

Crown Pastoral Land Tenure Review

Lease name : LAKE HAWEA

Lease number : PO 286

Conservation Resources Report - Part 1

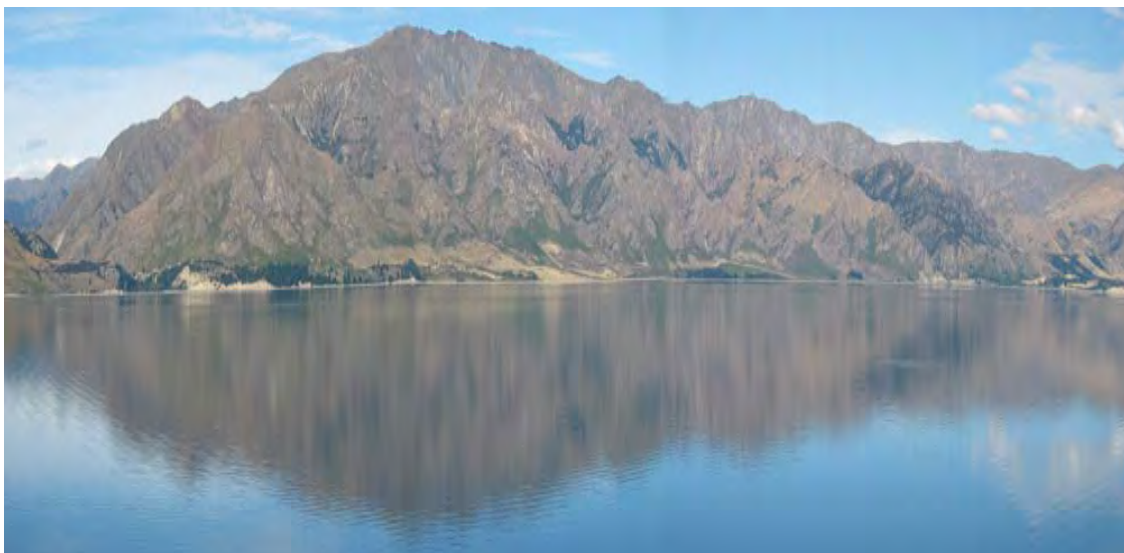
As part of the process of Tenure Review, advice on significant inherent values within the pastoral lease is provided by Department of Conservation officials in the form of a Conservation Resources Report. This report is the result of outdoor survey and inspection. It is a key piece of information for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

Note: Plans which form part of the Conservation Resources Report are published separately.

These documents are all released under the Official information Act 1982.

July 05

**DOC CONSERVATION RESOURCES REPORT ON
TENURE REVIEW OF
LAKE HAWEA PASTORAL LEASE**



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PART 1

INTRODUCTION

1.1 INTRODUCTION:

Lake Hawea Station Pastoral Lease (PL) was inspected on the 9 – 13 December 2002 as part of a review of its pastoral lease tenure. This review was requested by the lessees of the property and is being undertaken under the provisions of the Crown Pastoral Land Act 1998. As part of the tenure review process, a range of specialists have visited the property. Their specialised reports on inherent values have been incorporated within this Conservation Resources Report.

Lake Hawea Station comprises 11325ha of pastoral lease. The property is located on Gladstone Road (which runs onto the Timaru River Road) on the south-west corner of Lake Hawea, approximately 6 km from the town of Hawea. It is bounded by Lake Hawea to the west and Timaru River to the north.

The property is located in the Lindis Ecological District of the Central Otago Ecological Region and the Wanaka Ecological District of the Lakes Ecological Region. A Protected Natural Areas Programme survey report has been undertaken for the Lindis Ecological District. In the report three areas within the property were recommended for protection: RAP A7, RAP B3 and RAP B4 (See appendices 4-7).

PART 2

INHERENT VALUES: DESCRIPTION OF CONSERVATION RESOURCES AND ASSESSMENT OF SIGNIFICANCE

2.1 LANDSCAPE:

Lake Hawea Station spans two landscape types:

- An inland lake basin landscape type which includes the inland lake basins of Hawea and Wanaka.
- The tussock mountain lands in the Breast / Lindis.

Methodology:

The pastoral lease is divided into landscape units (LUs). These units reflect areas of similar landscape character. Landscape character is the quality that makes an area different from another and can be defined as follows:

'Landscape character results from a particular combination of characteristics formed by the interaction of natural processes and cultural (human) activities.' (NZ Institute of Landscape Architects).

For each unit, a landscape character description is included followed by an outline of the key visual and scenic attributes. An evaluation summary is then presented which uses a range of criteria to assess whether a unit has significant inherent values. The criteria include:

1. Intactness: - refers to the condition of the natural vegetation, patterns and processes and the degree of modification present.
2. Legibility: - refers to its expressiveness - how obviously the landscape demonstrates the formative processes leading to it.
3. Aesthetic Factors: - include criteria such as *distinctiveness* - the quality that makes a particular landscape visually striking. Frequently this occurs when contrasting natural elements combine to form a distinctive and memorable visual pattern. A further criteria assessed under aesthetic factors is *coherence*. This is based on characteristics including intactness, unity, continuity, and compatibility. Intrusions, alterations, disruptions tend to detract from coherence.
4. Historic Factors - refers to historically valued attributes in the context of a high country landscape.
5. Visibility - refers to the visibility from public places such as highways, waterways or local vantage points.
6. Significance - is the significance of the characteristics and features, or combination of characteristics and features within individual units, locally, regionally or nationally significant.
7. Vulnerability - is a measure of each landscape unit's susceptibility to further ecological deterioration, which would impact on landscape values.

Landscape Units:

Lake Hawea Station has been broken into three landscape units based on areas of similar landscape character (refer Map 2). These include:

- Hawea Front Faces
- Timaru River North Faces
- Breast Mountain Lands

Landscape unit 1 (LU1) – Hawea Front faces:

Character Description:

The most distinctive feature of the front faces is the rugged, very steep face of the Hawea eastern glacial head wall. The head wall forms a series of deeply incised west and south-west flowing tributaries. Upper slopes are characterised by very steep and rugged derivative slopes, bands of bluffs, distinctive spurs and rugged rocky terrain. Slumps, sheet wash and gully erosion are features on upper slopes. Colluvial slopes and fans extend from the headwall to the lake edge.

Vegetation is varied over this wide altitudinal sequence that extends from lake edge to the top of the escarpment and includes:

- Snow tussock and depleted herbfield on the tops.
- Significant areas of beech forest and shrubland within mid tributary catchments eg Bushy Creek and adjacent tributaries.
- Large areas of modified kanuka and grey shrubland on mid slopes and spurs.
- Lower and mid slopes are very rocky with scattered bracken and briar, matagouri, kanuka shrubland and oversown and top dressed (O.S.T.D.) ‘green areas’.
- Kowhai are notable on the rocky ridge south of the Peter Muir Bridge.
- The narrow strip of fan between the range face and the lake consists of pasture, bracken, kanuka shrubland, pine, matagouri and briar. Open areas of pasture and remnant kanuka shrubland occur along the fans at the toe of the head wall.

The indigenous component within individual tributaries varies considerably. Bushy Creek retains a high component whereas Johns Creek has little of its native cover. The Timaru River Road traverses the fan at the foot of the range.

Visual & Scenic Values:

The Hawea Front Faces contain high visual and scenic values. The steep and extremely rugged glacial headwall is a dramatic and distinctive feature within the Hawea Lake Basin. Bands of rock bluffs, prominent spurs, sheer rock faces and buttresses shaped by ice action and subsequent down cutting are highly legible in terms of past processes.

The remnant beech forests within the mid-tributaries are distinctive and significant landscape features viewed from within the Lake Hawea basin. The unit forms part of the eastern

backdrop to Lake Hawea and is highly visible from SH 6 Wanaka to Makarora as well as from on the lake and Lake Hawea township. The tussock upper slopes, remnant broadleaf, grey shrublands and kanuka are important aspects of landscape character. While vegetation is highly modified there is considerable potential for recovery with appropriate management.

Evaluation Summary:

Table 1

| Criteria | Value | Comment |
|-------------------|--------------|--|
| Intactness | Medium | -Variable. Comparatively high on tops. Tussock cover generally intact but inter-tussock plant communities are sparse. - Significant gully shrub and forest remnants. -Modified sunny faces |
| Legibility | High | Glacial and alluvial processes very expressive and legible |
| Aesthetic Factors | High | Dramatic and impressive landform features. Visually coherent apart from modified natural vegetation cover on lower slopes |
| Historic Factors | Low | |
| Visibility | High | Highly visible from lake and SH6 |
| Significance | High | Important landscape feature and backdrop within the Hawea Inland lake basin. Geologically significant. |
| Vulnerability | Medium | Gully remnants vulnerable to fire |

Landscape unit 2 (LU2) – Timaru river faces :

Character Description:

This unit includes the north faces of the Timaru River Gorge from the valley floor to the ridge extending from the mouth of the river at Lake Hawea to the eastern boundary of the lease.

It divides into two distinct zones:

-The lower zone extends from the river to about 1100 metres asl. This zone is very steep with a series of dissected gullies and very rugged, rocky terrain. Some of the tributaries contain extensive tracts of kanuka shrubland and small pockets of beech forest. Others are more fragmented with patchy kanuka, rocky shrubland, briar and pasture. Sunny slopes, spurs and easier terrain are generally more modified. A belt of modified (OSTD) country occurs between the lower and upper zones.

-The upper zone has north facing snow tussock basins below the ridge crest. Snow tussock is intact, but much depleted, and the inter-tussock herbfield is similarly sparse and highly

modified. Rock outcrops are much less of a feature in the upper basins although rocky scree is common, scattered across open, ripply, slump topography. Stodys Hut is a notable cultural feature at the eastern end of the unit.

Visual & Scenic Values:

The unit forms part of the Timaru River Gorge landscape. The wild rugged and rocky nature of the gorge faces is visually impressive, memorable and scenic. Extensive tracts of shrubland also contribute to scenic values associated with the gorge. Conversely, the highly modified areas detract to a degree from the natural inherent values.

The visual values within the upper alpine tussock basins are severely compromised by the depleted condition of the snow tussock and associated plant communities.

Evaluation Summary:

Table 2

| Criteria | Value | Comment |
|-------------------|---------------|--|
| Intactness | Low to Medium | Large tracts of kanuka shrubland although modified are a significant landscape feature |
| Legibility | High | |
| Aesthetic Factors | Medium | Very rugged. Memorable and visually impressive |
| Historic Factors | Low | |
| Visibility | Medium | Viewed from adjacent Conservation areas |
| Significance | Medium | Part of Timaru River Gorge landscape. Kanuka shrubland important within the context of the Upper Clutha Valley |
| Vulnerability | Medium | Remaining shrublands vulnerable to further fragmentation by farm management |

Landscape Unit 3 (LU3) – Breast Mountain Lands:

Character description:

This large land area includes all of the Breast Creek catchment within the lease and is made up of three incised tributaries of Breast Creek. Overall the characteristics are similar over the whole area and include the following:

- Broad and rounded ridge crests.
- Undulating, ripply, slump topography mountain slopes.
- Rock bluffs and outcrops usually associated with derivative slope.
- Vegetation consists of depleted snow tussock / herbfield on upper slopes.
- Reddish-brown patches of *Dracophyllum* are notable on upper south faces and *Aciphylla* is also significant over wide areas.
- Sunny faces and lower slopes are OSTD and generally highly modified with exotic pasture, extensive matagouri shrubland and depleted fescue tussock.
- Green stock camps occur on knobs and high spots.
- Sheet erosion is common over the whole of the unit.
- Very small and narrow areas of riparian beech and shrubland occur within the mid sections of Breast Creek.
- Access tracks are a feature over the whole of the unit.
- Has a remote backcountry feel.

Overall LU3 broadly retains the appearance of a tussock grassland although is fragmented on sunny faces and lower slopes. Past management has had a major adverse effect on tussock in some areas (eg. the crest above the Timaru River and the basin below Breast Hill). Three areas retain a greater degree of integrity than the rest. These include:

- The upper Breast Creek tributary (on the south boundary).
- The small valley east of Breast Hill which includes a small montane wetland.
- Generally the eastern end of the unit appears less modified than the western end.

Visual & Scenic Values:

The unit is typical tussock range-land. Visual values are directly related to the condition and health of the tussock grassland. Where areas identified above are in better condition, visual values are correspondingly higher. Within severely modified and depleted areas visual values are compromised. In some locations access tracks are visually disruptive and discordant, where there are steep cuts across open slopes. Occasional bands of rock outcrops and bluffs are visually significant (eg. within the southern Breast Creek catchment). In addition the small pockets of riparian beech and shrubland are significant landscape features.

Evaluation Summary:**Table 3**

| Criteria | Value | Comment |
|-------------------|---------------|--|
| Intactness | Low to medium | Appears as a tussock grassland but naturalness is severely reduced in many areas |
| Legibility | High | Formative processes legible |
| Aesthetic Factors | Low to medium | Visual values directly related to condition of tussock. Diminished and fragmented condition of tussock detracts from visual values. Extensive tracking and sheet erosion also detract from visual values |
| Historic Factors | Low | |
| Visibility | Low | Not visible from public areas |
| Significance | Low to medium | Not overly significant in terms of strategic priorities for landscape protection |
| Vulnerability | Low | Riparian beech and shrubland vulnerable to fire |

Significance of Landscape Values:

The lake face head wall contains Significant Inherent Landscape Values. The head wall is part of the eastern glacial wall of the Hawea / Upper Clutha Valley. It forms a distinctive and highly identifiable part of the Hawea Basin Landscape. The steep and rugged slopes with bands of bluffs, distinctive spurs and rocky terrain is visually impressive. It is clearly expressive of geological processes both glacial and the subsequent down-cutting action by water movement.

Vegetation changes markedly over an altitudinal sequence that extends from the lake edge at 340m to 1578m asl. Significant areas of beech and mixed woody shrubland feature in tributary catchments and are visible over a wide area

The upper Breast Creek catchment retains its integrity as a tussock landscape. Natural characteristics and patterns are intact. Rock outcrops and bluffs are an important feature.

The lower faces of Timaru Creek are of high landscape value. The wild, rugged and steep character of the landform, together with large areas of shrubland, are important to the Timaru River Gorge landscape. There is considerable potential for expansion of shrublands with appropriate management.

The riparian beech and shrublands within Breast Creek are significant natural landscape features contributing to indigenous character and diversity.

The upper tussock basins above Timaru Creek and a large area extending from Breast Hill to the east of the lease (referred to as Breast Hill and Upper Timaru Faces) represent an area of

lesser significance in landscape terms. It remains however, a relatively intact and coherent tussock landscape, marred by green stock camp areas, and other indications of tussock depletion and degradation. Despite this, natural patterns and characteristics remain more or less intact. There is also potential for long term recovery of vegetation patterns and condition under a different management regime.

2.2 LANDFORMS & GEOLOGY:

Lake Hawea Station extends from Lake Hawea across the dividing Grandview Range into the Breast Creek catchment, which is a tributary of the Lindis River. To the north is the deeply incised Timaru River.

The broad scale topography of Central Otago is dominated by a set of parallel fault-block mountain ranges and intermontane basins. The rock underlying most of the region is Haast schist, a metamorphic derivative of older marine sediments which are seen in a less reconstituted form as Torlesse and Caples greywacke rocks respectively north-east and south-west of Central Otago.

The schist is commonly exposed in tors (abrupt blocks of tower-like outcrops of platy laminated rock). These are a very distinctive feature, characteristic of Central Otago, seen both on summit ridges in the alpine zone and in the dry basins and lower slopes, where the planes of schistosity are nearly horizontal.

In the Lindis district the dislocation of the mid-tertiary peneplain responsible for Central Otago's large scale basin and range topography is expressed on a smaller scale and a different style from the standard pattern. The old erosion surface is warped into a set of north-east trending folds, with traces of the overlying Manuherikia group sediments. The district merges into the main uplift area of the Southern Alps to the north-west.

The glaciers which excavated Lakes Wanaka and Hawea have penetrated well down the Clutha in the past and had a strong influence on the landform of the western part of the Lindis Ecological District, steepening the valley wall and leaving extensive moraines and outwash gravels modified by younger alluvial fans. Except for the effects of this externally derived glacier, the mountains of the Lindis district have been essentially unglaciated and retain characteristically smooth, rounded ridges and summits (Grove 1994).

The dramatic landform of the steep front faces of Lake Hawea Station are a consequence of the oversteepening of the eastern wall of the Hawea – Upper Clutha Valley by the Hawea glacier in the Albert Town (and earlier) glacial advances and the relatively short time since then for rapid downcutting and dissection.

2.3 CLIMATE:

Annual rainfall averages around 690mm at the adjacent Hawea Flat and around 1500 mm in the alpine areas of the property, with a tendency for an early summer concentration. Summer temperatures are high. Winters are cold with severe frosts. Snow is common but lies only in higher areas for any length of time. There is a soil moisture deficit for much of the summer especially on sunny aspects. North-west and south-west winds can be severe at times.

2.4 VEGETATION:

This report identifies three land units (A, B & C), based on catchment groupings, for the purpose of describing the vegetation.

Description:

A. Timaru River faces:

This unit falls within the Wanaka Ecological District and is the south side of a large valley incorporating several small tributary creeks of the lower Timaru River. Altitude ranges from 400 m to 1578 m asl at Breast Hill.

From the bed of the Timaru River to 900 m -1100 m (depending on topography, fire and stock history) are extensive, moderately dense, kanuka (*Kunzea ericoides*) dominated shrublands. Other significant species within this community include bracken (*Pteridium esculentum*), manuka (*Leptospermum scoparium*), *Coprosma* sp. (t), and tutu (*Coriaria sarmentosa*). Shrublands with greater species diversity, dominated by mingimingi (*Coprosma propinqua*), matagouri (*Discaria toumatou*) and *Olearia odorata*, occur mainly in riparian situations. Pockets of mountain beech (*Nothofagus solandri* var. *cliffortioides*) forest also occur in steep rocky fire refuges, and are most prevalent in Waterfall Creek and the adjacent creek to the east. It is likely that beech forest once clothed all of the slopes now occupied by regenerating kanuka.

The mid altitude creek basins (variously between 900 – 1200 m asl) of the three creeks west of Waterfall Creek are dominated by pasture grasses. These grade into narrow-leaved tussockland (*Chionochloa rigida*) and finally slim snow tussockland (*Chionochloa macra*) at the range crest. The condition and composition of these upper snow tussocklands is comparable with the best of equivalent tussocklands described below for Breast Creek headwaters. The threatened broom *Carmichaelia vexillata* is particularly abundant amongst the inter-tussock turfy pavements.

Waterfall Creek and the adjacent creek to the east have retained a greater tussock cover with less ingress of pasture grasses than those creeks mentioned above.

B. Lake Hawea faces

This unit incorporates the Grandview Land System as defined in the survey report for the protected natural areas programme for the Lindis, Pisa and Dunstan Ecological Districts (Ward *et al.* 1994). A land system is an area given unity by its pattern of landform etc; in effect they are ecological sub-districts. The Grandview Land System is the eastern wall of the upper Clutha valley which has been “oversteepened” by the Hawea Glacier in the Albert Town (and earlier) glacial advances. This has resulted in a dramatic landform comprising steep, bluffy creek headwaters rising to jagged ridges, interspersed with colluvial slopes with local slumping. Botanically it is an area of relatively high diversity being a transition zone between the wetter Wanaka Ecological District and drier Central Otago.

B1 Catchments between Timaru River and Bushy Creek:

The lower slopes and flanks of several small catchments have been subjected to recent fires and have lost most of their native woody cover. A mixture of pasture and/or bracken fern now dominates these areas, with small riparian shrublands in gullies which have escaped

burning. Some exposed rock outcrops in this zone have retained a native herbaceous flora including the rare *Pachycladon cheesemaniae* (= *Ischnocarpus novae-zelandiae*), *Vittadinia australis*, *Senecio quadridentatus* and bristle tussock (*Rytidosperma setifolium*). Further up the catchments, particularly on south-facing slopes, are more extensive mixed native shrublands and occasional beech forest remnants.

Shrublands are generally dominated by mingimingi and *Olearia avicenniifolia*, but other common shrubs and trees include broadleaf (*Griselinia littoralis*), kowhai (*Sophora microphylla*), *Coprosma rugosa*, fuchsia (*Fuchsia excorticata*) koromiko (*Hebe salicifolia*), *Olearia lineata*, mountain wineberry (*Aristotelia fruticosa*), desert broom (*Carmichaelia petriei*), matagouri and porcupine shrub (*Melicactus alpinus*). Native jasmine (*Parsonsia heterophylla*), bush lawyer (*Rubus schmidelioides*) and pohuehue (*Muehlenbeckia complexa*) are common lianes; less common is climbing aniseed (*Scandia geniculata*). The delicate star lily (*Arthropodium candidum*) occurs in open places around the shrubland margins.

At highest altitude are narrow-leaved tussock grasslands, and alpine rock and scree communities similar to those described for Bushy Creek below.

B2 Bushy Creek:

Bushy Creek discharges from its steep headwaters across a wide alluvial fan built up from the actively eroding catchment. This regularly disturbed fan has a discontinuous cover of bracken, briar (*Rosa rubiginosa*), buddleia (*Buddleia davidii*) and matagouri. Higher up the valley, a fence line running parallel with the creek delineates native shrublands on the true right, from much more frequently burned land on the true left, dominated by bracken and woolly mullein (*Verbascum thapsus*).

True right shrublands and shrublands occupying the fan between the two upper tributaries are dense and diverse. The rare tree daisy *Olearia fimbriata* dominates but other common species include *O. avicenniifolia*, mingimingi, mountain wineberry, broadleaf, kohuhu (*Pittosporum tenuifolium*), koromiko and tutu. Bracken and porcupine shrub are common in gaps. Lianes are also plentiful and include native jasmine, bush lawyer and pohuehue.

Above the confluence of the two upper tributaries mountain beech forest occupies the steep valley sides. This is bereft of an understorey with the exception of occasional *Coprosma ciliata*. The mountain beech trees are host to abundant red mistletoe (*Peraxilla tetrapetala*) and the epiphytic hanging spleenwort (*Asplenium flaccidum*). Ground cover is predominantly moss with *Acaena profundeincisa* and occasionally *Pterostylis* sp.

Some exposed rock bluffs on the northern tributary have the rare cress *Pachycladon cheesemaniae* (= *Ischnocarpus novae-zelandiae*). These sparsely vegetated dry sites also support blue tussock (*Poa colensoi*), *Stellaria gracilentia* and *Brachyglottis southlandicus*.

In the upper catchment above the bushline, slopes become increasingly steep, eventually forming exposed rocky ribs and outcrops interspersed with steep screes. Relatively stable ground with soil development supports narrow-leaved tussockland but rocky, more eroding sites, have a sparse vegetative cover of low shrubs and herbs. Common species include *Hebe epacridea*, *H. buchananii*, *H. pinguifolia*, edelweiss (*Leucogenes grandiceps*), *Pachycladon* (= *Cheesemania*) *ensyii*, *Celmisia densiflora*, *Leptinella pectinata* subsp. *villosa*, *Colobanthus* sp., *Cardamine* sp., *Carmichaelia vexillata* and *Aciphylla montana*.

B3 Catchments between Bushy Creek and Johns Creek:

The two creeks to the south of Bushy creek have been heavily modified in their lower reaches by pastoral farming and burning. These areas support rough pasture and extensive bracken. Their upper reaches appear to contain natural values similar to upper Bushy Creek.

The two creeks west of spot height 952m asl are well advanced towards reconstitution of shrubland and forest following past disturbances. The lower parts of both catchments and the intervening slopes are very steep. Common shrubs and trees include manuka (*Leptospermum scoparium*), kanuka, kowhai, mingimingi, *Helichrysum lanceolatum*, *Corokia cotoneaster* and matagouri. The middle reaches of the larger (northern) catchment contain at least six trees of the rare *Olearia fimbriata* (Simpson 2002). Wilding pines are present on the lower slopes just above Timaru River Road.

B4 Johns Creek:

The low and middle reaches of Johns Creek have been heavily modified for pastoral farming and contain large areas of improved pasture. Pockets of mixed briar/matagouri shrublands extend along the main creek and many tributary gullies. Scattered clumps of narrow-leaved tussock are apparent from 800 m asl upwards; it eventually forms near continuous cover but with a very dense tussock hawkweed (*Hieracium lepidulum*) understorey.

The head of the valley, particularly south of the access track, rises abruptly into a very steep eroding rock face with colluvial fans below. Lower parts of the fans are quite weedy with buddleia, Californian thistle (*Cirsium arvense*), red clover (*Trifolium pratense*), Scotch thistle (*Cirsium vulgare*) and mouse-ear chickweed (*Cerastium fontanum*). Native species present include *Parahebe decora*, silver tussock (*Poa cita*), and feathery tutu (*Coriaria plumosa*). Rock outcrops at higher altitude support a range of predominantly native shrub and herb species including *Hebe buchananii*, *Helichrysum intermedium*, *Pimelea traversii*, *Olearia cymbifolia*, *Myrsine nummularia*, *Brachyglottis haastii*, *Celmisia densifolia*, *Anisotome haastii* and *Senecio lautus*.

B5 Grandview Creek:

The lower half of Grandview Creek has been extensively modified by pastoral farming although depleted tall tussocklands persist at highest altitudes. Small beech forest remnants and more extensive mixed shrublands and kanuka shrublands remain in small tributaries on the true right. In the headwaters mixed tall/short tussocklands predominate.

Several small stands of mountain beech are present on shady aspects adjacent to the main stream and tributaries. One of these contains a few silver beech (*Nothofagus menziesii*) trees. There is little understorey except on the stream banks where *Olearia avicenniaefolia* and mingimingi are common.

Diverse and very dense riparian shrublands contain *Helichrysum lanceolatum*, mingimingi, sweet briar, matagouri, desert broom, mountain wineberry, koromiko, *Olearia avicenniaefolia* and occasional broadleaf. Some dry ledges beneath large bluff systems have the rare cress *Pachycladon cheesemanii* (= *Ischnocarpus novae-zelandiae*) in association with rock fern (*Cheilanthes sieberi*), and the weeds horehound (*Marrubium vulgare*), Deptford pink (*Dianthus armeria*) and viper's bugloss (*Echium vulgare*). Kanuka shrubland occupies steep unstable ground on the sunny aspect southwest of the main stream and is present on sunny slopes nearby.

Fescue tussockland of generally low naturalness extends above the shrublands on sunny faces. A reasonable belt of narrow-leaved snow tussocklands exists between 1050 – 1300 m asl, above which slim snow tussockland extends to the ridge crest at 1450 m asl.

C. Breast Creek headwaters:

This unit incorporates the Breast Land System (Ward loc. cit.) and comprises long undulating ridges and very extensive development of ripply colluvial slopes on the valley sides of the deeply entrenched Breast Creek.

At lowest altitude are several small mountain beech forest remnants. These are confined to two main riparian locations in the south-eastern extremity of the unit; a strip approximately 1 km long up Breast Creek from the most eastern extent of the property and similar length strip further up the main stem near the hut. These have a sparse understorey of occasional mingimingi, mountain wineberry and false beech (*Gaultheria antipoda*), with a ground cover of tussock hawkweed and wall lettuce (*Mycelis muralis*). The red mistletoe is a common hemi-parasite on its beech host.

Small alluvial terraces exist along the larger water courses. These drought prone sandy soils support a rich herb and sub-shrub flora. Dominant species are *Gaultheria parvula*, *Coprosma perpusilla*, patotara (*Leucopogon fraseri*) and mouse-ear hawkweed (*Hieracium pilosella*). Other common species include *Acaena saccaticupula*, *Geranium sessiliflorum*, *Raoulia australis*, blue tussock, harebell (*Wahlenbergia albomarginata*), *Scleranthus uniflorus*, *Muehlenbeckia axillaris*, tussock hawkweed and King devil hawkweed (*Hieracium praealtum*).

Extensive riparian shrublands are present along most of the main stem of Breast Creek and many of its tributaries. These have been less affected by past fires than other matagouri dominated shrublands of the slopes, and are consequently quite diverse. While matagouri is still an important structural component, other major species include mingimingi, mountain wineberry, desert broom, porcupine shrub, koromiko, *Olearia odorata* and *Hebe subalpina*. Common understorey and fringing species include thousand-leaved fern (*Hypolepis millefolium*), wall lettuce, *Carex coriacea*, *C. petriei*, *Senecio quadridentatus*, pohuehue and *Clematis marata*. Occasional shrub weeds are bittersweet (*Solanum dulcamara*) and gooseberry (*Ribes uva-crispa*).

Two areas of riparian shrubland are of special note. One at the uppermost major fork of Breast Creek, and the other below the beech forest remnant and hut mentioned above, contain significant populations of the threatened shrub *Hebe cupressoides*. All age/size classes are represented, from seedlings a few centimetres tall to adults with a canopy spread exceeding four metres.

Many other shrublands not associated with waterways, are also present. These include:

- (a) Seral matagouri-dominated shrublands overtopping tall tussock at low altitude, present on north-facing slopes
- (b) *Coprosma ciliata*/*Melicytus alpinus* dominated shrublands fringing blocky screes
- (c) *Dracophyllum* dominated shrublands on south-facing slopes at higher altitude (above 1000 m)
- (d) Kanuka shrubland at low altitude on north-facing slopes

Narrow-leaved tussockland covers much of the unit between about 800 – 1300 m altitude. At lowest elevations cover is often patchy and fragmented. At about 1300 m a transition to slim snow tussock usually occurs. Common inter-tussock species include alpine fescue (*Festuca mathewsii*), golden speargrass, *Pimelea oreophila*, patotara, *Celmisia gracilenta*, false speargrass (*Celmisia lyallii*), *Pentachondra pumila*, *Anisotome aromatica*, *Gaultheria depressa* and *Raoulia subsericea*. False speargrass is locally very common at higher elevations where narrow-leaved tussock cover has been depleted. Tussock hawkweed is a pervasive weed throughout, although its contribution to ground cover declines on a north-south gradient.

On land immediately north-east of Breast Peak (containing the main access track down into the valley floor of Breast Creek) narrow-leaved tussockland is fragmented and relictual having been significantly replaced by pasture grasses and hieracium, especially at low – middle altitudes. This is most pronounced on north and east facing slopes.

Slim snow tussocklands occur above about 1300 m and are variable in composition and condition. Those on south-facing slopes at the most northern extent of Breast Creek (and in the southern named branch) are in relatively good condition with a significant shrub and herbaceous component. Common species include *Dracophyllum pronum*, cottonwood (*Ozothamnus vauvilliersii*), *Kelleria dieffenbachii*, *Hebejeebie* (= *Chionohebe*) *densifolia*, *Lycopodium fastigiatum*, *Celmisia gracilenta*, *C. angustifolia*, *Gaultheria depressa*, *Ourisia caespitosa*, *Raoulia grandiflora*, *Ranunculus gracilipes* and *Luzula pumila*. Tussock hawkweed, mouse-ear hawkweed and King devil hawkweed are present at low to moderate density.

In contrast, slim snow tussocklands in the basin east of Breast Peak are in a poor state. Native vegetation is reduced to 30% ground cover and this comprises sparse, low stature tussocks with a small number of hardy, dry tolerant species. Tussock hawkweed, King devil hawkweed and sheep's sorrel (*Rumex acetosella*) are abundant. In places, particularly near the ridge crest, slim snow tussocks have been eliminated and replaced by alpine fescue tussock and hieracium.

Wetlands are not a feature of the unit but one notable bog is present in the gentle headwaters of a tributary of Breast Creek, 1500 m east of Breast Hill. The vegetation is dominated by comb sedge (*Oreobolus pectinatus*) with a variety of sub-shrubs, sedges and herbs. Common species include *Coprosma perpusilla*, *C. atropurpurea*, *Kelleria* sp, *Gaultheria parvula*, *Carex berggrenii*, *C. gaudichaudiana*, *Plantago triandra*, *Pratia angulata*, *Schoenus pauciflorus*, *Oreomyrrhis* "bog", *Psychrophila obtusa* and *Epilobium* spp.

Rock outcrops, bluffs and tors are conspicuous features of the unit with a distinctive flora derived from their refugia attributes and specialist habitats. In the montane zone common shrub species include *Helichrysum intermedium*, coral broom (*Carmichaelia crassicaule*), *Corokia cotoneaster*, *Gaultheria crassa*, *Myrsine nummularia*, mingimingi and porcupine shrub. Herbaceous species include *Stellaria gracilenta*, *Vittadinia australis*, *Gingidia montana*, blue tussock, *Asplenium flabellifolium*, and occasionally *Pachycladon cheesemanii* (= *Ischnocarpus novae-zelandiae*). In the alpine zone, common species of rock habitats include *Hebe buchananii*, *Celmisia densiflora*, *C. angustifolia*, *Aciphylla montana*, *Schizeilema haastii*, *Neopaxia sessiliflora*, *Leptinella pectinata subsp. willcoxii*, *Brachyglottis haastii*, and *Anisotome haastii*.

Significance of vegetation:

Lake Hawea Pastoral Lease contains a wide variety of the ecosystems, plants and vegetation types that occur along a transition zone with the wetter Wanaka Ecological District. Ecosystems reflect both the steep climatic gradient and the strongly partitioned land systems of the ecological district. Much of the land has been substantially modified by fires since Polynesian settlement and by a combination of burning, grazing and browsing over the last 150 years. The impact of fire is particularly evident in the distribution and shape of beech forest remnants, already near their eastern limits.

The property lies at the northern edge of the Lindis Ecological District which was surveyed as part of the Protected Natural Areas Programme (PNAP) during the 1984-85 summer and reported in Ward *et al.* (1994). Three recommended areas for protection (RAPs) were identified on Lake Hawea Pastoral Lease. RAP 7 – Grandview Creek was ranked high for six of the eight criteria, with diversity and naturalness of woody vegetation being key features. RAP B4 – Grandview Tops, located immediately south-east of RAP 7, was ranked high for four criteria with strong emphasis on representiveness, naturalness, viability and buffering, particularly of the alpine communities. Ward (*loc. cit.*) noted that the main limitation of this RAP – that it is an alpine zone fragment of limited altitudinal range – could be remedied if it were linked to RAP 7 thereby expanding considerably the altitudinal sequence and representativeness of the Grandview Creek RAP.

RAP B3 – Mid Breast Creek, was ranked high for three criteria with strengths in representativeness, viability and landform. This most recent survey confirms that the identified values for all three RAPs are still present.

At least 170 native plant species are present on Lake Hawea Pastoral Lease. At least 12 species are listed as threatened in the most recent threat classification system (Hitchmough 2002). Of particular note is the occurrence of two large populations of the shrub *Hebe cupressoides* (ranking of ‘Nationally Vulnerable’) in Breast Creek. Taxa in this category are facing a very high risk of extinction in the wild. This plant is the subject of a national recovery plan (Norton 2000) which promotes the formal protection of its habitat. Also of note is the occurrence of at least two populations of the tree daisy *Olearia fimbriata* (ranking of ‘Serious Decline’). The Bushy Creek population comprises at least 100 adults and is one of the best sites known (Walls 2001). It is also subject to a draft recovery plan which promotes the formal protection of its habitat (Rance *in prep.*).

The extent and variety of shrublands on the property is one of its most significant vegetation features. Shrublands are a particularly rare ecosystem, especially those in the montane bioclimatic zone, where their former extent has been drastically reduced by burning and pastoralism. The importance of woody vegetation, and the desirability of protecting shrublands across a full range of Central Otago environments has been given prominence by Walker *et al.* (2002). The recovery of shrublands in the absence of grazing and fire has been demonstrated at several sites in Central Otago (Walker *loc. cit.*) and is a desirable outcome that is readily achievable at this site.

Extensive narrow-leaved snow tussocklands and slim snow tussocklands occur throughout the property. Slim snow tussockland here extend down to the lowest altitude known in the Lindis, Pisa and Dunstan Ecological Districts. Hawkweed species are significant contributors to inter-tussock ground cover. Land condition monitoring 1985 – 1997 recorded a major increase in frequency of tussock hawkweed and large decreases in frequency of hard tussocks

and small herbs. These changes are consistent with changes taking place throughout the high country (Jensen 1998).

Highly palatable slim snow tussocklands, which in Otago occupy a generally narrow altitudinal zone between the upper extent of narrow-leaved tussockland and alpine communities, are vulnerable to overgrazing. Areas of depleted slim snow tussockland are common at higher elevations on this property.

2.4.1 Problem Plants:

Wilding pines (*Pinus* spp) are present in scattered locations along the Lake Hawea faces with a small concentration in the area comprising two small creeks immediately north of Johns Creek. Some *Pinus contorta* trees are also present in Breast Creek along the main access track to Timaru Creek.

Buddleia is present in the riparian margins of John's Creek. While this is not a site of particularly high inherent values, its expansion into other lake face creeks or into Breast Creek headwaters presents a risk to identified inherent values in those areas.

At least four species of hawkweed are present throughout the property. They are, in places, the dominant inter-tussock species and a significant component of the ground cover. While restoration of a denser tall tussock cover may reduce the impact of mouse-ear hawkweed, the impact and continued spread of tussock hawkweed may be more intractable. Tussock hawkweed presents particular risks to rare species on rock bluff sites (Wardle 1999) which may necessitate site-specific control measures.

Riparian shrublands in Breast Creek contain briar, gooseberry and bittersweet. The latter two species are localised and their early control would prevent more serious impacts in the future.

2.5 FAUNA

2.5.1 Invertebrate Fauna:

Methods:

Invertebrates were collected by hand searching, turning rocks and logs, sweeping and beating vegetation, and litter searching.

It was not possible to survey the entire invertebrate fauna within the time available for inspection. Three particular groups were targeted; beetles (particularly Carabidae, Tenebrionidae and Curculionidae), spiders, and moths. These groups were chosen because they often display local endemism, can be useful ecological indicators and are readily identifiable.

Invertebrate collecting sites:

The main collection sites for invertebrates are shown in Appendix 7 and the details of each site in Appendix 8.

A total of 86 species of invertebrates were identified from the survey (see Appendix 9) despite wind and rain limiting collecting.

Timaru River valley (sites 1-4):

Nine insect species and four spider species typical of scrub and riverbeds were collected. This included the butterfly *Lycaena salustius*, which is common throughout NZ and indicative of diverse shrubland. Amongst the beetles found were the sap beetle *Soronia histrix*, which is found on sooty mould covered beech trees, the common manuka beetle *Pyronota festiva*, and the riverbed inhabiting carabid *Actenonyx bembidioides*, which was also found on the lake shore of Lake Hawea. One of the spiders found was *Notiodrassus distinctus*, which is widespread in forest in the southern regions of the South Island.

Lake Hawea lakeshore (site 5):

Three spider species and one beetle species typical of South Island lakeshores were collected. The three spiders found were *Anoteropsis lacustris*, *Dolomedes aquaticus* and *Steatoda lepida*; all are widespread and found in South Island riverbeds and lakeshores.

High country tussock and shrubland (sites 6-9, 12, 13, 18 and 23):

Thirteen insect species and three arachnids were collected. There were large numbers of the cockroach *Celatoblatta anisoptera*, which is found in rocky ground in Central Otago and the Mackenzie Basin (Johns 1966) and *Hemiandrus maculifrons*, a subalpine weta found in the southern half of the South Island (Salmon 1950). Several carabid beetles were found including *Megadromus* n.sp. 2, the Otago species *Demetrida moesta* and *Mecodema lucidum*. The crambid moth *Orocrambus philpotti* is a tall tussock grassland species that is indicative of good quality snowgrass. It is widespread in the central South Island high-country. The larvae have never been reared but probably feed on *Chionochloa* stems (B.H. Patrick *pers. comm.*). There were also large numbers of the grasshopper *Sigaus australis*, which is common at higher altitudes over most of the Southern Alps (Bigelow 1967). The chirping cicada *Amphipsalta strepitans* was located in kanuka scrubland at 1000 m. Spiders found included the gnaphosid *Matua valida*, which is found in Canterbury and Otago but with a very limited distribution (Forster 1979), and a new *Gasparia* species which was collected from under a rock, in tussock, on a ridge south of Timaru River.

Swampy creek near Breast Hill (site 10):

Eight insect species were collected. Large numbers of insects were observed in this habitat and included the carabid *Notogonum feredayi*, which occurs in damp habitats throughout the South Island; the day active moth *Paranotoreas zopyra*; and the early emerging and upland porina moth *Wiseana mimica*, larvae of which occur in flushes and damp grassland (B.H. Patrick *pers. comm.*).

Rocky gully near Breast Hill (site 11):

Seven insect species and one spider species were collected. Two weevil species were found, a new species in the genus and a species in the *Anagotus lewisi* group, which is widespread in southern New Zealand and has larvae that feed on tussock tiller bases. A specimen of the Central Otago spider *Taieria obtusa* was collected from under a rock and the sheetweb spider *Cambridgea antipodiana*, which is found throughout Otago (Blest & Vink 2000), was common under rocks at this site and site 14.

Rocks and scree near Johns Creek (site 14):

Four insect species and one spider species were recorded here and included the carabid *Holcaspis ovatella*, which is known from southern South Island and can be indicative of good snow tussock habitat (R.M. Emberson pers. comm.), and the tenebrionid beetle *Zeadelium ?aeratum*, a southern Otago and Southland species.

Breast Creek, beech forest and matagouri litter (sites 15-17 and 24):

This site produced 24 insect species and six spider species. The beech forest remnant had a high insect and spider diversity that included a new species of orb weaver spider in the genus *Cryptaranea*. The gnaphosid spider *Matua valida* was located under a rock in the beech forest. This species is found in Canterbury and Otago but with a very limited distribution (Forster 1979). Lepidoptera of interest were the butterfly *Lycaena salustius*, which is common throughout New Zealand but is indicative of diverse shrubland; *Glyphipterix cionophora*, a day active moth that is widespread in montane areas and can be locally common around *Poa* spp., the larval host in which the larvae are stem borers; *Tingena siderodeta* a widespread and locally common litter-feeding species that is a forest specialist and is also known from suburban gardens. Two Central Otago carabids *Holcaspis implica* and *Mecodema lucidum* and a North Otago species, *Megadromus* n.sp. 1, were collected from under rocks and logs. The widespread longhorn beetle *Eburida quadriguttata* was beaten from beech foliage and the tenebrionid *Zeadelium ?intermedium* was found in litter below matagouri. *Zeadelium ?intermedium* is widespread in the northern two thirds of the South Island and this may be the southern-most record of this species. The spider hunting wasp *Sphictstethus nitidus* was observed under a rock in the beech forest and several specimens of the wolf spider *Anoteropsis adumbrata*, a widespread species that inhabits higher altitude grassland, were seen.

Bushy Creek, mixed scrub and beech forest (sites 19 and 20):

This site produced nine insect species and four spider species. The flower weevil *Peristoreus* sp. was beaten from beech foliage. This beetle is alate so is usually distributed more widely but are often host specific (B.I.P. Barratt pers. comm.). Two male specimens of the stag beetle *Mitophyllus foveolatus* were found under a rotting beech log; this species is uncommonly found in South Island upland beech forests. The Central Otago and the Mackenzie country tenebrionid beetle *Mimopeus ?impressifrons* was found under rocks in matagouri. Foliage beating and sweeping produced the moth *Austrocidaria parora*, which is a local species of *Coprosma* feeding geometrid; it can be locally common where rich shrubland is present. *Maniho centralis* was found under a stone in beech forest.

Grandview Creek, mixed scrub and beech forest (site 21):

Thirteen insect species and four arachnid species were collected. Rock turning produced specimens of the widespread eastern carabid *Oregus aereus* and the click beetle *Prisahynus frontalis*, which is known from the western South Island. A tenebrionid beetle species in the genus *Zeadelium* was also found under rocks; this is either a new species or *Z. femorale*, which has been recorded from Central Otago and Southland (J.W.M. Marris pers. comm.). A local species of geometrid moth *Helastia plumbea* was beaten from foliage; the larvae live on moss on rock faces in montane zones. It has been recorded across Otago from Queenstown to the hills near Dunedin but it is more common in the western mountains (B.H. Patrick pers. comm.). The spider *Haplinis major* was observed in the creek bed beside Grandview Creek; this species is widespread in the eastern South Island (Blest & Vink 2002) and appears to be found only in non-polluted rivers and creeks.

Lepidoptera associated with plants of conservation interest:

Several plants of conservation interest were found at the Lake Hawea Pastoral Lease as noted in the vegetation section above. Five of these plants are known as hosts to specialist moths, which may also be present at Lake Hawea. Ten *Olearia* specialist moths have been found on *Olearia fimbriata* (Patrick 2000). *Peraxilla tetrapetala* is known to have three specialist moths (Patrick & Dugdale 1997). *Vittadinia australis* has the plume moth *Stenoptilia celidota* (Meyrick), the flower seed eater *Homoeosoma anaspila* Meyrick and the flower feeding noctuid *Australothis volatilis* Patrick & Matthews (B.H. Patrick *pers. comm.*). *Hebe buchananii* has the plume moth *Stenoptilia lithoxesta* Meyrick on buds (B.H. Patrick *pers. comm.*). *Clematis marata* has geometrid moth *Asaphodes chlamydata* (Meyrick) on foliage (B.H. Patrick *pers. comm.*).

Although conditions and/or time of year did not permit the collection of these species, many would likely be found in these plant habitats.

Invertebrate fauna of particular conservation interest:

Inophloeus n.sp. (Coleoptera: Curculionidae) [weevil] :

This species is likely to have a local distribution. It is related to *Inophloeus inuus* Pascoe, type locality Queenstown (B.I.P. Barratt *pers. comm.*). At Lake Hawea two males and two females were collected by turning over rocks in a gully of a tributary of Breast Creek (site 11).

Megadromus n.sp. 2 (Coleoptera: Curculionidae) [weevil] :

This new and undescribed species has not been seen before (P.M. Johns *pers. comm.*) and is probably has a restricted distribution. This species was found under stones in an alpine meadow on Breast Hill (1587 m) (site 6).

Amphipsalta strepitans (Kirkaldy) (Hemiptera: Cicadidae)[Cicada]:

Commonly named the chirping cicada (Scott & Emberson 1999) this species known from less than 230 sites in Otago in rocky montane areas and indicates good quality rocky-shrubland habitat (B.H. Patrick *pers. comm.*). A single specimen was collected by hand by John Barkla in kanuka shrubland in a tributary above the Timaru River at about 1000 m.

Paranotoreas zopyra (Meyrick) (Lepidoptera: Geometridae)[Looper moths]:

This day active species has larvae that feed on *Epilobium* spp. It is found in naturally disturbed areas and can be locally common in montane to low alpine areas (B.H. Patrick *pers. comm.*). Four specimens were collected in a swampy creek near Breast Hill (site 1).

Maniho centralis Forster & Wilton (Araneae: Amphinectidae)[spider]:

Known only from a few specimens found under rocks in riverbeds around Alexandra (Forster & Wilton 1973). The single female specimen was found under a log in beech forest beside the Bushy Creek riverbed (site 20). Species in the genus *Maniho* typically inhabit forest (Forster & Wilton 1973) and may have been widespread in Central Otago prior to deforestation.

Cryptaranea n.sp. (Araneae: Araneidae)[orb weaver spider]:

It is unusual to find a new species in the subfamily Araneinae, which was recently revised by Court & Forster (1988). Five of the seven species in the genus *Cryptaranea* are widespread

throughout New Zealand; with the other two restricted to subalpine Fiordland and Stewart Island (Court & Forster 1988). The structure of the median apophysis on the male pedipalp of this specimen suggests that it is most closely related to *Cryptaranea subalpina* Court & Forster, which is restricted to the subalpine region of the southwest of the South Island. A single male specimen was collected by beating beech foliage near Breast Creek at 800 m (site 17).

Gasparia n.sp. (Araneae: Desidae)[spider]:

Most *Gasparia* species are found in forest although two other species are found in open alpine and lowland habitats (Forster 1970). The structure of the male pedipalp of this specimen indicates that it is closely related to *Gasparia nelsonensis* Forster, which is restricted to the seashore around Nelson. The other two species found in open alpine and lowland habitats (*G. montana* Forster, *G. rustica* Forster) also have an Otago distribution. A single male specimen was found under a rock in tussock on the ridge south of the Timaru River at 1426 m (site 7).

Significance of Invertebrate Fauna:

The protected natural areas survey report for the Lindis Ecological Region (Ward, 1994) notes the following areas as key habitats for insects:

- River terrace saline areas, cushion fields and grassland, sandy areas;
- Montane rocky areas with shrubland;
- Subalpine shrubland;
- Subalpine low alpine tussocklands;
- Complete alpine ecosystems.

The following areas were considered significant:

-The headwater catchment of the northwest branch Breast Creek, which includes the swampy habitat of site 10 and the rocky gully of site 11. The swampy area in this catchment has a high diversity of endemic insects and species indicative of a diverse wetland habitat, such as *Paranotoreas zopyra*, which were collected from here. The rocky gully is so far the only known habitat for the new species in the weevil genus *Inophloeus*, which may well have a restricted distribution in the area.

-The beech forest remnant and surrounding shrubland at the southwest branch of Breast Creek, which includes sites 15, 16, 17 and 24. There was high insect and spider diversity in the beech forest and nearby matagouri. This included a new species of orb weaver spider in the genus *Cryptaranea*, which based on its most closely congener, is likely to have a restricted distribution.

-The remnant beech forest and mixed shrublands in the upper half of Bushy Creek, which includes sites 19 and 20. The invertebrate fauna collected from here is indicative of healthy beech forest and diverse shrublands. This was also the site of one of the few recordings of the Central Otago amphinectid *Maniho centralis*.

-The remnant beech forest and mixed shrublands of the northeast branch of Grandview Creek, which includes site 21. The invertebrate fauna collected from here is indicative of diverse shrublands and included several uncommon local species.

-Breast Hill, site 6. This is the only known site in which the completely new carabid species *Megadromus* n.sp. 2 is found.

-Much of the south-eastern face from the Timaru River to the ridge line is considered significant. This includes a large amount of high country tussock (sites 6, 7, 8 and 9) with a healthy invertebrate fauna including the new spider species in the genus *Gasparia*. The chirping cicada, *Amphipsalta strepitans*, was found in kanuka shrubland above Timaru River and this species indicates good quality rocky-shrubland habitat. It was not possible to sample the beech forest remnants in this area but, based on what was found in other beech areas, they are likely to have diverse and interesting invertebrate faunas.

2.5.2 Herpetofauna:

“Site locations of rare and endangered herpetofauna are recorded in the original report. Herpetofauna of this nature is at risk of illegal activities including damage and removal through unlawful interference and disturbance. Accordingly, information regarding the locations of any such herpetofauna has been deleted from this version of the report. The Department of Conservation has put in place mechanisms to ensure that such information can be released for genuine scientific and research purposes. Please contact the Department of Conservation directly to determine whether the information can be released.”

Inspections for the purpose of looking at lizard values were carried out on the 9 – 12 December 2002 and again on the 13 February 2003.

Three species of lizards were found, McCann’s Skink (*Oligosoma maccanni*) and Common Gecko (*Hoplodactylus* ‘Southern Alps’ [Hitchmough, 1997]) occurs in rock outcrops up to 1380m altitude, and Cryptic Skink (*O. inconspicuum*) was found between 900 – 1670m asl. Very few lizards were found on the east and north facing slopes overlooking Branch Creek or the Timaru River catchment, most specimens being found on the alpine ridge tops and the various branches of Breast Creek. Common Gecko were extremely abundant in the creek gorge.

A fourth species, the Grand Skink (*O.grande*), is present in bluffs above the main branch of Breast Creek. They were not observed during the December 2002 inspection due to the cold weather. Several had been previously seen in April 1998 and a total of 26 were seen during one day in February 2002. A further search in February 2003 found 8 Grand Skinks in a previously known location with little effort.

Significance of Herpetofauna:

The three species found during the December 2002 inspection are relatively widespread and common in the Otago and/or Canterbury areas. Both Cryptic Skink and Common Gecko are nearing their range limits (north and south respectively) in the Hawea area.

The Grand Skink is classified as an ‘Acutely Threatened’ – ‘Nationally Endangered’ species (Hitchmough, 2002). It was once widespread in Otago, but has declined considerably, today being known from only two areas: in the Lindis/Hawea district and in the Macraes Flat

district. The population in Breast Creek is the largest from the Hawea /Lindis area and represents the most important opportunity for conserving the species in this area.

2.5.3 Avifauna:

The following birds were sighted during the property inspection:

Endemic: New Zealand falcon, greywarbler, pipit, rifleman, tomtit, bellbird.

Native: black-backed gull, black shag, silvereye, Australasian harrier, fantail.

Exotic: chaffinch, skylark, Canada goose, Californian quail, blackbird, magpie, yellowhammer, redpoll.

Significance of Avifauna:

The New Zealand 'eastern' falcon is a threatened species, classified as 'Chronically Threatened' - 'gradual decline' (Hitchmough, 2002).

2.5.4 Aquatic Fauna:

The National Institute of Water and Atmospheric Research Freshwater Fish Database was searched for freshwater fish records for Lake Hawea Station. There were no records for the property.

Streams within this property flow either into Lake Hawea or into the Lindis River which is in the Clutha River/Mata-au catchment.

A total of 18 sites were surveyed on the property. (Appendix 10).

Each site was sampled using a backpack electric fishing machine and results were compiled based on the criteria in report: "Non-migratory galaxiid survey methods" (Allibone R. M. 1997). Habitat measurements were taken and recorded as set out in a NIWA freshwater data form. In-stream invertebrates were noted when they could be identified during electric fishing survey.

Tributaries of Lake Hawea:

Grandview Creek, Bushy Creek, Johns Creek and two unnamed tributaries of Lake Hawea are very steep and obviously subjected to very heavy rainfall events. The beds of all these streams are very unstable and therefore have little in stream values.

The upper reaches of these streams have a boulder dominated bed substrate with a fine sand/silt covering. On reaching the valley floor, stream flow slows with a corresponding bed profile change to cobble/coarse gravel.

No fish recorded within these streams and invertebrate numbers were low. However the invertebrates present (Mayflies; *Deleatidium*, *Nesameletus*) are indicative of good water quality.

Breast Creek:

Breast Creek and its tributaries are of lower gradient than those streams that flow into Lake Hawea. Breast Creek has a stable substrate with cobble type substrate dominating the bed profile.

The riparian margins are of grass-shrubs and in the upper reaches tussock, which provide good bank stability with few signs of erosion. Three species of fish present: introduced brown trout, and two native species, koaro (*Galaxias brevipinnis*) and the non-migratory *Galaxias* sp D. The lower section of the main stem of Breast creek produced high numbers of brown trout and one Koaro.

A healthy population of *Galaxias* sp D was found in small pools, in a small 1m wide tributary of Breast Creek at site location G40: 223192. Its substrate type was boulder/ cobble which provides for a stable bed. A substantial waterfall half way up this tributary appears to be a barrier for fish access to the headwaters, as no fish were recorded above it. This population will be exposed to trout predation and competition in the lower section. *Galaxias* sp D are probably confined to a reach with a maximum length of 2 kilometres.

Significance of freshwater fish fauna:

Galaxias sp D is ranked 'Nationally Vulnerable' (Hitchmough, 2002) and is the fourth rarest fish in New Zealand. This species occurs in the Clutha River catchment and areas of the Catlins District. The species occurs as four clusters of populations; from Bannockburn upstream in tributaries of the Clutha and Lindis Rivers at Queensberry and in around the Chain Hills (Lindis); a small number are known from Rough Ridge; the tributaries in the mid reaches of the Pomahaka River; and a group in the Catlins, Tahakopa and possibly the Mokareta Rivers. Genetic data indicates that the different clusters, while all part of the *Galaxias* sp D group, are distinct. Protection of populations throughout its range is required to preserve the present genetic diversity.

A large, probably resident population of brown trout is present in Breast creek.

Koaro are not considered threatened. This species is widespread around New Zealand and shows some ability to co-exist with trout, although at reduced densities. It can be found long distances inland, and landlocked populations are often found in sub-montane lakes and alpine streams at high elevation. It favours clear, swiftly flowing, boulder-cobble streams of small to moderate size, and is often occurs in waterways draining tussock and forest areas.

2.5.5 PROBLEM ANIMALS:

Rabbits have historically been a problem on this property, particularly at lower altitudes. Over most of the property numbers are now very low, except for the lake faces and gullies where moderate numbers are present.

Hares, possums, red deer and pigs and the odd chamois are present on the property. Escaped goats have moved onto the property in the past. Pigs have been the subject of some control measures. TB is known to be present in the wild pig population in Timaru Creek. Possum control has been undertaken for bovine TB vector control. They are spreading southwards and there are unconfirmed sightings on or close to the property.

2.6 HISTORIC

There are no recorded historic sites on Lake Hawea Station.

The recorded European history of the property relates to the first explorations of Central Otago. The first European explorer was Nathaniel Chalmers, who accompanied by a Maori guide, fought his way inland as far as Wanaka and Hawea.

In 1853 John Turnbull Thompson, who was Otago's chief surveyor, saw Lake Hawea from the top of Mount Grandview (just over the south boundary of Lake Hawea Station) and described it as "deep blue and narrow, surrounded by extensive forests reaching from snowline to shoreline."

2.7 PUBLIC RECREATION:

2.7.1 Physical Characteristics:

Lake Hawea Station is located in the south-east corner of Lake Hawea and serviced by the Gladstone/Timaru River Road. It has around 6 km of frontage to the lake on its western boundary and almost 10km frontage onto the Timaru River to the north.

The centre and rear of the property are not visible from the lake or Hawea Flat, being obscured by the steep front scarp below Breast Hill and Breast Peak. Access to the rear of the property is confined to one steep farm track up Johns Creek.

Timaru River is a reasonably popular and easy walk, but involves numerous river crossings. The track is signposted at the beginning; however it isn't well marked and is in poor repair. Although the track is no longer maintained, it provides strategic access to the back of Lake Hawea PL. Most of the route is outside the PL boundary.

There are numerous tracks within the property, most being of 4WD standard. These tracks link to the east through Breast Hill and Forest Range properties (which connect further on to the Lindis Pass Highway) and to the south through Mount Grand Station and onwards along the Grandview Range.

Lake Hawea is easily accessed from the Timaru River Road, but in parts, farmed paddocks need to be crossed.

2.7.2 Legal Access:

The main legal access is the Gladstone Road which, after crossing Johns Creek is called the Timaru River Road. The small lake shore settlement of Gladstone is surrounded by Lake Hawea PL.

A legal but unformed road is in place of a marginal strip up the true left of Timaru River. Due to the steep nature of the terrain, in places it would be impractical to form or even traverse on foot.

On the south boundary of the property is a legal but unformed road called the Grandview Track. It starts at the Hawea Back Road and traverses the main ridge. The practicality of the legal line is unclear, but it is assumed that a horse or bullock track existed along this route and could be redefined in future.

Marginal strips have been defined on all creeks over 3 metres average width. These are the lower parts of Johns Creek, Grandview Creek and Breast Creek and its tributaries. Lake Hawea itself has no marginal strip as it is Crown land covered by an operating easement for hydro lake water storage. Thus technically the property does not adjoin the lake.

2.7.3 Activities:

Although visually prominent, to some extent Lake Hawea PL is located in an out of the way corner of the district. It currently attracts little of the high recreational demand common in the Queenstown Lakes District. This is due in part to the physical and legal access restrictions within the property. Also it is not on an established tourist route like the other side of the lake. Travelers on the Timaru River Road are often heading for Timaru River or beyond to Dingleburn Station.

On the other hand the position of the property provides future potential for recreation due to the strategic position at the top end of the Grandview Range and being situated between the Hawea and Lindis catchments. In future tramping and mountain biking may be important, with linkages through to the Lindis Pass/Ahuriri Valley. With the increasing population of the Upper Clutha Valley there will be an increasing demand for recreational opportunities, especially close to townships. Lake Hawea PL is ideally suited to cater for such a demand.

The back country of Lake Hawea PL already attracts 4WD enthusiasts, horse riders and mountain bikers. Some walkers climb to the range crest to look out at the expansive views. The vista includes the lakes of Hawea and Wanaka, Hawea flat, Wanaka Township, the Pisa and Burke mountain ranges, through in the distance to Mt Aspiring and the Southern Alps.

Hunting of red deer and to a lesser extent pigs and chamois, is an important recreational activity within the adjoining Timaru River catchment.

Lake edge recreation is popular in summer. Fishing is popular in Lake Hawea and Timaru River is renowned for its runs of trout.

The holders of the lease run a popular home stay business with its associated passive recreational activities.

PART 3

OTHER RELEVANT MATTERS & PLANS

3.1 CONSULTATION

a) An NGO early warning meeting was held on the 19/9/02 with interested groups. The following views were expressed:

Public access to land at the back of the property was seen as important. There is existing public use of the Johns Creek track to Breast Hill and along the range crest.

A continuous public access linkage along the range crest and possibly on to Timaru River was proposed. It was seen as very suitable for bikes, horses and walking. It also provides a link to Breast Creek and also through to Ben Avon.

Breast Hill 4WD route is used as a fund raiser. High maintenance requirements of Johns Creek track were recognised.

Access to lake front to be looked at. Timaru Creek popular for camping but an alternative camping area on the terrace below the road is a possibility. A recreation reserve should be looked at.

b) A further NGO meeting was held on the 22/5/03 after property inspections had taken place by DOC and the NGOs.

Recreational opportunities were recognised along the side of Lake Hawea.

A proposed trail running the length of the South Island called the Te Araroa Trail is proposed to run through either Timaru Creek or Lake Hawea Station.

The middle part of property may not have high ecological values, but it would have high landscape and recreational setting values.

The track up Johns Creek is a key access point. Need to consider access along to Grandview Mountain and the ridge above Timaru Creek.

c) Federated Mountain Club provided a report on public recreation values (see appendix 1).

The FMC report concluded that the tenure review of Lake Hawea Station is a one off opportunity to greatly enhance the recreational opportunities of the Hawea – Lindis area, and to increase the recreational value of those lands by recognizing the very significant inherent values described in the PNAP surveys carried out in the mid 1980s.

The outcome of the tenure review on Lake Hawea Station, if it includes the important recreation and conservation recommendations included in this report, could contribute significantly to the achievement of the objectives declared in the Hawea- Lindis Special Place in the Conservation Management Strategy for Otago.

d) The Southern Lakes Branch of the NZDA made a written submission on the 31 March 2003 (see appendix 2)

It noted that access with firearms and dogs (where appropriate) was their main concern.

Lake Hawea Station has historically been an area for trophy red stag and it still has good bloodlines present.

Public use of the track up Johns Creek and along the ridge crests would make the area more accessible.

e) The Upper Clutha Branch of Forest and Bird Protection Society made a written submission on the 30 June 2003 (See appendix 3) . Following are the summarised main points of the submission:

Significant inherent values to be considered:

- Remnant beech forests in Lake Hawea faces and bottom end Breast Creek.
- Three RAP areas.
- Landscape outstanding and the main value.
- Kanuka forest on lake face and terraces below Timaru Creek Road.
- Grand Skink habitat in Breast Creek.
- Recreation will centre on walking, biking and horse riding trails.
- Johns Creek 4WD access desirable although limitations noted.
- Access along Grandview Range and through to Ahuriri River in conjunction with other properties.

3.2 REGIONAL POLICY STATEMENTS AND PLANS:

Lake Hawea Station is in the Otago Regional Council area. Parts of the property are subject to the Otago Regional Plan: Water rule which requires resource consent for suction dredge mining.

3.3 DISTRICT PLANS:

The western and northern parts of the property are located within the general rural zone of the Queenstown Lakes District Plan.

In general, the proposed Queenstown Lakes District Plan (amended to incorporate Council decisions) does not act as a trigger for the protection of tussock grasslands and smaller wetlands and forest areas. Resource consent is required for subdivision and subsequent development, buildings, forestry and also ski area activities. No forestry shall be undertaken in an alpine area with an altitude greater than 1070m. There are no registered historic sites, protected features or areas of significant indigenous vegetation as set out in the appendices of the plan. The protected landscape provisions of the Plan is in the process of going through the Environment Court. However, it is likely that part of this property will be in an Area of Outstanding Landscape. Protection is limited to the controls set out above.

The south-eastern part of the property is located within the rural resource zone of the Central Otago District Plan.

In general, the proposed Central Otago District Plan (amended to incorporate Council decisions) does not act as a trigger for the protection of tussock grasslands and smaller wetlands and forest areas. Resource consent is required for excavations or tree planting within specified distances of a water race or irrigation pipeline, and for development work within 10m of any water body. The property is not in the area noted as outstanding landscape. There are no registered historic sites, or areas of significant indigenous vegetation and habitats of significant indigenous fauna and wetlands as set out in the schedules of the plan. Protection is limited to the controls set out above.

3.4 CONSERVATION MANAGEMENT STRATEGIES AND PLANS

The Otago Conservation Management Strategy has a general objective regarding Central Otago ecosystems.

This is to recognise the distinctive contribution the ecosystems of Central Otago make to the diversity of New Zealand's flora, fauna, ecological communities and processes and to retain representative examples through protection at lower altitudes and more extensive protected areas at higher altitudes.

This objective is to be implemented by the following:

- *The protection of representative examples of ecosystems including aquatic ecosystems on privately occupied land will be negotiated using a range of options including acquisition through tenure review, covenants, management agreements and land purchases or exchanges. Attempts to secure buffer zones and ecological linkages between areas will be included in this exercise.*
- *Survey of areas for the PNA Programme will be completed as access and resources become available and efforts will be made to negotiate formal protection for areas identified as a priority for protection.*
- *The value of tussock grasslands as a contributor to the character of New Zealand and its landscape and biodiversity will be promoted and retention of tussock grasslands advocated.*

The front faces and Timaru River faces are noted in the CMS as being part of special place 23: *Hawea – Lindis*.

The objectives for the area are:

To manage and enhance the recreational opportunities on lands administered by the Department in the Hunter-Hawea area to maintain the natural and historic resources of the areas while providing for an appropriate range of recreational activity of high quality.

To achieve permanent protection for areas of significant nature conservation importance in the area.

To maintain and where appropriate enhance the quality of aquatic habitats in the area.

NEW ZEALAND BIODIVERSITY STRATEGY

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

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

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

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

PART 4**MAPS ETC.****4.1 Additional information****References:**

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4.2 ILLUSTRATIVE MAPS

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| Map 1 | Topo/Cadastral Plan |
| Map 2 | Landscape Values Plan |
| Map 3 | Areas of significant natural values |

