Toitu te Land whenua Information New Zealand

Crown Pastoral Land Tenure Review

Lease name : MT PROSPECT

Lease number : PS 085

Conservation Resources Report

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

They are released under the Official information Act 1982.

July 04

DEPARTMENT OF CONSERVATION
REPORT ON TENURE REVIEW
OF MT PROSPECT PASTORAL LEASE
(Ps 85) UNDER PART 2
CROWN PASTORAL LAND ACT

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PART 1

The lessee of Mt Prospect pastoral lease has applied to the Commissioner of Crown Lands for a review of tenure. The property was inspected by DOC on 12-13 November and 18-19 December 2001. A return visit was required to complete the inspection due to inclement weather.

Mt Prospect is a medium sized pastoral lease of 3433ha. It is located at the end of Kakapo Road, some 23km east of Te Anau. The property comprises a series of terraces rising from the Whitestone River, most of which has been intensively developed, with terraces in the south-west part of the lease undergoing development at the time of inspection. The bulk of the property lying above the 400 metre contour has not been developed and is largely in a natural state apart from some modification from pastoral farming activities.

No Protected Natural Areas Programme survey has been undertaken of the property, or of the Upukerora Ecological District.The property adjoins the Mt Prospect and Dawson City conservation areas to the northeast and southwest respectively and the Lake Thomas marginal strip in the southeast.

A large Telecom communications facility on its own title is situated on the top of Mt Prospect in the north east corner of the lease, and is serviced by a well formed metalled vehicle track.

PART 2

Inherent Values: Description of Conservation

2.1 Landscape

METHODOLOGY

For this assessment, Mt Prospect has been divided four landscape units with the boundaries being defined principally by changes in aspect and land cover. After defining the landscape units (LU's) the following assessment criteria was applied to each unit to help determine its distinctive character and landscape values.

LANDSCAPE CHARACTER DESCRIPTION

This section of the assessment explains the overall appearance of the LU using common descriptive terms to help create a "mental picture" of the primary elements, which include:

- Landform – which reflects the topography and natural processes such as erosion and weathering.
- Land cover – which covers vegetation and water bodies.

- Land use – which reflects cultural and social processes such as farming.

ASSESSMENT OF LANDSCAPE VALUES

The criteria used to assess and evaluate each of the landscape units is based on the following attributes.

- Naturalness – which is an expression of the degree of indigenous content of the vegetative cover, and the extent of human intervention.

- Legibility – which is an expression of the clarity of the formative processes and how striking these physical processes are.
- Aesthetic values – which includes the concepts of memorability and naturalness. Aesthetic factors which can make a particular landscape vivid include simplicity in landform, muted colours and fine textured ground cover.

VALUES THAT WILL BE ASSESSED WHEN APPROPRIATE

Other values that may be assessed when considered appropriate include:

- Transient values – ephemeral events such as the occasional presence of wild life.

- Landscapes commonly valued – quintessential landscapes reflected in popularity through photographs, art work, tourism and recreation.

- Historical values – areas containing high heritage importance.

VISUAL VALUES

Visual values is a sub set of landscape values and relates to the visibility of a particular landscape/or natural feature as seen from key viewing locations such as regional highway system, viewing points within a township, tourist routes and recreational areas.

A term frequently used is "visual amenity" which is basically the value of a particular view in relation to what is seen and how people respond to it.

POTENTIAL VULNERABILITY TO CHANGE

This is a measure of each landscape unit's susceptibility to further modifications based primarily on the criteria set out in the Methodology. In general terms the less modified an area is, the more vulnerable to further change as a result of human activities that unit is likely to be.

LANDSCAPE UNIT 1

Description

This unit includes the elevated terraces that overlook the Whitestone River on the eastern side. The terraces are slightly tilted towards the river with the surface intermittently dissected by the down-cutting of streams. The largest of these streams is Moat Creek, which has cut through the glacial outwash gravel before draining into the river. Adjacent to the steep side slopes of the adjoining Mt Prospect there are still relics of terminal moraine which include hummocky terrain and the occasional low ridge that line up with the maximum advance of the last glaciers. These low ridges have caused poor drainage and the retention of a high water table, which in places has transformed into a complex wetland system.

In the north the ground cover is dominated by pasture grasses, while further south there still remain intact areas of matagouri shrublands in association with modified short and tall tussock. A large proportion of these shrublands have recently been ploughed and cultivated ready to be sown into intensive farmland.

The primary land use of the terraces is pastoral farming, with much of the more accessible land being subdivided into intensively grazed paddocks. There are some extensively grazed blocks of "native cover" around the base of the slopes. Cris-crossing the developed terraces are lines of shelter planting which include pine, red cedar and hybrid poplar. The homestead and auxiliary buildings for the farming operation are located at the end of Kakapo Road.

Landscape Values

The extensive conversion of the original cover into productive farmland has resulted in a diminishing of natural landscape values. In the future this trend will continue with the existing natural areas becoming small fragmented areas surrounded by farmland.

Visual Values

Owing to the lack of physical relief these river terraces have only moderate visual resource value. However these flat terraces help to provide the Whitestone River valley with an overall impression of spaciousness.

Potential Vulnerability to Change

This unit is highly modified. Further risks of change are localized and are generally associated with the degradation of the wetland systems. These risks include further open drainage that will affect the wetlands by lowering the local water table, the direct run-off of sediments into the wetlands and adjoining streams, lack of buffering around the wetlands and inappropriate recreation activities over the wetlands.

LANDSCAPE UNIT 2

Description

This unit incorporates the western facing slopes of the chain of lower mountains or sub alpine zone that extends out from the Snowdon Forest. The dominant landform is Mt Prospect (965m.asl.) which is a distinctive dome that is surrounded by similar shaped features. The side slopes are typified by rounded colluvial spurs that are separated by concave depressions, which frequently contain permanent watercourses. At a high altitude, in places, the over-steepened slopes have weakened causing deep gully erosion. The base of this unit is relatively well defined by a change in slope to the more gently undulating terrain of the river terraces (LU 1).

The vegetative cover within this unit is complex, being strongly influenced by altitude and aspect. The broad zones comprise the mixed shrublands descending down to about 700m.asl. where they merge in with a band of red tussock. The lower slopes are extensively covered by a mix of bracken fern, *Coprosma* and manuka. Within these three broad zones there is a mosaic of different plant associations with the upper section of the shrublands being dominated by *Ozothamnus* and *Dracophyllum*. Other species represented are *Hebe, Coprosma* and *Celmisia*, while at a lower level there is a greater diversity of woody shrubs that include three finger and the occasional bog pine. The only weed observed within this zone was individual broom bushes.

The transition between shrublands and red tussock cover is strongly dictated by aspect and previous fire lines with the tussock generally extending further up ridgelines than in the corresponding damper gullies. Amongst the red tussock there are sporadic matagouri, *Coprosma* and shield fern. Along the sunny and drier ridgelines the tussock is frequently replaced by pasture grasses and legumes owing to the concentration of stock grazing. Additionally, along the drier ridgelines there is a presence of hawkweed.

The lower band of gray shrublands occupy the gaps that were once clad in silver beech and also the wetland margins. The possibility for the forest to reoccupy these enclaves now covered in seral species is considered high owing to the local seed source and adequate annual rainfall. Presently affecting the natural migration of beech back out into the enclaves is the browsing of stock around the forest edges.

The primary land use of this unit is light grazing with stock tending to concentrate on the drier ridgelines. The main spur leading up to Mt Prospect contains an all-weather road that services the communication installations.

Landscape Values

Mt Prospect and the surrounding dome shaped peaks are a fundamental component of the broader Te Anau Basin. These front rangelands form

the edge that separates the Snowdon Forest and the Te Anau Basin. The existing convoluted edge of the adjacent beech forest is becoming less pronounced owing to the progressive reversion of shrublands taking place. The potential for the beech forest to reoccupy its natural niche is high due to the advanced stage of regeneration.

By allowing the beech to repatriate the mid slopes will result in a more cohesive and sustainable forest, thus resulting in a more aesthetically pleasing rural landscape.

Visual Values

The visual integrity of Mt Prospect has been compromised by the all weather service road and the communication installations that have been sited on its peak. However this low mountain with its distinctive form is a local landmark that can be viewed from many points around the Te Anau Basin. Its visual accessibility is also the reason why Mt Prospect has been utilized for communication purposes.

Potential Vulnerability to Change

This unit has a moderate risk of further change by possible further die-back of the beech outliers from stock grazing and camping, loss of tall tussock on the ridgelines due to concentration of stock, the potential of fire through the inherently inflammable bracken fernlands, and additional proliferation of installations on Mt Prospect.

LANDSCAPE UNIT 3

Description

This unit encompasses the hummocky hill country between Mt Prospect in the north and Danby Hill to the south. It includes several hillocks, the most prominent being 780m.asl. Separating these hillocks is a wide undulating basin that contains the headwaters of two streams, the major being Moat Creek that drains into the Whitestone, while the Thomas Burn connects up with Dale Creek outside the property. The uniformity of the basin's topography has been bisected by the entrenchment of Moat Creek.

The basin is generally covered in an intact sward of red tussock with a presence of fescue tussock on the drier slopes and mixed shrublands on the darker faces. Within the basin a distinctive feature is the continuous ribbon of beech forest that follows the margins of Moat Creek.

The primary land use within this unit is extensive grazing with the basin being subdivided into large grazing blocks. The only noticeable "built" element is are two small musterers huts which are sited at the edge of the forest.

Landscape Values

This well defined unit is possibly representative of what large tracts of the Te Anau district resembled before human occupation. It conveys a strong sense of uniformity with the simplicity of the tall grasslands being overlaid on a subdued undulating landform. There are no obvious hard edges in the grazing patterns with the only "built" element being the two musterers huts. The landscape character within this unit contrasts vividly with that contained in L.U. 2, especially in relation to landform and range of vegetation.

In essence, this unit conveys the original character, in a natural context, of what much of Northern Southland once represented.

Visual Values

This unit is completely contained by the surrounding ridgelines and hillocks. This containment makes the unit visually inaccessible from most viewing points, thus reinforcing its strong sense of remoteness and qualities of a back country landscape.

Potential Vulnerability to Change

This unit is highly sensitive to change through additional subdivision along with AOS&TD that would create hard edges within the existing homogenous land cover. Any earth works associated with possible tracking would be detrimental to the uniformity of the land cover. Further spread of weeds from adjoining catchments should be avoided.

LANDSCAPE UNIT 4

Description

This unit is located at the southern end of the property and incorporates the shady faces of Danby Hill and the valley floor. It boundaries onto two large areas of open water, Dawson City and Lake Thomas. These two large water masses are fed by an intricate pattern of small streams, many of which have their origins in the adjoining Landcorp Farming property.

The vegetation is greatly influenced by aspect and fire intervention with shrublands expanding over the side slopes of Danby Hill, where there also still survive two remnants of silver beech. On the valley floor the dominant vegetative cover is bracken fern and in places both matagouri and Coprosma are overtopping it. On the drier spurs modified red tussock still remains, in association with introduced grasses and mats of hawkweed.

Landscape Values

This unit is dominated by the southern slopes of Danby Hill, which within a landscape context links the higher rangelands to the north with the Te Anau Basin. This unit could be described as being fairly typical of the district's hill country, although somewhat lower in altitude.

Visual Values

This unit has limited visual resource value as it can only be viewed in a local context.

Potential Vulnerability to Change

Further change to this unit would come from conversion of the bracken fern land to cultivated land, fire damage to the beech forest remnants and the loss of buffering to the local wetlands and open water. The potential of spreading of weeds from neighbouring properties is also a concern.

Significance of the Landscape

This property is located on the edge of the pastoral development of the Te Anau Basin, therefore it has to be accepted that substantial changes will have been made to the original landscape character. Some of these changes are highly legible such as the fire influenced edges to the adjoining beech forest and outliers. The limitations to farming have been recognized with some of the steeper slopes being allowed to revert back to a natural state.Overall, a 'pioneer approach' to farm development is evident.

The property contains some of the last undeveloped farmland in the Te Anau Basin, therefore it is important in representing these values (both landscape and vegetation).

Landscape units 2 and 3 make a positive contribution to the back country of the Te Anau district, with both of these units differing markedly in landform, land cover and landscape values. In many respects these units complement each other and in total aggregate form a diverse and aesthetically pleasing natural landscape.

2.2 Landforms and Geology

Mt Prospect (965 m asl) itself is composed of a thick sequence (>400 m & probably up to 1000 m) of late tertiary and early quarternary conglomerate and sandstone known as the Prospect formation (McKellar 1973, Turnbull 1986). The parent material is almost entirely Caples terrane greywacke. This forms rounded and well rounded pebbles and cobbles in a matrix of coarse sandstone. It is weakly cemented and has been uplifted and deformed. Near the summit the formation is very visible as a prominent funnel shaped land-slip, exposing dipping strata. Elsewhere, on the lease, relief is fairly gentle with exposures along incised creeks or terrace scarps. Mantling the mountain on the western slopes is morainic debris from successive quarternary glaciations. The oldest episode (Moat Creek advance) overtopped Danby Hill and left erratic boulders of granite, diorite and gneiss.

Most of the lease spans between 350 –700 metres and is of low rounded relief. West of Mt. Prospect and Danby Hill are partly dissected terraces with well defined scarp margins from extensive

episodes of deposition and then re-working of glacial outwash sediments (eg. Whitestone formation (McKeller 1973)). Poorly drained hollows have post glacial swamp and peat deposits in them. The lower Moat Creek is cut down through glacial outwash of the Whitestone formation as is the Whitestone River floodplain. There are three small fans and some areas of tallus on the western flank of Danby Hill.

Elsewhere, quarternary glacial outwash has had limited effect on tributaries of Thomas Burn and slopes south of Mount Prospect and in these areas the landforms are generally worn and rounded with streams meandering down open valleys.

Significance of the Landform

Significant interpretation of geological uplift of late tertiary sedimentary rock through quarternary time is provided by a land-slip near the summit of Mt. Prospect.

On lower western slopes and terraces are landforms attributable to glaciation and glacial outwash. These are fairly easily interpretable because they are not forested and also have significant natural character since they are largely un-cultivated. In contrast to this, are the southern slopes of Mt. Prospect east of Danby Hill. This region (also without forest) has rounded ridges and open valleys of gentle relief where glacial till material and glacial ice flow have had far less influence.

Soils

Natural fertility of the soils is very low being derived from mainly greywacke rocks and loess. Well drained hill soils –yellow-brown loams cover much of the uplands, slopes and terraces of the lease. In places vegetation cover is naturally sparse or low and soils are prone to wind erosion when exposed. In the region of lower Moat Creek and also west of Danby Hill are terraces with complex patterning of well drained gritty silt loams contrasting with shallow peat and gley soils in small hollows as well as extensive depressions. The mid slopes of Mt. Prospect also have such areas where water is brought to the surface in extensive peaty flushes. Free draining recent soils that are stony, and some areas of swampy gley soils with higher fertility, occupy the floodplains adjacent to the Whitestone River.

Significance of the Soils

Soil sequences in the region of lower Moat Creek and also on the downlands of the Thomas Burn catchment on the Lease are significant since they are relatively undisturbed soils and soil-vegetation associations at low altitude within the Te Anau Basin. Some of these areas have a complex patterning as a consequence of topography, drainage and other physical drivers. The property contains extensive altitudinal sequences within the ecological district context. These soil sequences are vulnerable to threats

such as modification through pastoral farming activities eg. burning, oversowing, cultivation and vehicle damage to wetlands.

2.3 Climate

The climate includes cool winters and frosts with frequent cold air drainage along with dry summers where water short periods are common. Rainfall averages 1300mm per annum.

2.4 Vegetation

Ecological Setting

The Te Anau basin lies in the Upukerora Ecological District (ED). The Upukerora ED consists of low gentle hills and rolling country, crossed by the Upukerora, Whitestone and Mararoa Rivers. The geology is largely of Pleistocene outwash gravels, moraine and tills. The soils are generally strongly leached, stony, shallow, free draining and of low fertility. On sites with poor drainage wetlands have developed.

The vegetation of the Upukerora ED has been significantly modified by historic fires and more recently by agricultural use and land development. The original pre-human vegetation of the ecological district was described in the Southland Protection Strategy (Harding, 1999), see table 1. The pre-European vegetation would have been disturbed by fires but would have included extensive beech forest in the north, with a mosaic of forest remnants (mainly beech forest with local podocarp stands), shrubland (of mainly manuka or bog pine), red tussockland, lichenfield and wetlands through the southern Te Anau Basin portion of the district.

Table 1: Ecosystems of the Upukerora ED from Southland Protection Strategy (Harding 1999)

	Ecosystem type	Original extent (% of ED)	Proportion of original extent remaining (%)	Proportion of original extent protected	Proportion of remaining area protected
1	Montane mountain beech forest	65	50	47	95
2	Montane kereru-podocarp-hardwood forest	5	5	4	90?
3	Montane celery pine-bog pine-mountain totara shrub.	10	10	3	30
4	Montane manuka shrubland ecotone	5	50	30	60
5	Montane koitareke-red tussockland-flaxland	6	30	24	80
6	Montane rushland shrubland on peat soils	5	80	56	70
7	Montane tara-gravelfield-red tussockland	2	(30)	7	25
8	Montane herbfield turf on lake shores	1	90	81	90
9	Montane fescue tussockland	1	5?	1?	20?

The Upukerora ED has undergone intensive land development since the 1950's. Most of the low altitude areas (ie below 500m) have now been converted to farmland. The present vegetation includes beech forest (mainly mountain beech), most extensive in the north and areas of manuka shrubland, red tussockland, and wetlands (mainly peatlands). Within the developed Te Anau Basin part of the Upukerora ED area there are now limited natural areas remaining. These are largely peatbog systems. Podocarp forest, bog pine shrubland, fertile wetland swamp, lichenfield and herbfield in the braided riverbeds have become rare. These vegetation types have also become both regionally and nationally threatened vegetation types.

Description of the Property

Mt Prospect Station lies in the north of the Upukerora ED. It extends from Mt Prospect (965m) and Danby Hill (724m) down to the Whitestone River (340m). The vegetation of the property includes extensive hill slope red tussockland, shrublands (of a variety of types), shrub-tussockland, beech forest, regenerating forest, wetland (including both peatlands and more commonly *Carex* swamps) and lichenfields. The red tussocklands represents one of the most extensive red tussockland areas remaining in the Te Anau Basin. One of the most distinctive features of the property are the wetlands because of their diversity, numbers, extent, condition and composition. The wetlands are of two major types; peatlands dominated by sphagnum moss and wirerush; and swamps dominated by

sedges and herbs. There is a great diversity within the swamp systems. Some wetlands are a mosaic containing both peatland and swamp systems.

Land development on the property has been restricted to below 500m, though much land also remains undeveloped in this lowland zone. Of particular note are the low altitude red tussock, *Carex* swamp and lichenfield communities which have become locally, regionally and nationally much diminished or threatened.

The property is described in 4 parts, these being Mt Prospect, the Central (Moa Creek) block, Danby Hill and the Lower Terraces.

Mt Prospect block: This block includes the slopes of Mt Prospect. The block contains two tongues of beech forest which are Conservation Land. The block also contains the headwaters of Moat Creek. The lower slopes are generally in pasture, with several wetlands and some shrublands, but limited tussock cover. The naturalness and condition improves with increasing altitude. The upper slopes are dominated by a mixture of red tussockland, shrub-tussockland and shrubland.

Central (Moat Creek) block: This block is centred on Moat Creek and tributaries of the Thomas Burn, but contains the northern slopes of Danby Hill. It is undeveloped, with limited fencing and generally in a relatively intact condition. The vegetation is dominated by red tussockland, with some valley floor wetlands, beech forest along Moat Creek and limited shrubland.

Danby Hill block: This block extends from Danby Hill to the southern and eastern property boundary. It contains much red tussockland on the upper and mid slopes of Danby Hill, while the lower slopes have much bracken. The gullies on the slopes of Danby Hill contain shrubland and beech forest. The large Lake Thomas wetland system is in the south-east, while the "middle" swamp is found in the south-west of the block.

Lower Terraces block: This block contains lower terraces and more gentle country. Most of the area north of Moat Creek has been cultivated, while the area south of Moat Creek (to date) is only partially developed, but is subject to a Crown Pastoral Land Act (CPLA) consent for land development. The area south of Moat Creek retains a number of lowland wetlands, areas of red tussockland, lichenfield and shrubland. The two portions of the block are separated by the incised lower section of Moat Creek.

Description of the Vegetation

The vegetation found on Mt Prospect pastoral lease is highly representative of the Upukerora ED, with 5 of the 9 ecosystems recorded by Harding (1999) found.See Table 1. These 5 ecosystems are mountain beech forest, manuka shrubland, red tussockland-flaxland, rushland-shrubland on peat soils and fescue tussockland. The red tussockland-flaxland ecosystem is better split into valley floor red tussockland and swamp (dominated by one or more of *Carex* species, *Baumea* species, flax and red tussock), while fescue tussockland should include lichen-herb-tussock vegetation.

A Mt Prospect block

Shrublands

Mt Prospect shrublands: This community relates to the shrubland adjacent to the summit of Mt Prospect and extending down the southern face. The shrubland canopy is generally dense and 1-3 m tall, with some areas that are semi-open. The canopy contains *Brachyglottis cassinioides* (cover 30%), *Ozothamnus vauvilliersii* (12%), *Hebe odora* (10%), *Coprosma ciliata* (8%), *C. pseudocuneata* (5%), with some *Hebe rakaiensis, Dracophyllum uniflorum* and occasional silver beech (*Nothofagus menziesii*) and *Brachyglottis buchananii*. The understorey and open areas include bryophytes (15%), *Coprosma cheesemanii* (5%), *Astelia nervosa* (3%), *Lycopodium fastigiatum* (3%), prickly shield fern (*Polystichum vestitum*, 2%), *Gaultheria depressa, Celmisia traversii, Viola cunninghamii, Uncinia* sp. and many other herbs.

Upper altitude shrublands: These vary in composition and density as a response to aspect, disturbance regime and other factors. Along the road below the summit *Ozothamnus vauvilliersii* dominated with some *Hebe odora*, *Brachyglottis cassinioides, C. pseudocuneata* and other species. Locally,inaka/turpentine scrub, *Dracophyllum longifolium* and *D. uniflorum* are both dominant.

Gully shrublands: Another site in a gully slightly lower down contained a mixed shrubland. This shrubland is dominated by *Ozothamnus vauvilliersii* and mingimingi (*Coprosma propinqua*), with *Coprosma ciliata*, *C*. sp. aff *parviflora, C. rugosa, C. cheesemanii*, matagouri (*Discaria toumatou*), *Hebe odora* and *Hebe rakaiensis.* There is a patch of *Olearia avicenniaefolia* and *O. nummularifolia* and hybrids between these two species.

At lower altitude mingimingi is dominant with much matagouri, some koromiko (*Hebe salicifolia*), *Rubus schmidelioides* and other species.

Manuka shrubland: At lower altitudes there are areas of manuka shrubland, these have become somewhat fragmented.

Red tussockland

Upper altitude shrub-tussockland: This community is dominated by red tussock (*Chionochloa rubra*, 20%) and *Coprosma cheesemanii* (18%), with bryophytes and lichen (15%, including 5% *Racomitrium lanuginosum*), hawkweed (*Hieracium pilosella*, 10%), *Celmisia traversii* (8%), rock and bare soil (5%), *Gaultheria macrostigma* (3%), *Leucopogon fraseri* (2%), *Coprosma ciliata* (2%), fescue tussock (*Festuca novae-zelandiae*, 2%), *Ranunculus multiscapus, Brachyglottis bellidioides, Raoulia glabra*, blue tussock (*Poa colensoi*) and other species.

Upper altitude red tussockland: This tussockland is dominated by red tussock (30%) and bryophytes and lichen (35%). Also present are exotic grasses (8%), *Celmisia traversii* (5%), hawkweed (5%), leaf litter and bare soil/rock (5%), *Coprosma* sp. aff *parviflora* (2%), *Gaultheria macrostigma* (2%), *Pimelea oreophila* (2%), *Leucopogon fraseri*, fescue tussock, blue tussock, *Ranunculus multiscapus, Raoulia glabra* and other species.

Along gullies and seepages the red tussock is more dense, with *Juncus gregiflorus* and occasionally *Olearia bullata* and the herbs *Pratia angulata, Hydrocotyle novae-zelandiae, Ranunculus foliosus, Schizeilema nitens* and other species.

Lower altitude red tussockland: This is found on a ridge between wetlands 1 and 2 but is typical of lower altitude red tussockland. The community is composed of hawkweed (20%), red tussock (15%), *Gaultheria macrostigma* (10%), manuka (*Leptospermum scoparium*, 5%), the moss *Racomitrium lanuginosum* (5%), *Raoulia subsericea* (4%), matagouri (3%), *Coprosma petriei* (3%), other bryophytes (3%), bracken (2%), little hard fern (*Blechnum penna-marina*, 2%) and many other species.

Modified tussockland: Gentle slopes at lower altitude are used more intensively by stock. One of these sites is composed of hawkweed (20-90%, average 60%), exotic grasses (12%), *Gaultheria macrostigma* (8%), fescue tussock (6%), matagouri (5%), bracken (3%), red tussock, mingimingi, *Coprosma petriei*, harebell (*Wahlenbergia albomarginata*) and other species.

Wetlands

There are a variety of wetlands at the foot of Mt Prospect. The best three of these are described below.

Wetland 1

This wetland was located south of the Mt Prospect road at Grid Ref. NZMS D43 122 204. The major associations are described below.

Herbfield on wetland margin: This association is found at the top end of the wetland on the toe of a hill slope. The association is composed of bryophyte (25%), *Hydrocotyle microphyllum* (12%), *Epilobium komarovianum* (10%), sog (water, mud and decomposing plant

material, 10%), *Gonocarpus micranthus* (8%), *Leptinella squalida* var. *mediana* (8%), *Carex echinata* (5%), *Carex diandra* (3%), *Eleocharis gracilis* (3%), sweet vernal (*Anthoxanthum odoratum*, 3%), *Plantago uniflorum* (2%), *Ranunculus cheesemanii* (2%), *Pratia angulata* (2%), sundew (*Drosera arcturi*, 2%), comb sedge (*Oreobolus pectinatus*, 1%), bladderwort (*Utricularia monanthos*, 1%), *Mimulus moschatus* (1%), *Ranunculus glabrifolius* and other species.

Carex diandra swamp: This association is the major component of the wetland system. It is dominated by bryophytes, with much *Carex diandra* (c. 10%), sog, and similar herbs to the wetland margin but with more *Mimulus moschatus* (5%) and *Carex echinata* (5%).

Peatland on wetland edge: This association is confined to parts of the edge. The association is composed of bryophytes (50%), comb sedge (18%), wirerush (*Empodisma minus*, 12%), *Gonocarpus micranthus* (10%), *Carex echinata* (3%), *Carex coriacea* (2%), sundew (2%), *Pratia angulata* (1%), *Eleocharis gracilis* and other species.

Carex-rush-tussockland: This association is found at the southern end of this wetland system. The community consisted of sog (40%), cutty grass (*Carex coriacea*, 15%), bryophytes (10%), *Juncus gregiflorus* (8%), red tussock (5%), *Epilobium insulare* (5%), *Mimulus moschatus* (4%), *Carex tenuiculmis* (3%), *Ranunculus cheesemanii* (2%), *R. glabrifolius* (2%), spike rush (*Eleocharis acuta*, 2%), exotic grass species (2%), white clover (*Trifolium repens*, 1%), *Hydrocotyle novae-zelandiae* var. *novae-zelandiae*, little hard fern, *Euchiton limosum, Lagenifera barkeri* and other species.

Wetland 2

This wetland is similar in composition to wetland 1. The wetland is an elongated wetland system at the toe of the hill, adjacent to developed farmland, located at Grid Ref. NZMS D43 124 200. The most extensive community is a *Carex diandra* swamp. Also associated are turf areas and wetland tussockland.

Wet pavement: This community is along a seepage feeding into the wetland. The community is composed of *Epilobium komarovianum, Leptinella mediana* ssp*. squalida, Plantago triandra, Eleocharis gracilis, Drosera arcturi* and other species.

Wetland 3

This wetland is found in a gully adjacent to the Mt Prospect road (GR D43 124 216). The wetland is a diverse wetland within semi-developed land. The wetland is composed of *Carex secta, C. virgata, C. diandra*, sphagnum moss, wire rush, *Juncus gregiflorus*, red tussock, *Coprosma* sp. aff. *intertexta*, manuka and other species.

Wetland 4

This is a large wetland system adjacent to forest under Conservation management (GR D43 128 222). The wetland is in two parts separated by a tongue of forest. The eastern part is lower, larger and more diverse (this is referred to as 4a).

Wetland 4a: This wetland is a relatively large (c. 10 ha) and diverse wetland. The eastern side has an intact margin with beech forest.

Wetland margin: The wetland margin is variable however two associations were examined. One is on a flat area with a peaty substrate, which was composed of *Polytrichum juniperinum* (75%), red tussock (8%), *Juncus gregiflorus* (5%), cutty grass (3%), *Carex echinata* (3%), wirerush (2%), sky lily (*Herpolirion novae-zelandiae*, 2%), *Coprosma* sp. aff. *intertexta* (2%), *Olearia bullata*, comb sedge (*Oreobolus pectinatus*) and *Celmisia graminifolia*.

The other wetland margin examined is composed of bryophytes (18%), *Leptinella mediana* ssp. *squalida* (15%), *Gonocarpus micranthus* (15%), *Carex gaudichaudiana* (12%), exotic grasses (12%), red tussock (10%), *Hydrocotyle microphylla* (5%), *Eleocharis gracilis* (3%), cutty grass (2%), *Carex echinata* (2%), *Ranunculus cheesemanii* (2%), *Mentha cunninghamii*, *Carex tenuiculmis* and other species.

Carex diandra sedgeland: This community is found in the western portion of the wetland and grades into the *Carex secta* sedgeland. This association was composed of *Carex diandra* (55%), sog and bryophytes (35%), *Carex virgata* (3%), *Ranunculus glabrifolius* (2%), *Potamogeton cheesemanii, Epilobium insulare* and few other species.

Carex secta sedgeland: This is the largest community present and dominated the southern portion of the wetland. The community is composed of *Marchantia berteroana* (50%), *Carex secta* (40%), with *Carex diandra* (3%), *C. virgata* (3%), *Blechnum minus* (2%), *Ranunculus glabrifolius* (1%), *Hydrocotyle salcata* (1%), *Mimulus moschatus*, holy grass (*Hierochloe redolens*) and few other species.

Sedgeland-peatland interface: This association forms the gradation between the *Carex secta* sedgeland and the peatland. It is composed of *Carex virgata* (18%), sphagnum moss (*Sphagnum cristatum* (18%), wirerush (12%), *Coprosma* sp. aff. *intertexta* (10%), sog (10%), *Carex secta* (8%), *Marchantia berterana* (5%), *Juncus gregiflorus* (3%), cutty grass (3%), *Carex echinata* (2%), *Ranunculus cheesemanii* (2%), toetoe (*Cortaderia richardii*, 1%), other bryophytes (2%), manuka (1%), *Blechnum minus* (1%), red tussock, *Ranunculus glabrifolius* and other species.

Peatland: This community is the second largest community and is found in the north of the wetland. The community is composed of sphagnum moss (50%), wirerush (20%), *Dracophyllum prostratum* (6%), other bryophytes (5%), cutty grass (3%), *Gonocarpus micranthus* (3%), comb sedge (2%), *Carex secta* (2%), *Gaultheria macrostigma* (2%), *Dracophyllum* sp. aff. *oliverii* (1%), *Carex echinata* (1%), manuka, *Cyathodes empetrifolia, Drosera arcturi* and few other species.

Wetland 4b: This wetland is largely surrounded by beech forest and has intact margins.

Carex diandra sedgeland: This community forms the western portion of the wetland. The community is composed of *Carex diandra* (70%), *C.*

echinata (10%), sog (10%), bryophytes (5%), exotic grass (4%), white clover (1%), *Ranunculus glabrifolius, Epilobium insulare*, spike rush (*Eleocharis acuta*) and other species.

Sphagnum shrubland: This community forms the eastern portion of the wetland. The community is composed of sphagnum moss (60%), *Dracophyllum prostratum* (8%), *Carex gaudichaudiana* (8%), *Carex diandra* (5%), cutty grass (5%), manuka (4%), *Coprosma* sp. aff. *intertexta* (3%), *Carex secta* (3%), *C. virgata* (1%), bog pine and other species.

Wetland 5

This wetland system includes a pond and lies adjacent to the Mt Prospect road (GR D43 120 223). The pond forms a habitat for waterfowl and is used for duck shooting (a maimai is present). It has a fringe of spike rush. The adjacent swamp vegetation includes red tussock, *Carex* species and *Juncus effusus*.

B Central (Moat Creek) block

Red Tussockland

Valley floor red tussockland: This community is generally fragmented but found in scattered sites along the tributaries of the Thomas Burn. Two sites were described within the Danby Hill block. This community has a variable cover of red tussock, the most dense cover being in wet sites. Dryer sites have more exotic grass, hawkweed and other exotics. There is generally a rich diversity of native species associated.

River terrace tussockland: This community is on a terrace along the valley floor (GR D43 146 165). This community was composed of hawkweed (35%), red tussock (10-30%, average 15%), exotic grass (12%), lichen (8%), blue tussock (5%), bryophytes (5%), *Gaultheria macrostigma* (4%), matagouri (3%), *Coprosma petriei* (2%), *Raoulia subsericea* (2%), hard tussock (1%), *Leucopogon colensoi* (1%), *Pimelea oreophila* (1%), sky lily (1%), *Luzula rufa* (1%), harebell, *Ranunculus multiscapus*, little hard fern, *Leucopogon fraseri*, *Muehlenbeckia axillaris*, adders tongue fern (*Ophioglossum coriaceum*) and other species.

Within the valley floor tussockland are occasional old streambed hollows. These hollows contain *Hydrocotyle microphylla*, *Pratia angulata, Rumex flexuosus*, *Plantago raoulii, P. triandra, Schizeilema cockaynei*, *Ophioglossum coriaceum, Gnaphalium traversii*, *Lagenifera barkerii*, *Galium perpusillum, Gonocarpus aggregatus* and other species.

Red tussockland on shady face: This tussockland represents the low altitude red tussockland. This site was sampled within the Danby Hill block, near to the block boundary (at GR D43 150 157). This community is composed of red tussock (20-60%, average 40%), hawkweed (2-30%, average 10%), bryophyte (8%), *Ozothamnus vauvilliersii* (5%), *Gaultheria macrostigma* (5%), exotic grass (5%), blue tussock (3%),

Blechnum penna-marina (3%), *Raoulia subsericea* (3%), matagouri (2%), fescue tussock (2%), *Helichrysum filicaule* (2%), lichen (2%), *Leucopogon colensoi* (1%), *Brachyglottis bellidioides* (1%), *Viola cunninghamii* (1%), *Celmisia gracilenta* (1%), *Lycopodium fastigiatum* (1%), *C*. sp. aff. *parviflora*, bog pine, snowberry, *Leucopogon fraseri*, sky lily, *Ranunculus multiscapus*, *Acaena caesiiglauca* and other species.

Shrub-tussockland: This community is on a wet shady slope (GR D43 145 169). The community was composed of red tussockland (15%), *Ozothamnus vauvilliersii* (12%), *C*. sp. aff. *parviflora* (8%), bracken (6%), sphagnum (5%), *Gaultheria macrostigma* (4%), cutty grass (4%), mingimingi (3%), matagouri (2%), *Coprosma* sp. aff. *intertexta* (2%), *Juncus gregiflorus* (2%), *Carpha alpina* (2%), koromiko, inaka (*Dracophyllum longifolium*), *Astelia nervosa*, *Dolichoglottis lyallii*, holy grass (*Hierochloe redolens*), *Anisotome aromatica* var. *flabellifolium*, *Lycopodium fastigiatum* and other species.

Tussockland on sunny face: This community is a heavily depleted tussockland on a steep, sunny slope at low altitude. The community sampled was at GR D43 146 161. The community was composed of bare/stones (35%), bracken (5-40%, average 15%), hawkweed (5-20%, average 14%), fescue tussock (8%), exotic grass (8%), *Gaultheria macrostigma* (5%), *Coprosma petriei* (2%), red tussock (1%), *Leucopogon colensoi* (1%), *Leucopogon fraseri* (1%), *Pimelea oreophila* (1%), matagouri, *Gaultheria crassa,* little hard fern, *Helichrysum filicaule*, *Geranium sessiliflorum*, 5 orchid species and other species.

Tussockland on dry ridge: This community is on a dry ridge at Grid Ref D43 147 176. The community was composed of lichen (20%), bryophytes (15%), red tussockland (8%), hawkweed (5-15%, average 8%), *Gaultheria macrostigma* (5%), *Raoulia subsericea* (5%), blue tussock (4%), *Ozothamnus vauvilliersii* (3%), exotic grass (2-5, average 3%), hard tussock (2%), matagouri (2%), *Leucopogon colensoi* (2%), *Coprosma petriei* (2%), *Pimelea oreophila* (2%), *Brachyglottis bellidioides* (2%), sky lily (2%), *Lycopodium fastigiatum* (2%), *Leucopogon fraseri (1%), Cyathodes empetrifolia, Celmisia gracilenta, Ranunculus multiscapus, Helichrysum filicaule* and other species.

Tussockland on broad valley floor: This red tussockland is located in the broad valley floor in the head of the Thomas burn northern tributary (GR D43 146 179). The community is composed of the moss *Polytrichum juniperinum* (60%), red tussock (20%), cutty grass (12%), *Cyathodes empetrifolium* (3%), blue tussock (2%), catsear (1%), little hard fern, *Aporostylis bifolia*, *Brachyglottis bellidioides*, *Celmisia graminifolia* and other species.

Dense red tussockland: This community is large scale on the gentle slopes to the north of Moat Creek. The area sampled is at Grid Ref D43 133 184. This community is composed of red tussock (30-90%, average 45%), exotic grass (12%), *Gaultheria macrostigma* (10%), hawkweed (8%), *Ozothamnus vauvilliersii* (5%), bryophyte (5%), sky lily (3%), blue tussock (2%), *Raoulia subsericea* (2%), *Lycopodium fastigiatum* (2%), *Coprosma petriei* (2%), *Pimelea oreophila* (1%),

Brachyglottis bellidioides (1%), *Cyathodes empetrifolia,* comb sedge, *Coprosma* sp. aff. *intertexta* and other species.

On flat areas and very gentle slopes a dense, 1.2m tall red tussockland is found, containing red tussock (80%), leaf litter (15%), *Ozothamnus vauvilliersii* (2%), little hard fern (2%),*Olearia bullata*, mingimingi, *Coprosma* sp. aff. *intertexta* and few other species.

Wetlands

Wetland 1:

This wetland was located at GR D43 151 152.

Carex bog: This is dominated by sog (50%), bryophyte (15%) and *Carex gaudichaniana* (10%), with *Leptinella squalida* var. *mediana* (6%), *Epilobium komarovianum* (4%), *Carex echinata* (3%), *Ranunculus cheesemanii* (3%), *Gonocarpus micranthus* (3%), *Euchiton laterale* (2%), exotic grasses (2%), *Eleocharis gracilis, Juncus antarcticus* and other species.

The more peaty, less fertile part of the wetland contains more bryophtye (25%), *Sphagnum cristatum* (12%), comb sedge (10%), hawkweed (6%), *Gaultheria macrostigma* (5%) and *Plantago uniflorum*, with less sog and *Carex gaudichaudiana*.

Wet turfs

These are scattered along the streamside. The major species are *Hydrocotyle novae-zelandiae*, *Pratia angulata, Ranunculus foliosus, R. cheesemanii*, *Gonocarpus aggregatus, Plantago triandra, Schizeilema nitens*, *Lagenifera barkeri*, *Celmisia gracilenta, Eleocharis gracilis, Mazus radicans, Mentha cunninghamii, Galium perpusillum,* and other species.

Wetland 2:

This wetland was located at GR D43 146 162.

Wetland fringe: This community is found between the toeslope and the *Carex diandra* swamp. The community was composed of bryophytes (35%), sphagnum (15%), cutty grass (8%), red tussock (6%), *Pratia angulata* (6%), sog (5), sweet vernal (5%), *Carex gaudichaudiana* (3%), *Gonocarpus micranthus* (3%), *Epilobium komarovianum* (3%), *Carex diandra* (2%), *Eleocharis gracilis* (2%), hawkweed (2%), *Ranunculus glabrifolius* (1%), *Carex echinata* (1%), *Euchiton limosum* (1%), comb sedge, *Epilobium pallidiflorum* and other species.

Carex diandra swamp: This community forms the core of the wetland. The community is composed of bryophytes (60%), *Carex diandra* (10%), *Eleocharis gracilis* (5%), *Gonocarpus micranthus* (5%), Yorkshire fog (5%), *Hydrocotyle microphylla* (3%), cutty grass 2%), *Eleocharis acuta* (2%), *Drosera arcturi* (2%), *Pratia angulata* (2%), sweet vernal (2%), *Epilobium komarovianum* (1%), *Ranunculus glabrifolius*, *R. cheesemanii*, *Mimulus moschatus* and other species.

Flush slope: This flush slope was found at the head of the wetland. The community is composed of the liverwort *Marchantia berteroana* (30%), bryophytes (25%), *Juncus articulatus* (10%), *Colobanthus affinus* (10%), *Eleocharis acuta* (8%), *Carex echinata* (6%), *C. gaudichaudiana* (5%), *Hydrocotyle microphylla* (5%), *Gonocarpus micranthus*, pearlwort (*Sagina procumbens*) and other species.

Wetland 3:

This wetland is a peatbog system which occupies a broad valley floor (GR D43 144 178).

Sphagnum peatbog: This community is the major wetland community. It is composed of sphagnum (60%), wirerush (18%), *Dracophyllum prostratum* (8%), *Carex gaudichaudiana* (5%), *C. echinata* (2%), the sundew *Drosera arcturi* (2%), comb sedge (1%), *Nertera scapanioides, Cyathodes empetrifolia, Isolepis aucklandicus* and *Aporostylis bifolia.*

Within this community are some pools. These contain a fringe of sphagnum moss, spike rush, *Juncus effusus* and bladderwort.

Wirerushland: This community is localised on the edge of the wetland. The community is dominated by wirerush (48%), sphagnum (30%), cutty grass (6%), *Juncus effusus* (4%), red tussock (3%), *Gaultheria macrostigma* (3%), *Cyathodes empetrifolia* (3%), *Coprosma* sp. aff. *intertexta* (1%), little hard fern (1%), *Carpha alpina* and *Dracophyllum prostratum.*

Forest

Along Moat Creek is a narrow strip of mountain beech forest. Stock have removed the understorey.

C Danby Hill Block

Brackenland

The southern aspect, lower slopes of Danby Hill are somewhat variable in their vegetation, having been modified by past fires. Bracken (*Pteridium esculentum*) fernland is the most abundant community. This community is dominated by bracken (average 50% cover, 20-90 range) with exotic grasses (c. 25%), some *Gaultheria macrostigma* (up to 5%), hawkweed (up to 5%), red tussock (c. 2%) and occasional *Ozothamnus vauvilliersii*, *Coprosma propinqua* and matagouri. If left undisturbed it is expected the vegetation will develop into shrubland and eventually regenerate into forest.

Shrublands and Forest

There are a number of gullies on the south side of Danby Hill. These gullies are generally dominated by a *Coprosma* shrubland, dominated by *C. propinqua* and *C*. sp. aff. *parviflora*. These shrublands are a successional stage and if permitted they will eventually progress to beech forest. The shrubland in an incised gully at GR D43 123 109

was more diverse containing koromiko (*Hebe salicifolia*) and lancewood (*Pseudopanax crassifolius*). A gully at GR D43 131 162 contains beech forest. Another gully at GR D43 134 159 contains three finger (*Pseudopanax colensoi*) forest. A gully at GR D43 131 162 contains beech forest. These gullies illustrate progressively more advanced succession stages.

Red tussocklands

Valley floor red tussockland: This community is generally fragmented but found in scattered sites in the tributary of the Thomas Burn. The site described is at GR D43 151 152 (within the Danby Hill block). At this site the community is dominated by red tussock (20-60+%), exotic grass (up to 30%) and hawkweed (up to 30%). The most intact areas tend to be the wetter areas and in these sites the vegetation consisted of red tussock (60%), exotic grass 10%, bryophytes (5%), *Hydrocotyle novae-zelandiae* (3%), *Ranunculus cheesemanii* (2%), *Lagenifera barkeri* (2%), *Celmisia gracilenta* (2%), *Oreomyrrhis ramosa* (1%), cutty grass, *Viola cunninghamii, Ranunculus glabrifolius, Gonocarpus micranthus, Galium perpusillum, Pratia angulata, Mazus radicans, Blechnum penna-marina* and other species.

At another wet site (GR D43 150 155) the vegetation consists of red tussock (40-80 %, average 50%), exotic grass (15-40%, average 20%), fescue tussock (2-8%, average 4%), *Ozothamnus vauvilliersii* (3%), *Viola cunninghamii* (3%), hawkweed (1-4%, average 3%), *Hydrocotyle novae-zelandiae* (2%), *Ranunculus foliosus* (2%), *Pratia angulata* (2%), catsear (2%), mingimingi (1%), *Oreomyrrhis ramosa* (1%), *Schizeilema nitens* (1%), little hard fern (1%), *Gaultheria macrostigma*, *Mazus radicans, Mentha cunninghamii, Gonocarpus micranthus, Galium perpusillum, Lagenifera barkeri*, *Celmisia gracilenta* and other species.

Red tussockland on shady face: This tussockland represents the low altitude red tussockland. Two sites were sampled. The first (at GR D43 152 153) is composed of red tussock (20%), *Gaultheria macrostigma* (10%) hawkweed (10%), matagouri (8%), lichen (6%), exotic grass (5%), snowberry (*Gaultheria novae-zelandiae*, 5%), *Raoulia subsericea* (4%), blue tussock (3%), *Blechnum penna-marina* (3%), *Leucopogon fraseri* (3%), rock/gravel/bare (3%), *Pimelea oreophila* (2%), *Pentachondra pumila* (2%), *Ranunculus multiscapus* (2%), bryophyte (2%), *Leucopogon colensoi* (1%), *Lycopodium fastigiatum* (1%), *Brachyglottis bellidioides* (1%), *Coprosma petriei* (1%), *C*. sp. aff. *parviflora*, bracken, *Acaena caesiiglauca* and other species.

The second at GR D43 150 157 is composed of red tussock (20-60%, average 40%), hawkweed (2-30%, average 10%), bryophyte (8%), *Ozothamnus vauvilliersii* (5%), *Gaultheria macrostigma* (5%), exotic grass (5%), blue tussock (3%), *Blechnum penna-marina* (3%), *Raoulia subsericea* (3%), matagouri (2%), fescue tussock (2%), *Helichrysum filicaule* (2%), lichen (2%), *Leucopogon colensoi* (1%), *Brachyglottis bellidioides* (1%), *Viola cunninghamii* (1%), *Celmisia gracilenta* (1%), *Lycopodium fastigiatum* (1%), *C*. sp. aff. *parviflora*, bog pine, snowberry, *Leucopogon fraseri*, sky lily, *Ranunculus multiscapus*, *Acaena caesiglauca* and other species.

On the scarp above the stream are patches of shrub-tussockland. The major shrub species are matagouri, mingimingi, *C*. sp. aff. *parviflora*, *Ozothamnus vauvilliersi* and tutu (*Coriaria sarmentosa*), with localised manuka, koromiko and *Coprosmsa rugosa.*

Tussockland on lower sunny face: This tussockland is severely modified, though typical of the eastern-most lower slopes (Grid Ref. NZMS D43 151 150). This community consists of hawkweed (50%), bracken (20%), exotic grasses (15%), matagouri (3%), *Gaultheria novae-zelandiae* (3%), *Leucopogon fraseri* (2%), *Hypericum perforatum*? (2%), mingimingi (1%) and other species. The primary value of this community is the linkage from the central (Moat Creek) block to Danby Hill and the Lake Thomas wetland.

Tussockland on upper aspect, southern face: This community is dominated by red tussock and bryophytes with much *Coprosma cheesemanii*, *Ozothamnus vauvilliersii*, *Coprosma* sp. aff. *parviflora, Hebe odora, Gaultheria novae-zelandiae, Leucopogon fraseri, L. colensoi, Lycopodium fastigiatum, Ranunculus multiscapus* and other species. One area viewed contained abundant *Dracophyllum uniflorum* with some bog pine and *Lycopodium scariosum*.

Wetlands

Lake Thomas Wetland

This wetland is a large and diverse wetland system located at GR D43 142 146.
Peatbog: This is localised occurring around sections of the wetland margin. The area recorded consists of comb sedge (*Oreobolus pectinatus*, 45%), wirerush (*Empodisma minus*, 20%), bryophytes including *Sphagnum* moss (12%), red tussock (8%), sky lily (*Herpolirion novae-zelandiae*, 5%), *Cyathodes empetrifolia* (3%), *Coprosma* sp. aff. *intertexta* (1%), *Gonocarpus micranthus* (2%), *Dracophyllum prostratum, Carex coriacea, Carpha alpina, Drosera arcturi* and other species.

Sphagnum bog: This wetland community was minor in extent. The community is composed of *Sphagnum cristatum* (70%), *Carex gaudichaudiana* (12%), *Dracophyllum prostratum* (5%), wirerush (3%), *Gaultheria macrostigma* (3%), sweet vernal (*Anthoxanthum odoratum*, average 2%, up to 10%), *Carex echinata* (2%), *Gonocarpus micranthus* (2%), *Plantago uniflora* (1%), hawkweed (1%) and other species.

Carex echinata/C. gaudichaudiana swamp: This is the most extensive community in this wetland. The community is very wet and short in stature. The wetland is dominated by sog (40% cover), bryophyte (30%), *Carex echinata* (12%) and *C. gaudichaudiana* (10%), with *Carex diandra* (locally common), *Epilobium komarovianum* (6%), *Gonocarpus micranthus* (3%), *Ranunculus cheesemanii* (2%), *Leptinella squalida* var. *mediana* (1%), *Euchiton laterale, Hydrocotyle microphylla, Drosera arcturii, Eleocharis gracilis, Juncus antarcticus*, comb sedge and other species.

Carex diandra swamp: Similar to the *Carex echinata/C. gaudichaudiana* swamp described above however differs in composition with the vegetation being taller and being higher in fertility. The vegetation consists of sog (40%), bryphytes (15%), *Carex diandra* (12%), *C. gaudichaudiana* (10%), sweet vernal (up to 8%), *Gonocarpus micranthus* (5%), *Ranunculus glabrifolius* (5%), *R. cheesemanii* (4%), *Leptinella squalida* var. *mediana* (3%), *Eleocharis gracilis* (2%), *Pratia angulata* (1%), *Hydrocotyle microphylla* (1%), *Drosera arcturii* (1%), *Euchiton laterale, Epilobium palidiflorum,* comb sedge and other species.

An association within this wetland community contained a greater mixture of *Carex* species. This association was dominated by sog (30%), *Carex coriacea* (15%), *Carex diandra* (10%), bryophtyes (10%), *Carex gaudichaudiana* (5%), *Ranunculus glabrifolius* (5%), *R. cheesemanii* (5%), *Euchiton laterale* (3%), *Carex tenuiculmis* (2%), *C. virgata*, exotic grasses, *Juncus gregiflorus*, *Epilobium palidiflorum* and other species.

Red tussockland: This is on gentle, damp slopes above the wetland. Red tussock forms a buffer to the wetland. This tussockland consists of red tussock (18%), exotic grass (12%), bryophyte (10%), *Gaultheria macrostigma* (6%), hawkweed (5%), little hard fern (*Blechnum penna-marina,* 3%), *Coprosma* sp. aff. *intertexta* (2%), *C.* sp. aff. *parviflora* (2%), fescue tussock (2%), *Ranunculus foliosus* (2%), *Helichrysum filicaule* (2%), *Sphagnum cristatum* (2%), *Raoulia subsericea* (2), catsear (*Hypochaeris radicata*, 2%), matagouri (1%), *Lycopodium fastigiatum* (1%), *Wahlenbergia albomarginata* (1%), *Ozothamnus vauvilliersii, Cyathodes empetrifolia, Pimelea oreophila, Kelleria dieffenbachii, Poa colensoi, Uncinia rubra, Carpha alpina*, comb sedge and other species.

Middle swamp

This swamp is located at Grid Ref. NZMS 260 D43 115 163.

Peatland edge: The western edge of the wetland has a peatland margin. This peatland is dominated by *Sphagnum cristatum* (60%), wirerush (15%) and comb sedge (8%), with some bryophyte (5%), cutty grass (*Carex coriacea*, 3%), *Carex echinata* (3%), *Gonocarpus micranthus* (2%), *Cyathodes empetrifolia, Carex gaudichaudiana, Gentiana grisebachii* and other species.

Carex swamp: This community is saturated and generally has 50mm of water above the ground surface. The community is composed of sog (35%), *Carex diandra* (25%), *Leptinella squalida* var. *mediana* (15%), bryophytes (10%), *Myriophyllum* sp. (5%), *Euchiton laterale* (2%), *Ranunculus cheesemanii* (2%), *Pratia angulata* (2%), *Plantago uniflora* (1%), *Eleocharis acuta* (1%), *Epilobium komarovianum* and other species.

Turf slopes: On the eastern margin of the wetland there are seepage areas that feed into the wetland. These are generally dominated by herb species.

D Lower Terraces Block

1 South of Moat Creek

i Southern Developed Block

This block has recently been developed, with tractor work continuing while the inspections were being undertaken. Two large wetlands (Dawson City Wetland extension and Upper Dawson Creek Wetland) are the major natural areas remaining. Much of the remainder of the area has been substantially modified by recent burning and ploughing.

1 Dawson City Wetland Extension

This wetland lies to the northwest of the Dawson City conservation area.

Carex diandra Swamp: This swamp is dominated by sedges and herbs, with much bryophyte cover. It is characterised by standing water (sog) and a rich diversity of plants. The vegetation of an area sampled consisted of sog (20%), *Carex diandra* (15%), *Leptinella squalida* ssp. *mediana* (15%), *Carex echinata* (8%), *Epilobium komarovianum* (8%), bryophytes (8%), *Pratia angulata* (5%), *Gonocarpus micranthus* (3%), *Eleocharis gracilis* (3%), sweet vernal (3%), *Ranunculus cheesemanii* (2%) and other species.

The wettest areas have some spike rush (*Eleocharis acuta*) and *Potamogeton cheesemanii.*

Herbfield: Locally parts of the wetland margins are dominated by herb species, sog and bryophytes with some sedges. The major herb species are *Leptinella squalida* ssp. *mediana*, *Gonocarpus micranthus*, *Epilobium komarovianum* and *Euchiton laterale.* Sedge species include *Eleocharis gracilis and Carex gaudichaudiana.*

Peatbog-Carex swamp interface: This community is found between the *Carex diandra* swamp and the peatbog. It is dominated by sphagnum moss with a variety of herbs and sedges. The vegetation of an area sampled consisted of *Sphagnum cristatum* (70%), *Gonocarpus micranthus* (15%), *Carex echinata* (5%), *Eleocharis gracilis* (3%), sweet vernal (3%), *Carex gaudichaudiana* (2%) and other species.

Peatbog: There are scattered areas of peatbog within the wetland complex. The peatbogs tend to be around the margins, in areas of lower fertility. The vegetation of an area sampled consisted of *Sphagnum cristatum* (60%), wirerush (*Empodisma minus*, 20%), *Carex echinata* (8%), *Gonocarpus micranthus* (3%), sweet vernal (3%), *Eleocharis gracilis* (2%), comb sedge (1%), *Juncus gregiflorus* (1%), *Gaultheria macrostigma* (1%), with some red tussock and other species.

Red tussockland: There is an area of tall, wet red tussockland on the southern boundary adjacent to the Dawson City Wetland. Parts of this area was burnt, however the tussock is now re-sprouting. The community contains much of the moss *Polytrichum juniperinum*, some little hard fern ,*Viola cunninghamii, Oreomyrrhis ramosa, Ranunculus*

multiscapus, Pratia angulata, comb sedge and other species associated. This area contains a population of the nationally threatened sedge *Carex tenuiculmis*.

Modification

Water table/Drainage: Culverts and associated drains have been established at the lower end of two tongues of the wetland on the property boundary. A drain has been established upstream of the wetland which enters the upper portion of the wetland.

Land development: Adjacent land has been ploughed up to the edge of the wetland. In some parts shrubs have been bulldozed onto the edge of the wetland. Areas ploughed on the eastern side of the wetland serve to fragment it.

Burning: Fire has carried across parts of the wetland. The greatest damage is on the peatland margins and the red tussockland at the southern end of the wetland. Most of the woody vegetation has been killed. Much of the burnt wetland vegetation is re-sprouting and re-growing. This burning damage is only temporary, as much of the wetland vegetation is rhizomatous and will recover relatively quickly. Woody vegetation will take the longest to recover.

ii Upper Dawson Creek Wetland

The wetland contains a mosaic of vegetation types from *Carex diandra* sedgeland, through *Carex*-red tussock-sphagnum into peatland vegetation and riparian shrub-tussockland. These communities are similar in composition to those described in the Dawson City wetland. The peatbog areas were more extensive and contained more woody vegetation, though much was killed by burning. This peatbog area was probably one of the largest, most diverse and intact and therefore the most significant on the property prior to recent burning.

Modification

Water table/Drainage: This wetland has had a culvert put across near the top of the wetland adjacent to the fence forming the boundary of the development block. Below this culvert the wetland has had a drain dug through it for c. 100m until it joins the natural stream. The bottom of the wetland area has also had a culvert across the stream. This culvert has lowered the stream by c. 30 cm.and is draining the wetland.
Land development: The western boundary of the wetland is along the foot of the hill slope. The hill slope has been ploughed and shrubs have been bulldozed onto the edge of the wetland. The ploughing undertaken on the eastern side of the wetland serves to fragment the wetland.

Burning: Fire has carried across parts of the wetland. The greatest damage was on the peatland. Most of the woody vegetation has been killed. Much of the burnt wetland vegetation is re-sprouting and re-growing. This burning damage is only temporary, as

much of the vegetation is rhizomatous and will recover relatively quickly. Woody vegetation will take the longest to recover.

C Other sites

Aerial photographs indicate that dense red tussockland was formerly scattered through the southern developed block, however this has almost totally been destroyed by land development. The only other natural area remaining is a fragmented wetland system along the stream (between the upper Dawson Creek Wetland and Dawson City Wetland). The values of this wetland are largely duplicated in the larger upper wetland and the remaining vegetation has been impacted by burning.

ii Northern Undeveloped Block

Wetlands:

1 Peatbogs

There are a number of wetlands present. These include the two largest peatbogs on the property, a small *Carex*–herb swamp and some ponds. The two peatbogs are similar in composition, the vegetation being dominated by sphagnum moss and wirerush.

Peatbog 1:

This system is west of Moat Creek, in an ancient river channel (Grid Ref. NZMS 260 D43 116 187). The wetland has a strip of *Carex diandra* swamp along the southern/eastern margin and running through the peatbog. A description of different associations within the system follows.

Carex diandra sedgeland: These are found within channels and on the margin of the peatbog. The vegetation consists of *Carex diandra* (60%), sog (20%), *Leptinella squalida* ssp. *mediana* (6%), *Carex echinata* (5%), *Gonocarpus micranthus* (2%), *Epilobium komarovianum* (2%), *Eleocharis gracilis* (2%), sweet vernal (2%), *Hydrocotyle microphylla, H. sulcata,* bladderwort *(Utricularia monanthos), Epilobium pallidiflorum* and other species.

Pool within *Carex diandra* channel: The pool contained spike rush and *Myriophyllum pedunculatum.*

Peatbog margin: This association consisted of sphagnum moss (50%), wirerush (18%), comb sedge (12%), *Carex sinclairii* (8%), *Dracophyllum prostratum* (5%), *Carex echinata* (2%), *Gonocarpus micranthus* (2%), *Eleocharis gracilis* (2%), *Drosera arcturi* (1%), *Pentachondra pumila* (1%), other bryophytes (1%) and other species.

Wirerush peatbog: This community dominates the wetland system. There is some minor variation across the peatland. Two areas were described.

The first area consists of spahgnum moss (40%), other bryophytes (25%), wirerush (18%), comb sedge (8%), *Dracophyllum prostratum* (3%), *Carex echinata* (2%), *Drosera arcturi* (1%) with few other species.
The second area consists of spahgnum moss (70%), wirerush (22%), *Dracophyllum prostratum* (5%), *Cyathodes empetrifolia* (2%), comb sedge, *Drosera arcturi, D. spathulata, Aporostylis bifolia* and a few other species.

Peatbog 2:

This second peatland is located on a depression on a terrace above the Whitestone River (GR D43 106 188). A description of different associations within the system follows.

Wetland margin: This association was on a slope above the south end of the peatbog. The association was composed of comb sedge (22%), wirerush (15%), *Carex gaudichaudiana* (10%), *Gonocarpus micranthus* (10%), red tussock (8%), exotic grass (8%), sog (5%), *Cyathodes empetrifolia* (4%), *Gaultheria macrostigma* (3%), *Eleocharis gracilis* (3%), *Plantago uniflora* (2%), *Hydrocotyle microphylla* (2%), *Pratia angulata* (1%), *Drosera arcturi* and other species.

Herbfield: Locally adjacent to the wetland margins is a herbfield association dominated by herb species, sog and bryophytes with some sedges. The major herb species are *Leptinella squalida* ssp. *mediana*, *Gonocarpus micranthus*, *Epilobium komarovianum, Hydrocotyle microphylla*, *Euchiton laterale* and bladderwort . Other species include *Eleocharis gracilis, Juncus antarcticus* and *Carex gaudichaudiana.*

Wirerush peatbog: This community dominates the wetland system. There is some minor variation across the peatland. An area described consisted of spahgnum moss (40%), wirerush (22%), comb sedge (8%), other bryophytes (5%), *Cyathodes empetifolia* (5%), *Dracophyllum prostratum* x *Dracophyllum oliverii* (4%), *Dracophyllum prostratum* (3%), *Pentachondra pumila* (3%), *Gonocarpus micranthus* (3%), sky lily (2%), *Gaultheria macrostigma* (1%), red tussock, *Dracophyllum oliverii*, bog pine with few other species.

Carex sinclairii peatland: This association was found near the western edge of the peatland. The association was composed of *Carex sinclairii* (18%), leaf litter (18%), wirerush (15%), sphagnum moss (15%), other bryophytes (10%), *Gonocarpus micranthus* (8%), *Carex echinata* (5%), veined sun orchid (*Thelymitra cyanea*, 2%), exotic grass (2%), comb sedge (2%), *Pratia angulata* (1%), and other species.

Peatbog 3

This community consisted of a small peatland hollow within red tussockland (GR D43 106 185). The community consisted of bryophytes (30%), sphagnum moss (18%), wirerush (15%), comb sedge (15%), red tussock (5%), *Cyathodes empetrifolia* (5%), *Gonocarpus micranthus* (4%), exotic grass (3%), lichen (2%), *Hydrocotyle microphylla* (1%),

hawkweed, *Plantago uniflora, Carex echinata, Thelymitra cyanea* and other species.

Carex-herb Swamp

Only one small *Carex* swamp is found within this block. This *Carex* swamp consisted of *Gonocarpus micranthus* (15%), bryophyte (15%), sog (12%), *Leptinella squalida* ssp. *mediana* (12%), *Eleocharis gracilis* (10%), *Hydrocotyle microphylla* (8%), *Carex diandra* (8%), *C. echinata* (5%), *Ranunculus cheesemanii* (2%), *Epilobium komarovianum* (2%), bladderwort (2%), *Agrostis pallescens* (1%), *Pratia angulata* (1%) and other species. The margin of the *Carex* swamp contained cutty grass, sphagnum moss, comb sedge and sundew.

Ponds

There are two ponds within the block. The first as a small shallow pond adjacent to the track at the south end of the lichenfield valley (GR D43 114 192) and has a margin of *Carex gaudichaudiana* and spike rush. The other pond has been created for duck shooting at GR D43 116 180. This pond has been fenced and has mainly rushes, sedges and spike rush around the margin. The are also turf areas where the pond floods periodically. There are some Douglas fir (*Pseudotsuga menziesii*) planted adjacent to the pond and these are starting to seed and spread.

Lichenfield

There are two major lichenfield areas within this block. They represent the major lichenfield areas that now remain on the property. Aerial photographs indicate that there were formerly some extensive lichenfields in the southern developed block that have recently been destroyed by land development. Descriptions of the two lichenfield areas follows.

Lichenfield 1: This lichenfield occupies a valley floor area, near Moat Creek at GR D43 116 184. The community consists of lichen (25%, range10-40%), hawkweed (18%, range 10-30%), *Coprosma petriei* (15%), *Raoulia subsericea* (6%), *Gaultheria macrostigma* (5%), fescue tussock (4%), blue tussock (3%), red tussock (2%), sky lily (2%), bryophytes (2%), exotic grass (2%), *Brachyglottis bellidioides* (1%), *Pimelea oreophila* (1%), *Celmisia gracilenta* and other species. Other notable species found include *Carmichaelia nana* and *Celmisia glandulosa*.

Lichenfield 2: This lichenfield occupies a valley floor area, through which the vehicle access track runs. Two areas were described.

The first area was adjacent to the track (GR D43 110 185). The community consists of lichen (25%, range10-35%), hawkweed (22%, range 10-30%), litter/bare ground (15%), *Coprosma petriei* (8%), *Roulia subsericea* (6%), exotic grass (4%), *Gaultheria macrostigma* (3%), *Pimelea oreophila* (2%), *Leucopogon fraseri* (2%), bryophytes (2%), matagouri (1%), *Luzula rufa* (1%), *Lagenifera cuneata* (1%),

Thelymitra longifolia (1%), fescue tussock, red tussock, sky lily and other species.

The second area was near the western boundary at GR D43 106 181. This second area was generally similar to the first area however the major components were lichen 28%, hawkweed (12% average, 10-22%), *Coprosma petriei* (8%), *Raoulia subsericea* (5%), red tussock (3% average, 1-6%), exotic grass (<1%).

Red tussockland

Dense red tussockland is restricted to terraces where there is impeded drainage. Some of the best red tussock on the property was found in this block. Two areas of dense red tussockland were examined, these are described below.

Red tussockland 1: This area of dense red tussockland is located on a terrace above Moat Creek (GR D43 118 191). The typical tussockland is of moderate density red tussockland consisting of red tussock (20% average, 12-30%), hawkweed (18% average, 6-30%), *Gaultheria macrostigma* (8%), exotic grass (8%), bryophyte (6% average, 2-10%), lichen (5% average, 2-10%), matagouri (4%), *Coprosma petriei* (3 % average, 2-8%), blue tussock (3%), *Leucopogon fraseriii* (3%), *Lycopodium fastigiatum* (3%), fescue tussock (2%), sky lily (2%), *Pimelea oreophila* (2%), *Raoulia subsericea* (2%), *Luzula rufa* (1%), *Ranunculus multiscapus* (1%), cottonwood manuka *Celmisia gracilenta, Prasophyllum colensoi* and other species.

A wet red tussockland association consists of red tussockland (60%), bryophytes (12%), exotic grass (8%), *Ranunculus multiscapus* (3%), *Juncus gregiflorus* (2%), *Hydrocotyle novae-zelandiae* var. *novae-zelandiae* (2%), *Viola cunninghamii* (1%), cottonwood, *Olearia bullata, Celmisia gracilenta, Geranium microphyllum, Uncinia rubra*, blue tussock and other species. Within this are wet hollows containing cutty grass (*Carex coriacea, C. tenuiculmis* and *Juncus gregiflorus*.

Red tussockland 2: This area of dense red tussockland is located on a terrace near the western boundary (GR D43 105 185). The dense red tussockland consists of red tussock (50%), bryophyte (15%), leaf litter (12%), exotic grass (6%), wirerush (3%), bog pine (2%), matagouri (2%), cutty grass (2%), lichen (2%), *Coprosma* sp. aff. *parviflora* (1%), *Pentachondra pumila* (1%), *Cyathodes empetrifolia* (1%), *Lycopodium fastigiatum* (1%), *Ranunculus multiscapus* (1%), *Acaena novae-zelandiae* (1%), cottonwood, *Coprosma* sp. aff. *intertexta*, *Gaultheria macrostigma* and other species.

Shrub tussockland

This community dominates much of the block, being found mainly on hill slopes. The composition of this community varies greatly. Generally red tussock, matagouri, other shrubs, bracken and a range of smaller stature plants are present. Only one area was described. This area consisted of red tussock (18% average, 6-30%), hawkweed (20% average, 12-35%), the moss *Racomitrium lanuginosum* (15% average, 2-20%), bracken (12%),*Gaultheria macrostigma* (6%), exotic

grass (5%), matagouri (3%), blue tussock (3%), *Leucopogon fraseri* (3%), bryophytes (3% average, 2-5%), *Coprosma* sp. aff. *parviflora* (2%), *C. petriei* (2%), *Lycopodium fastigiatum* (2%), lichen (2%), mingimingi (1%), *Pimelea oreophila* (1%), *Brachyglottis bellidioides* (1%), harebell (1%), manuka, *Coprosma rugosa, Corokia cotoneaster*, bog pine, *Ranunculus multiscapus*, little hard fern and other species.

Bracken mingimingi, manuka and bog pine can all be locally important.

Shrubland

There are limited shrubland areas on the property.

Coprosma propinqua shrubland: This community was found on the steep scarp above the Whitestone River. Much of this community is thought to be on marginal strip. The area described was at GR D43 105 188. The major components of the shrubland are mingimingi (*Coprosma propinqua*, 50%), *Corokia cotoneaster* (8%), bracken (8%), *Olearia avicenniaefolia* (5%), *Coprosma* sp. aff. *parviflora* (5%), *Rubus schmidelioides* (5%), matagouri (3%), with some manuka, bog pine and *Coprosma rugosa*.

A shrubland similar to this extends around onto the scarp above Moat Creek. In this area the major species is again mingimingi, with much matagouri, some *Coprosma* sp. aff. *parviflora, C. rugosa*, pouhuehue (*Muehlenbeckia australis*) and *Rubus schmidelioides*

Manuka shrubland: A small area of manuka shrubland was recorded at GR D43 115 192. This shrubland was dominated by manuka with some mingimingi, matagouri and *Coprosma* sp. aff. *parviflora.*

2 North of Moat Creek

This area is largely cultivated pasture land, with some modified wetlands and shrublands on terrace risers.

Problem Plants

Species recorded were:

Broom

Scattered throughout the property but widespread about the southern boundary with an extensive and increasing infestation near Lake Thomas. Much of the source is on adjoining properties.

Spanish Heath

One plant found (and removed) north of the mid-section of Moat Creek.

Elderberry

Scattered plants by the Moat Creek vehicle crossing and along the Mt Prospect road.

Himalayan Honeysuckle

Common in the shrublands near Lake Thomas.

Scotch Thistle

Scattered along the Mt Prospect road.

Foxglove

Scattered patches beside the lower sections of the Mt Prospect road and near the vehicle crossing on Moat Creek.

Sweet Brier

Scattered along much of the Mt Prospect road.

Wilding Trees

Three trees (probably *Pinus radiata*) observed – two near Lake Thomas and one on the northern slopes of Danby Hill. Fringe spread from some Douglas fir planted by a duck pond north-west of Danby Hill is in need of urgent control action.

Hieracium pilosella

Widespread throughout open unimproved country.

Gorse

Some scattered plants around the property, especially near the southern boundary.

The greatest threats are from the broom about Lake Thomas and Douglas fir wilding spread. The latter could well spread over much of the undeveloped country in time if action is not initiated promptly.None of the other species are currently a significant problem, and will not become so if control operations were to be initiated promptly.

Significance of the Vegetation

Mt Prospect contains a rich diversity of vegetation,both in the number of kinds of ecosystems represented, and in the naturalness and species richness of plant assemblages in each ecosystem.Wetlands feature throughout the lease and many of them are nationally significant – particularly those where *Carex* species sedges are common elements.Low altitude tussock, shrub and lichenfield communities are each nationally significant.Out of 9 ecosystems

described for the Upukerora ED by Harding(1999), 5 are on the lease and are summarised below.

1 **Mountain Beech Forest**

Small areas along Moat Creek and in gullies on the south side of Danby Hill.A significant lowland riparian association with regeneration potential.

2 **Shrublands**

Broadly split into five groups, comprising:

- sub-alpine shrublands on summit and south slopes of Mt Prospect.

- gully shrublands at mid altitudes on southerly aspects.

- mixed shrublands on lower slopes adjacent to Moat Creek and in the stream adjacent to Mt Prospect road.

- manuka shrubland, originally once extensive around wetlands and natural fire scars (eg. bottom of Mt Prospect road) is now scarce and fragmented by pastoralism.Manuka blight has also taken its toll.

- shrub-tussockland and bog pine shrub-tussockland, the latter relatively widespread at lower altitudes and is a much reduced characteristic of the Upukerora ED.The notable shrub *Olearia bullata,* is a nationally threatened shrub of wetlands.

3 **Red Tussockland-flaxland**

This ecosystem is split in to the following:

- hill slope red tussockland, extensive on the property with variable tussock density.

- dense red tussockland on gentle slopes and flat areas, around Moat Creek.

- Valley floor red tussockland, in tributaries of the Thomas Burn, and dry river terraces, often with variable tussock cover.

  These tussocklands have been induced by a long fire history. However the condition, extent and diversity of the red tussocklands indicate that they have been present for some substantial time. Mt Prospect now retains the most extensive tussockland in the Te Anau Basin. The geology and soils differ from that in the Burwood Red Tussock Scientific Reserve and so the composition is also different. Notable species found include the nationally listed threatened plants *Ranunculus ternatifolius* and *Carex tenuiculmis*, as well as the native broom,*Carmichaelia nana.*

4 **Lichenfield**

There are two major lichenfield areas remaining, both within the lower currently undeveloped land. Cold air drainage and frost lie combines with impoverished gravely soils to influence the vegetation pattern. Communities of this type associated with glacial soils are not known elsewhere in New Zealand outside of Southland and this site is the sole remaining site known in the Upukerora ED. The natural setting of this highly significant community adds to its importance.

5 **Wetlands**

There are two major wetlands types found on the property, these being the infertile peatlands and more fertile swamps. There are however a range of swamp systems present and often the peatlands and swamps can form part of a large wetland complex.

- peatlands, of which 3 moderate sized examples occur on the property. They are well-buffered and more natural than many other peatlands in the ecological district.

- swamps. Major communities include:

  - short *Carex* moss-turf swamp, a few of these swamps are present on the property. The major *Carex* species is *C. diandra* though locally *C. gaudichaudiana* and/or *C. echinata* occurs.
  - turfs.
  - tall *Carex* swamp.
  - *Carex secta* dominated swamp, adjacent to beech forest in the north of the property, and a drained example north of Moat Creek, near the Whitestone River.
  - *Carex diandra* dominated swamp, found in a couple of wetlands.
  - Mixed *Carex* –rush-tussock swamp, part of a larger wetland at the foot of Mt Prospect.

Swamps are much more fertile than peat bogs and have suffered much more from drainage and land development. They are amongst the most reduced wetland associations locally, regionally and nationally. Mt Prospect retains some relatively large and diverse wetland systems, which were once widespread in the Te Anau Basin and Upukeroroa ED. Though several peatland systems are protected, swamps are relatively poorly represented or protected in the Te Anau basin. The size, intactness and diversity of swamps, their association with peatlands, and the natural setting of these wetlands results in national importance of these systems.

Flora

A flora of 239 native species (including 3 hybrid plants and one planted species) were recorded (see Appendix 1). This flora is diverse considering the relatively low altitude of the property, however it reflects the ecosystem diversity and relatively intact condition of the vegetation. Species groups that are considered

particularly diverse include *Carex* (13 species), *Epilobium* and orchids (11 species), *Olearia* (7 species), *Ranunculus* (11 species) and *Euchiton* (11 species).

Species of particular note that were recorded include:
Ranunculus ternatifolius (National status – vulnerable) This buttercup was recorded from two sites, however suitable habitat indicates that it could be more widespread. It is also expected to increase in abundance and distribution if freed from browsing pressure.

Alepis flavida (National status – Gradual Decline) This mistletoe was recorded from mountain beech forest on DOC administered land. It could also be found on the property.

Carex capillacea (National status – sparse) This sedge was recorded from a few plants at a single site in the Thomas Burn catchment.

Carex tenuiculmis (National status – sparse) This sedge was recorded from eight sites on the property, however the amount of suitable habitat indicates it is probably more widespread. Two moderate sized populations (found at GR D43 107 163 and 122 203) are considered significant sites.

Olearia bullata (National status – sparse) This shrub daisy was recorded from a number of sites in wetland and on wetland margins.

Note: Species status follows Molloy et. al. (2001).

2.5 Fauna

2.5.1 Invertebrate Fauna

Invertebrates were hand collected or collected at ultraviolet light at night. An inventory of 172 species of invertebrates was made including 129 moths that characterise a broad range of habitats. Some moths are endemic to west Otago and Southland, many other moths are uncommonly noted being widely recorded in the South Island but specifically associated with a class of habitat rather than being widely distributed. A feature of the moth fauna is the occurrence of upland-alpine grassland and shrub species. This is despite the absence of extensive land above 800 m. In general, insects on the lease are associated with inter-montane basin ecosystems/habitats of non-forest. Invertebrates of such habitats as wetlands, grasslands and shrublands are an outstanding feature of Mount Prospect Pastoral lease and nationally significant assemblages of insects are recorded. Extensive areas that are inclusive of such an array of habitats and gradients between them were characteristic of glacial tills and glacial outwash terraces elsewhere in the Upukerora Ecological District (ED). However, this lease now encompasses the most natural and extensive habitat mosaic that remains in the ED.

Feature sites or habitats with significant inherent value for invertebrates are described as follows;

West of Mt. Prospect and Danby Hill: Terraces and lower slopes below 500 m

A rich complex of interlocking communities has evolved in post glacial times on out-washed moraine debris and loess. The severity of frosting, cold air drainage and summer dry spells is an important influence on all communities. Terraces have a subdued relief of undulating humps and hollows. Thus, a mosaic of mixed tussock and shrubland, includes many peaty hollows and extensive broad and gently dipping areas of sog-short *Carex* species wetlands. There are also some basins of well drained soils where herbs and lichens dominate a mixed short tussock grassland.

Moths *Orocrambus scutatus* and *Ichneutica* sp.aff. *notata* and also butterfly *Argyrophenga antipodum* all have larvae feeding on red tussock. Moth *Tingena maranta* is known from short tussock. In the habitats of herbfield and low shrubland are; moth *Pasiphila magnimaculata* (larvae in *Gaultheria* flowers), moth *Epichorista aspistana* (larvae on *Acaena*) and boulder butterfly *Boldenaria* nsp. (larvae on *Muehlenbeckia axillaris*). Lichenfield features insects with very fragmented distribution in association with naturally open areas that have sparse vegetation cover. These include ground weta *Hemiandrus* ?species (generally –Range restricted, Molloy et al. 2001), black cicada (*Maoricicada campbelli*) and moth *Delogenes limodoxa*. This last moth has flightless females and limited ability to disperse. A number of insects specialise in dry shrubland here and many pollenator insects were associated with flowering manuka.

Complex wetlands are nationally significant for their assemblage of insects. They have characteristically abundant production of midges, leaf hoppers, damsel flies and many other species. As well, moths were recorded in specific habitats. The moth *Asaphodes stinaria* (threat of extinction rank: Nationally endangered, Molloy et al 2001) has larvae feeding on native buttercup *Ranunculus foliosus* or *R. reflexus* in wet and possibly shaded sites here. This moth was once widespread and common in Southland and elsewhere in New Zealand but has not been recorded in Southland for 57 years. The sphagnum porina *Heloxycanus patricki* (Gradual decline, Molloy et al 2001) and bright day active moth *Orocrambus heliotes* inhabit moss bog. The tiny moth *Glyphipterix bactrias* has larvae on short *Carex* sedges. The vividly patterned moth *Meterana exquisita* (Gradual Decline) is locally common here on shrubs of *Olearia bullata* growing in wetland margins.

West Mt. Prospect above 500 m

Tussock, bracken and fernland, forest, shrub and herbfield, and wet flush areas all have invertebrate fauna with significant natural character. Some colourful alpine moths of note include *Dasyuris callicrena* (larvae on *Hebe*), *Notoreas paradelpha* (larvae on *Kelleria*) and *Asterivora barbigera* (larvae on *Celmisia* leaves). These along with other moths and grasshopper *Paprides dugdali* are indicators of a natural alpine environment.

Communities linked to Moat Creek

The lower Moat Creek is cut down through terraces and has well vegetated gorge like slopes flanking a narrow valley floor where the shallow stream meanders through coarse gravels in forest and in shrubland. Further downstream the creek emerges out onto the Whitestone River floodplain and then dissipates its flow in a swamp system. Another stream catchment under the summit of Mt. Prospect and flanking the airstrip is cut down in a similar way and has some of the same habitats. Lower Moat Creek has a rich fauna of shrubland insects including 34 moths recorded from shrub and forest and 25 caddis species from the stream. Having adjacent native grassland and wetlands adding to the habitat diversity, this is one of the richest low elevation areas on the lease and in the ED retaining significant invertebrate diversity.

Thomas Burn catchment -south of Mt. Prospect

Because this region has escaped having large volumes of glacial till and outwash dumped on it, the soils and landforms are derived from weakly cemented and weathered conglomerate and sandstone. Ecosystems have high natural character here and the invertebrate fauna shows a long association with diverse non-forest habitats. It is likely that historical natural forest cover was discontinuous and very open. Thus the extensive dry grasslands, wet grasslands, mixed shrublands, dry herb and lichen areas and wet flush areas are important habitats of invertebrates. Many moths noted here are also present in the west of the lease (eg. moth *O. heliotes*) and many species are also upland and alpine species (eg. moth *Ichneutica nervosa*) found here at unusually low altitude (470 –600 m asl). Wet flush areas are at the toe of some slopes and these feature cushion and liverwort communities. Moth *Kiwaia cheradias* has larvae on open cushion areas and moth *Sabatinca* (?)*caustica* has larvae on liverworts. Associated seepages are also sites for aquatic insects such as caddis *Triplectides dolichos* and stonefly *Zealandobius furcillatus*. The small tributary streams have very high natural character being clothed and often obscured by a dense cover of tussock and shrub. Streams are integrated with seepage, flush and moss/cushion bog providing diverse natural habitats for aquatic invertebrates.

In addition to the damp areas, the extensive lowland grassland/shrub/moss-lichen associations are nationally significant habitats of native invertebrates. Many moth species are endemic to

Southland and Otago region and 56 species of moth were noted from these habitats during survey.

Forest Areas

The large carabid beetle, *Mecadema sculpturatum* was found under a log within forest. The forest also contains a range of other invertebrates. Although most of the forest in the locality is already legally protected there are some areas of forest within the lease. Most of the forest (including legally protected areas) is unfenced. As a consequence, stock have an impact upon the forest understory and hence the invertebrate habitat. Fencing would improve the forest habitat.

2.5.2 Herpetofauna

Two species of lizard were widespread throughout Mt Prospect Station. *Oligosoma inconspicuum* and *O. nigriplantare polychroma* were both found at several sites on the property, particularly on north-west facing slopes.

Oligosoma inconspicuum is a widespread species in Southland however it is considered to be in gradual decline (Hitchmough, 2001) as the species is localised in many areas due to habitat reduction. This species was relatively common throughout the survey area in a variety of habitats.

O. nigriplantare polychroma is also a widespread species within Southland and it is ranked as not threatened (Hitchmough, 2001). This species was also widespread and abundant in a variety of habitats on Mt Prospect station.

2.5.3 Avifauna

Birds recorded during the inspection were:

White-faced heron - several seen flying or feeding about the property, especially around the new cultivation.
Mallard - present on most ponds.
Paradise shelduck - groups of up to four seen on pasture west of the shearing shed, and on ponds and wetlands at the south of the property.
Australasian harrier - scattered throughout
New Zealand falcon - two birds seen above the major slip beside the Mt Prospect road.
South Island pied oystercatcher - four on the ATV-damaged wetland at the south of the property.
Pied stilt - ten on the ATV-damaged wetland.
Spur-winged plover - 32 recorded on the new cultivation.
Black-backed gull - regularly seen flying over – usually in pairs.
Black-billed gull - six seen on the new cultivation.

Black-fronted tern - several seen on the ATV-damaged wetland and flying over the new cultivation.
Parakeet sp. - one heard calling from beech forest and shrubland opposite the airstrip.
Shining cuckoo - one heard calling from beech forest and shrubland to the north of the Mt Prospect road.
Skylark - scattered throughout more open unimproved areas.
New Zealand pipit - common throughout, especially along vehicle tracks.
Dunnock (Hedge sparrow) – scattered throughout open and shrubby areas of the property.
Brown creeper - several heard in beech forest and shrubland near the Mt Prospect road.
Grey warbler - heard in beech forest and shrubland near the Mt Prospect road.
South Island Tomtit - two seen in beech forest and shrubland to the north of the *Carex* swamp adjacent to the Mt Prospect road.
Blackbird - scattered throughout taller shrubland.

Silvereye - scattered throughout shrublands.
Tui - one in trees by the homestead.
Yellowhammer - common throughout.
Greenfinch - several in shrubland by the Mt Prospect road.
Redpoll - common throughout, especially about shrubland edges.
House sparrow - a few around farm buildings.
Australian magpie - eight on the new cultivation.
Chaffinch - regularly recorded around shrublands.

2.5.4 Aquatic Fauna (Freshwater Fish)

Fish were surveyed by observation for larvae in small stream pools and by spot fishing with a backpack mounted electric fishing machine (EFM). Observations from five streams are shown in Table 1. below. The significance of the flowing waters of the lease is also discussed.

Table 1. Sites spot fished by EFM

Locality	elevation	fish species recorded	grid reference
Moat Creek	355 m	Alpine galaxias *Galaxias paucispondylus, Galaxias gollumoides*, *Galaxias* species 'Southern', Upland Bully *Gobiomorphus breviceps*	D43 111 195
Moat Creek	430 m	*G. gollumoides*	D43 120 183
Unnamed tributary, Whitestone R.	440 m	*G.* species 'Southern'	D43 125 213

(west Mt. Prospect)			
Unnamed tributary, Dawson City	400 m	*G.* species 'Southern'	D43 114 167
Wetland Tributary, Lagoon Creek	455 m	*G. gollumoides*	D43 132 151
Tributary, Thomas Burn	465 m	none	D43 152 153

Four species of fish were noted on the lease including one bully and three non-migratory galaxiid fish species. No introduced fish were found and the lack of trout is particularly significant. Significantly, Moat Creek has the most complex fish community with all four species present. The lack of sea migratory fishes reflects the remoteness of the area as well as the filtering/barrier effect of the Mararoa Weir on migration of fish from the Waiau River downstream. Alpine galaxias *Galaxias paucispondylus* found in Moat Creek has never previously been known from the Whitestone River catchment or indeed anywhere in the entire Waiau River basin. Its occurrence in Moat Creek signals a relatively unique habitat for the Te Anau Basin. There is abundant mobile greywacke alluvium in the beds of both Moat Creek and the un-named tributary streams enclosing the airstrip. The beds are shallow and sinuous over coarse rounded cobbles and the water flows are swift. Elsewhere in the South Island, generally on Torlesse terrane greywacke, this is the ideal habitat of alpine galaxias. The high sediment loads of these streams is sourced from a number of naturally occurring steep soil slips and landslides on the upper slopes of Mt Prospect (Sutherland 1995). The tributary associated with the Mt Prospect airstrip is one of the more significant sediment sources for the Whitestone River (Sutherland 1995). However, Moat Creek descends into the bermlands of the Whitestone where a large swamp acts as a filter for sediments from this catchment (Sutherland 1995). The filtering effect of the swamp is also a significant barrier to brown trout. Brown trout and other salmonids have reduced the range and abundance of native galaxiid fishes elsewhere. Their absence from the lower Moat Creek (at 355 m altitude) is nationally significant for the complex assemblage of native fish that persist here.

Aside from Moat Creek, the non-migratory fishes *G.* species 'Southern' or *G. gollumoides* are known from small tributary streams in all the remaining catchments on the lease. No fish were found in the tributary of the Thomas Burn (Table 1). However, the national freshwater fish database indicates the presence of galaxiid fish and brown trout in the Thomas Burn and it is very likely that one of these fish is present in low numbers in tributaries on the lease. The extensive wetland complexes of sog, swamp and wire rush that are associated with all the streams listed in Table 1. are significant for water supply (Sutherland 1995) and water chemistry. The importance of these wetlands for the life cycles of galaxiid fishes and as habitat for them is un-known.

The Department of Conservation has a national recovery plan for threatened non-migratory fish including *G.* species 'Southern' (threat of extinction status –Data deficient, Molloy et al. 2001)

and *G. gollumoides* (not threatened). This plan (Department of Conservation, draft 2002) states as its primary ecosystem objective "Identify, protect and manage a minimum of 30 habitats with key non-migratory populations, for each species". Both these fish species are found as numerous isolated small stream populations endemic to catchments south of the Clutha River/Mata-au (with a few Clutha populations) and on Stewart Island. Both fish species are protected on Stewart Island and some populations of *G. gollumoides* are known in protected areas of the Eyre Mountains, Longwood Range and some other sites. Few records exist for *G*. species 'Southern' and there is less certainty about populations in protected localities. In this context, each of the streams with native fish in Table 1 above is very natural in character and contains key populations of non-migratory galaxiids worthy of protection as outlined in the national recovery plan.

2.5.5 Problem Animals

Rabbits - scattered through much of the terrace country. There is evidence of past high numbers around spot height 432 metres in particular.

Hares - widespread especially in open unimproved country.

Pigs - sign seen at several sites around the property, notably around the edge of the wetland to the north of spot height 432 metres.

Deer - present in adjoining forest areas.

Significance of the Fauna

Invertebrate Fauna

On the lease, a great complexity and diversity of non-forest habitats of invertebrates is present at low altitude (much of it below 600 metres). This feature is nationally significant. Many insects are representative of the Te Anau Basin and the Upukerora Ecological District but their habitats elsewhere in the district or Southland generally are much diminished. There is high natural character in the significant assemblages associated with:

-sog/short *Carex* species wetlands -moss bogs
-Moat Creek -Thomas Burn tributaries/wetlands
-wet tussock/*Olearia bullata* -extensive tussock-shrub communities
-lichenfield & short tussock.

The presence of upland-alpine insects at low altitude is significant. The linkage between different classes of habitat and linkage to adjacent protected forest is significant for faunal habitat viability, integrity and buffering.

Species ranked for threat of extinction (criteria of Molloy et al 2001) are present including:

Insect	**Habitat**
Moth *Asaphodes stinaria* (Nationally endangered)	wetland buttercups
Moth *Meterana exquisita* (Gradual Decline)	wetland shrub daisy
Moth *Heloxycanus patricki* (Gradual decline)	sphagnum moss bog
Ground weta *Hemiandrus* ?species (generally –Range restricted)	lichenfield & short tussock

Herpetofauna

Oligosoma inconspicuum and *O. n. polychroma* are present at numerous sites managed by the Department of Conservation throughout Southland. However, the significance of Mt Prospect Station's lizard fauna is in terms of the relatively intact and diverse natural environment in which they exist. Encounter rate of both species was reasonable in areas of low modification (ie. no recent burning, light grazing) and good lizard habitat was identified at a number of locations e.g. Danby Hill, Thomas Burn, spot height 432 metres. Of note was the small area of boulder fields on Danby Hill. This site contained two species of skink and was the only place on Mt Prospect Station where this type of habitat was found. This site is significant in the context of the Te Anau Basin.

Lizard records within the Te Anau Basin are somewhat patchy and whether this is due to a general lack of records in the Te Anau region and /or a reduction in suitable lizard habitat due to intensive pastoral development is uncertain. Much of the Te Anau Basin has been intensively developed and farmed since the 1950's. This land development has fragmented the natural habitat for lizards.However, Mt Prospect has extensive habitat with high natural character in the non-forested parts.This is significant for skinks in the Te Anau Basin.

Avifauna

Considerable diversity of bird species occurs due to:

- close proximity to extensive beech forests and bush margins.
- extensive wetlands, swamps and open water bodies.
- extensive (open range) tussocklands.
- extensive developed farm land.

The most significant species present was the New Zealand falcon. This is a second priority species for conservation (Molloy and Davis, 1994).The extensive open sog wetlands are significant feeding areas for visiting wetland birds.

Aquatic Fauna

The fish alpine galaxias *Galaxias paucispondylus* has a population at Moat Creek. It's discovery is a significant new range extension and

the only record for the entire Waiau River Catchment. It is at its south-western distributional limit for the fish.

The assemblage of four species of non-migratory fish found in Moat Creek (alpine galaxias, *Galaxias* species 'Southern' *Galaxias gollumoides* and upland bully *Gobiomorphus breviceps*), where brown trout are absent, is nationally significant.

The linkage between numerous small tributary streams and extensive natural wetland is significant for aquatic ecosystems. Where this occurs in shrub and grass dominated sites (Thomas Burn, Dawson City Wetland and lower Moat Creek catchments) rather than forest the aquatic ecosystems are uncommon and endemic to the Upukerora Ecological District.

The fluvial geomorphology of both Moat Creek and the un-named tributary streams enclosing the airstrip is uniquely influenced by very active sedimentation from soil slip and landslide of rocks known as the Prospect formation (tertiary sandstone/conglomerates) on the upper slopes of Mt. Prospect (Sutherland 1995). The physical character of these streams is un-common for the Upukerora Ecological District. These create a habitat suitable for the fish alpine galaxias *Galaxias paucispondylus*.

The fish species *Galaxias* species 'Southern' has the threat of extinction status –Data deficient and is present in at least three streams on the lease. The draft national non-migratory freshwater fish recovery plan supports the protection of key populations of *G.* sp. 'Southern' and *G. gollumoides* across their natural geographic range. Both these fish occur in Moat Creek. This creek has high natural character and could be described as a key site. The other streams on the lease where either fish is present also have high natural character and are also candidates as key sites.

2.6 Historic

There are no known historic or archaeological sites of interest on the property.

2.7 Public Recreation

2.7.1 Physical Characteristics

The property is located at the eastern end of Kakapo Road, in the western part of the Te Anau Basin, east of the Whitestone River. This river, along with contributing water bodies on Mt Prospect, are part of the large Waiau River catchment.

Road access within the property is limited to the well formed 2WD standard track to the summit of Mt Prospect, built to service the telecommunications facility on the summit, and 4WD farm access tracks that cross the river flats and low terraces and onto the summit of Danby Hill. There is no tracking within the catchment of Moat Creek.

2.7.2 Public Access

Marginal Strips

Marginal strips exist along the east bank of the Whitestone River and around Lake Thomas. Dawson City is existing conservation land.

The lease was renewed in 1993 but the new lease title fails to record that it is subject to Part IVA Conservation Act marginal strip requirements.There appears to be no record that watercourses were ever assessed by DOSLI, (predessor of LINZ), to assess marginal strip requirements.

Potential marginal strips are likely to be required along Moat Creek and the un-named stream south of the airstrip to its junction with the Whitestone River. The branch of this stream that extends northeast to the Glen Echo Station boundary is also a likely contender for marginal strips.

Legal Roads

The only legal access to the property is Kakapo Road, which adjoins the pastoral lease boundary in the middle of the Whitestone River bed. There are no legal roads, formed or unformed, within the pastoral lease. The legal road shown leading to Lake Thomas on the status report plan for the property appears to have been surveyed as legal road but never taken for this purpose.

The track that provides access to the Telecom land and facility on the summit of Mt Prospect has been surveyed as a right of way. DOC understands that the legal agreement between the Crown and Telecom for the acquisition of this land by Telecom was to include the access track from the pastoral lease boundary at the end of Kakapo Road to Mt Prospect summit and for it to become freehold owned by Telecom also. Access for farm management purposes over the lower portion of this track was to be provided to the lessee of Mt Prospect.

At the time of writing this report, this acquisition had not been completed and the land over which the access track lies remains as pastoral lease. This acquisition action will need to be completed prior to the tenure review concluding. The result will be that this land and access track will no longer be part of the pastoral lease and could not be considered for future access needs for DOC or the public.

A ROW exists for DOC and the public from the end of Wilderness Road, to provide legal access to Dawson City conservation area which is adjacent to the pastoral lease boundary.

2.7.3 Activities

The summits of Mt Prospect and Danby Hill are easily accessible and provide excellent views of the Te Anau Basin, Lake Te Anau, eastern Fiordland, Livingstone Range, Snowdon Forest, West Dome and the

Takitimu Range. Both summits have tracks leading to them that would be suitable for walking, mountain biking and horse trekking.

The basin between Mt Prospect and Danby Hill, with its untouched natural character, has considerable amenity value for easy tramping trips combined with climbs to the two summits.

Limited hunting for deer and pigs exists.Duck shooting maimais occur on some of the ponds on the property.

There are three small musterers huts ,two in the midreaches of Moat Creek and the other in a beech remnant on the south slopes of Danby Hill.These huts may have some value for recreation use.

PART 3

Other Relevant Matters and Plans

3.1 Consultation

The property was commented on by NGOs at an early warning meeting held in Alexandra on 8 October 2001.

Key points raised were:

- upper slopes of Mt Prospect have high inherent values and adjoin conservation estate.
- public access opportunity up the Telecom access road.
- wetlands around lake Thomas and Moat Creek are significant and will need marginal strips.
- Whitestone River has important braided river natural values.

Written confirmation of these values has been received from the Upper Clutha branch of Royal Forest and Bird Protection Society. Additionally, written reports following inspections have been received from the following:

Dr Alan Mark (Appendix 2)

- recommended conservation area status for the red-tussock shrubland in the headwaters of Moat Creek from Mt Prospect summit and the beech forest along the creek margins.

- recommended a small area of mixed red tussock – bog pine on terrace country be reserved or covenanted.

- recommended covenanting of a small area of peaty soil with substantial amounts of podocarp wood present as a historic record of the past vegetation of the Te Anau Basin.

Dr Kelvin Lloyd, Federated Mountain Clubs (Appendix 3)

- identified a substantial part of the property become conservation land namely most of the remaining undeveloped land above the 440 metre contour, utilising existing fencelines.

- land south of the Danby Hill ridge to the southern boundary of the property to be protected by covenant or conservation area with a grazing concession to control broom.

- protection by covenant over the wetlands below the airstrip.

- protection by covenant over the lower terrace lichenfield.

- public foot and mountain bike access easement up the Mt Prospect access track, along the farm track below the airstrip and heading south and east to proposed conservation area boundary near Lake Thomas. Access to Danby Hill and covenanted wetlands and lichenfields to be included.

3.2 Regional Policy Statements and Plans

The Southland Regional Policy Statement identifies named wetlands in the Te Anau Basin as being regionally important. At the time of preparation of this RPS, knowledge was poor of all the significant wetlands in Te Anau Basin.
The Proposed Southland Regional Freshwater Plan allows for the drainage of all but a few named wetlands. None of these wetlands are on Mt Prospect although the RPS identifies the wetlands in Te Anau Basin as regionally important.

It is also noted that land clearance and wetland drainage in the past by the Crown in the Te Anau Basin has had very significant effects. At least one detention dam had to be constructed to replace a lost wetland – Lagoon Creek Wildlife Management Reserve. This experience would strongly suggest that developers clearing indigenous vegetation such as tussock grasslands and wetlands in this area will change the hydrological cycle to the extent that significant stream bank erosion and flooding of downstream properties will occur. Small permanent streams are also likely to dry up in the summer with a consequent impact on any fishery values.

3.3 District Plans

The operative Southland District Plan has a Rule HER 3 that requires applicants to seek consent:

* For the clearance modification or destruction of indigenous vegetation that has grown naturally or on land cleared of vegetation prior to 1984;

* The clearance or modification of indigenous grasslands where the percentage canopy of tussock species is more than 50%. Thus the development of a paddock with 60% coverage of tussocks would require an application for a land use consent to the Southland District Council.

* Clearance of lichenfields and peat bogs and other indigenous vegetation not specified would require a consent.

3.4 Conservation Management Strategy (CMS)

The Southland Conservancy CMS has identified the Te Anau Basin as a significant landscape unit and has described the conservation features within the unit (see section 6.20, Te Anau Basin, extract attached – Appendix 4).

Statements made that are relevant to Mt Prospect pastoral lease are:

- to give priority to the protection of bog pine communities and wetlands.

- advocate for protection of peatlands which are relatively intact or offer potential for restoration.

- to allow horse trekking and mountain biking in specified back country areas where they are compatible with the protection of natural values.

- to provide opportunities ….. for visitors to enjoy back country areas which offer day and overnight recreation opportunities.

3.5 Freshwater Fisheries Plans

The Department has prepared a draft National Non-migratory Freshwater Fish Recovery plan. It contains the following key ecosystem objective.

Objective 1: Identify, protect and manage a minimum of 30 habitats with key non-migratory [fish] populations, for each species (see Appendix list of key sites).

Performance measure:

- **Protective measures are initiated for water-bodies containing key populations of nationally threatened non-migratory galaxiids through tenure review, plan or resource consent hearings, or non-statutory initiatives such as covenanting, by 2005.**

Explanation

Forestry operations, farming impacts such as poor riparian management, and water abstraction are key issues affecting most non-migratory galaxiid species. More co-ordinated action to address these threats is required for nationally threatened species, particularly those with a highly restricted geographic range. Legal protection of habitat, in tandem with statutorily set minimum flows through the Resource Management Act, are tools to address these threats. To date RMA advocacy has been the main tool used to combat these threats. A more targeted effort using other initiatives such as purchase/covenanting is also required for identified key non-migratory population sites. Other options include more targeted advocacy through guiding documents such as the [draft] multi-species Recovery Plan for Canterbury's braided rivers.

3.6 New Zealand Biodiversity Strategy

The New Zealand Government is a signatory to The Convention on Biological Diversity. In February 2000, Government released the New Zealand Biodiversity Strategy which is a blueprint for managing the country's diversity of species and habitats and sets a number of goals to achieve this aim. Of particular relevance to tenure review is Goal Three which states:

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

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

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

PART 4

MAPS ETC.

4.1 ADDITIONAL INFORMATION

4.1.1 Appendices

- Appendix 1 Mt Prospect Station – native plant species list.
- Appendix 2 Submission from Dr Alan Mark.
- Appendix 3 Submission from Dr Kelvin Lloyd of Federated Mountain Clubs.
- Appendix 4 Extract from Southland Conservancy Conservation Management Strategy.
  pp 304-309.

4.2 References

Department of Conservation 2002. Draft – National non-migratory freshwater fish recovery plan. Draft. Department of Conservation, Wellington.

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McKellar, I.C. (1973). Te Anau – Geology of Manapouri District. Geological Survey Miscellaneous Series Map 4. Department of Scientific and Industrial Research, Wellington.

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Sutherland, R. D. (1995). Mararoa and Whitestone Catchments: Sediment sources & management opportunities. Electricity Corporation of New Zealand, Dunedin.

Turnbull, I. M. (1986). Sheet D42 BD & Part Sheet D43 B Snowdon. Geological map of New Zealand. Department of Scientific and Industrial Research, Wellington.

4.3 Illustrative Maps

4.3.1 Topo. Cadastral
4.3.2 Landscape Values
4.3.3 Ecological Values

Mt Prospect Station – native plant species list

Ferns

Asplenium flabellifolium	a fern
Asplenium flaccidum	spleenwort
#Blechnum minus	swamp kiokio
Blechnum novae-zelandiae	kiokio
Blechnum penna-marina	little hard fern
Blechnum montanum	mountain kiokio
#Grammitis billardierei	a fern
Histiopteris incisa	water fern
Hypolepis millefolium	thousand-leaved fern
#Lycopodium australianum	a clubmoss
Lycopodium fastigiatum	a clubmoss
Lycopodium scariosum	a clubmoss
Ophioglossum coriaceum	adder's tongue fern
Polystichum vestitum	prickly shield fern
Pteridium esculentum	bracken
Pyrrosia eleagnifolia	leather-leaved fern

Trees and shrubs

Alepis flavida	yellow flowered mistletoe
Aristotelia fruticosa	mountain wineberry
Brachyglottis buchananii	a tree daisy
Brachyglottis cassinoides	a shrub daisy
Brachyglottis revoluta	a shrub daisy
Carmichaelia nana	a dwarf native broom
Carmichaelia petriei	a native broom
Carpodetus serratus	marbleleaf
Coprosma brunnea	a coprosma
Coprosma cheesemanii	a coprosma
Coprosma ciliata	a coprosma
#Coprosma cuneata	a coprosma
Coprosma sp. aff. intertexta	a swamp coprosma
Coprosma sp. aff. parviflora	a coprosma
Coprosma petriei	a dwarf coprosma
Coprosma propinqua	mingimingi
Coprosma pseudocuneata	a coprosma
Coprosma rugosa	a coprosma
Coriaria sarmentosa	tutu
Corokia cotoneaster	corokia
Cyathodes empetrifolia	a dwarf shrub
#Cyathodes juniperina	prickly mingimingi
Discaria toumatou	matagouri
Dracophyllum longifolium	turpentine shrub
Dracophyllum sp. aff. oliveri	swamp turpentine shrub
Dracophyllum prostratum	a dwarf turpentine shrub
Dracophyllum prostratum x D. aff. oliveri?	a hybrid turpentine shrub
Dracophyllum uniflorum	a turpentine shrub
Fuchsia excorticata	tree fuchsia
Gaultheria antipoda	false beech
#Gaultheria crassa	a snow berry
Gaultheria depressa	a snow berry
Gaultheria macrostigma	a snow berry
Gaultheria novae-zelandiae	a snow berry
Griselinia littoralis	broadleaf
Hebe odora	a hebe
Hebe aff. pauciramosa	a hebe
Hebe rakaiensis	a hebe

Hebe salicifolia	a hebe
Hebe subalpina	a hebe
Kelleria dieffenbachii	a dwarf shrub
Leptospermum scoparium	manuka
Leucopogon colensoi	a dwarf shrub
Leucopogon fraseri	a dwarf shrub
Melicytus aff. alpinus	porcupine shrub
Myrsine divaricata	weeping mapou
Nothofagus menziesii	silver beech
Nothofagus solandri var. cliffortioides	mountain beech
#Olearia arborescens	a shrub daisy
Olearia avicenniifolia	a tree daisy
Olearia bullata	a shrub daisy
#Olearia cymbifolia	a shrub daisy
#Olearia ilicifolia	mountain holly
#Olearia moschata	a shrub daisy
#Olearia nummularifolia	a shrub daisy
#Olearia nummularifolia x O. avicenniifolia	a hybrid shrub daisy
Ozothamnus vauvilliersi	cottonwood
Pentachondra pumila	a dwarf shrub
Phyllocladus alpinus	celery pine
Pimelea oreophila	a dwarf shrub
Pseudopanax colensoi var. ternatus	three finger
Pseudopanax crassifolius	lancewood

Climbers and vines

Clematis marata	a native clematis
Muehlenbeckia australis	pohuehue
Muehlenbeckia axillaris	a creeping shrub
Muehlenbeckia complexa	a vine
Rubus cissoides	a lawyer vine
Rubus schmidelioides	a lawyer vine

Herbs

#Acaena anserinifolia	a bidibid
Acaena caesiiglauca	a bidibid
Acaena fissistipula	a bidibid
Acaena inermis	a bidibid
Acaena novae-zelandiae	a bidibid
Acaena novae-zelandiae x A. inermis	a hybrid bidibid
Aciphylla glaucescens	a speargrass
#Aciphylla aff. horrida	a speargrass
Aciphylla subflabellata	a speargrass
Anaphalioides bellidioides	ever-lasting daisy
Anisotome aromatica var. flabellifolia	a herb
Brachyglottis bellidioides	a daisy
Cardamine aff. debilis (turf hollows adjacent to streams)	a bitter cress
Celmisia glandulosa	a daisy
Celmisia gracilenta	a daisy
Celmisia sp “gracilenta rhizomatous”	a daisy
Celmisia graminifolia	a daisy
Celmisia semicordata	a daisy
Celmisia traversii	a daisy
#Celmisia verbascifolia	a daisy
Centella uniflora	a creeping herb
Craspedia sp.	a woolly head
Dolichoglottis lyallii	yellow marguerite
Drosera arcturi	a sundew
Drosera spathulata	a sundew
#Epilobium alsinoides	a willow herb

Epilobium atriplicifolium	a willow herb
Epilobium brunnescens	a willow herb
Epilobium chlorifolium	a willow herb
#Epilobium elegans	a willow herb
Epilobium insulare	a willow herb
Epilobium komarovianum	a willow herb
Epilobium sp. “minutifolium”	a willow herb
Epilobium pallidiflorum	a willow herb
Epilobium pernitens	a willow herb
Epilobium tenuipes?	a willow herb
Euchiton audax	a cudweed
Euchiton laterale	a cudweed
Euchiton limosum	a cudweed
Euchiton polylepis	a cudweed
Euchiton traversii	a cudweed
#Euphrasia zelandica	an eyebright
#Forstera tenella	a herb
Galium perpusillum	a herb
Gentiana bellidifolia	a gentian
Gentiana grisebachii	a gentian
Geranium microphyllum	a geranium
Geranium sessiliflorum	a geranium
Geum leiospermum	a herb
#Gingidia decipiens	a herb
Gingidia montana	a herb
Gonocarpus aggregatus	a herb
Gonocarpus micranthus	a herb
Gonocarpus montanus	a herb
#Gunnera dentata	a creepingherb
Gunnera prorepens	a creeping herb
Helichrysum filicaule	an ever-lasting daisy
Hydrocotyle microphyllum	a pennywort
Hydrocotyle novae-zelandiae var. montana	a pennywort
Hydrocotyle novae-zelandiae var. novae-zelandiae	a pennywort
Lagenifera barkerii/petiolata	a daisy
Lagenifera cuneata	a daisy
Lagenifera strangulata	a daisy
Leptinella squalida var. mediana	a creeping daisy
Mazus radicans	a creeping herb
Mentha cunninghamii	native mint
Montia fontana	a water herb
Myriophyllum pedunculatum	a water millfoil
Nertera ciliata	a creeping herb
Nertera depressa	a creeping herb
Nertera setulosa	a herb
Oreomyrrhis colensoi	a herb
Oreomyrrhis ramosa	a herb
Oreomyrrhis rigida	a herb
Oreostylidium subulatum	a herb
Ourisia caespitosa	a creeping herb
#Oxalis lactea	a herb
#Plantago lanigera	a plantain
Plantago raoulii	a plantain
Plantago triandra	a plantain
Plantago uniflora	a plantain
Potentilla anserinoides	silverweed
Pratia angulata	a creeping herb
Pseudognaphalium luteo-album	Jersey cudweed
Ranunculus cheesemanii	a buttercup
Ranunculus foliosus	a buttercup

Ranunculus glabrifolius	a buttercup
Ranunculus multiscapus	a buttercup
Ranunculus reflexus	a buttercup
Ranunculus ternatifolius	a buttercup
Raoulia glabra	a mat daisy
Raoulia subsericea	a mat daisy
Raoulia tenuicaulis	a mat daisy
Rumex flexuosus	a native dock
Schizeilema cockaynei	a herb
Schizeilema nitens	a herb
Scleranthus brockei	a herb
Scleranthus uniflorus	a cushion
#Senecio wairauensis	a daisy
Stellaria parviflora	native chickweed
Utricularia monanthos	bladderwort
Viola cunninghamii	a native violet
Viola filicaulis	a native violet
Wahlenbergia albomarginata	harebell

Monocots

Grasses

Agrostis pallescens?	a grass
Chionochloa rigida var. rigida	snow tussock
Chionochloa rubra var. cuprea	copper tussock
Cortaderia richardii	toetoe
Elymus sp.	a grass
Festuca novae-zelandiae	fescue tussock
Hierochloe redolens	holy grass
#Poa brevifolia	a grass
Poa cita	silver tussock
Poa colensoi	blue tussock

Sedges

Carex breviculmis	a sedge
Carex capillacea	a sedge
#Carex comans	a sedge
Carex coriacea	cutty grass
Carex diandra	a sedge
Carex dissita	a sedge
Carex echinata	a sedge
Carex flaviformis	a sedge
Carex gaudichaudiana	a sedge
Carex secta	a sedge
Carex sinclairii	a sedge
Carex tenuiculmis	a sedge
Carex virgata	a sedge
Carpha alpina	a sedge
Eleocharis acuta	a spike rush
Eleocharis gracilis	a spike rush
Isolepis aucklandicus	a dwarf sedge
#Isolepis habra	a sedge
Oreobolus pectinatus	a comb sedge
Oreobolus strictus	a comb sedge
Schoenus pauciflorus	a sedge
Uncinia caespitosa	a hook grass
#Uncinia divaricata	a hook grass
Uncinia rubra	red hook grass
#Uncinia uncinata	a hook grass

Orchids

Aporostylis bifolia	an orchid
#Caladenia lyallii	an orchid
#Chiloglottis cornuta	an orchid
Corybas macranthus?	a spider orchid
Microtis oligantha	an orchid
Microtis unifolia	onion orchid
Prasophyllum colensoi	leek orchid
Pterostylis sp1	a green hooded orchid
Pterostylis sp2	a green hooded orchid
Thelymitra cyanea?	a sun orchid
Thelymitra longifolia	a sun orchid

Rushes

Juncus antarcticus	a rush
Juncus gregiflorus	a rush
Juncus novae-zelandiae	a rush
Juncus pusillus	a rush
Luzula leptophylla	a woodrush
Luzula rufa	a woodrush

Other monocots

Arthropodium candidum	a lily
Astelia nervosa	a lily
Bulbinella angustifolia	a Maori onion
Centrolepis ciliata	a dwarf cushion
Cordyline australis	cabbage tree
Empodisma minus	wire rush
Herpolirion novae-zelandiae	sky lily
@Phormium tenax	lowland flax
Potamogeton cheesemanii	a pondweed

@ planted species
# recorded on 30 December 1992

Brian Rance
12-13 November and 18-19 December 2001