catchment of the Ahuriri River of Birchwood occurs in the Waitaki Unit of the Canterbury CMS. The key priorities relevant to significant inherent values are: to negotiate with landholders to protect significant areas of native vegetation/wildlife habitat, seek formal habitat protection for wading birds generally, and to seek the gazettal of key areas of Crown riverbed with high wildlife value as conservation areas or reserves. Additional requirements under other sections of the CMS such as recreation opportunities include - negotiate for enhanced public access as part of tenure review, identify areas suitable and unsuitable for off-road vehicle use in conjunction with 4 W D groups and district councils, manage mountain-biking by identifying suitable tracks and areas, and identify areas suitable or unsuitable for horse travel.

The Dingleburn Valley is within the Otago Conservancy. It falls within the Hawea-Lindis area in the special places section of the CMS. The priorities for this area are for consolidation of protected areas and protection of key habitats through tenure review negotiations, improving public access and animal and plant pest control activities.

The management issues they have listed relevant to the Dingleburn Valley (and Birchwood) are:

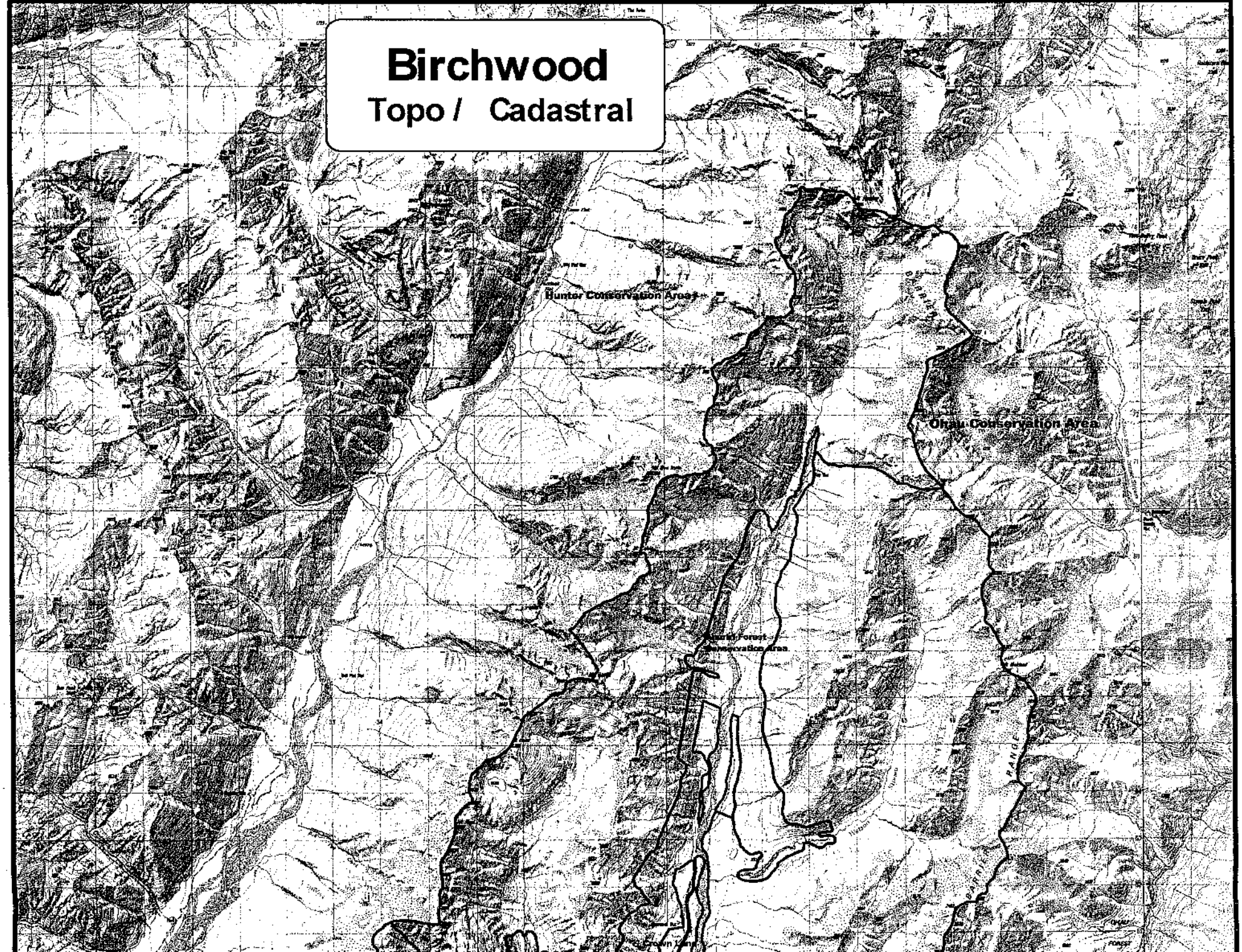
- for rationalisation of land tenure so as to connect up the rather fragmentary conservation land parcels in the Hunter and Dingleburn Valleys, and apply conservation management to other areas of natural resource importance.
- Providing for appropriate levels of aerial commercial and private access in the Hunter and Dingleburn Valleys, relative to the preferences of some user groups for aircraft free areas.
- Keeping thar at near zero density in the area, including the use of Judas thar techniques.
- The maintenance and rationalisation of the department's less frequently used recreational facilities in the Hunter and Dingleburn Valleys and on the surrounding mountains.

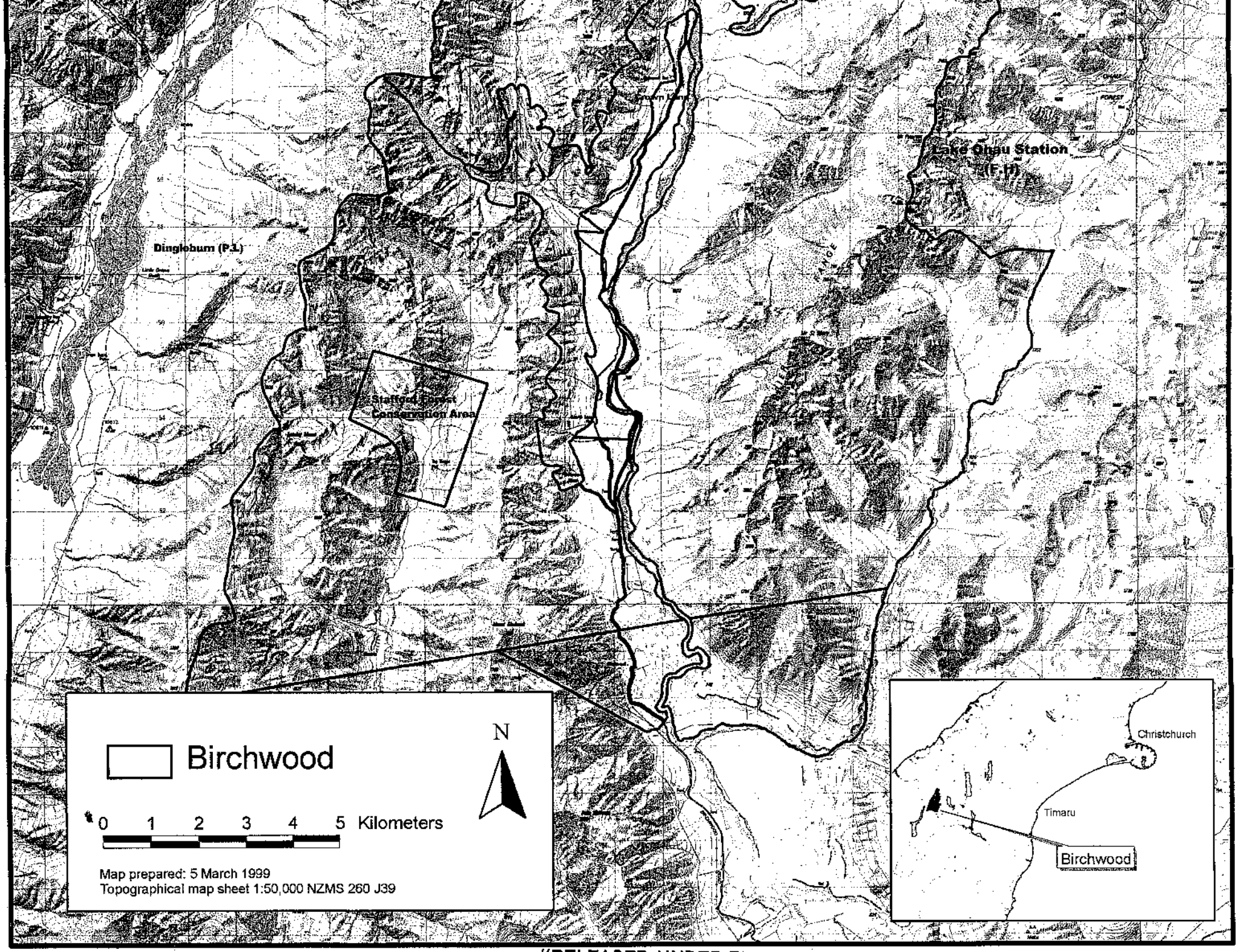
The objectives for the Hawea-Lindis area include managing and enhancing recreation opportunities on lands administered by the Department, and to achieve permanent protection for areas of significant nature conservation importance in the area.

The CMS proposes implementing these objectives by taking negotiation opportunities presented by pastoral tenure review or land exchanges with a view to:

- Protecting areas of significant nature conservation value
- Linking and buffering existing lands administered by the department
- Improving public access and recreational opportunities on lands administered by the Department
- Given the significance of recreational values located within the Dingleburn Valley, the Department considers it an inappropriate location for regular landings of commercial and private aircraft. Consequently, the existing aerial access concessions will be allowed to expire in accordance with its phase out conditions and further concessions are unlikely to be granted and landing permission refused except in emergencies or for management purposes.

[REMAINDER OF REPORT WITHHELD UNDER S 9(2)(J)
OFFICIAL INFOMATION ACT 1982]


Birchwood
Topo / Cadastral
Hunter Conservation Area
Ohau Conservation Area


Lake Ohau Station
(P.L)
Dinglebum (P.L)
Stattyed Forest
Conservation Area
Birchwood
N
0 1 2 3 4 5 Kilometers
Map prepared: 5 March 1999
Topographical map sheet 1:50,000 NZMS 260 J39
Christchurch
Timaru
Birchwood