

## **Crown Pastoral Land Tenure Review**

**Lease name :Mt Difficulty**

**Lease number :PO 353**

### **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.

The report attached is released under the Official Information Act 1982.

**Copied October 2002**

**DOC REPORT TO THE  
COMMISSIONER OF CROWN LANDS ON  
TENURE REVIEW OF MT DIFFICULTY PASTORAL LEASE**

**PART I**

**INTRODUCTION**

The lessee of Mt Difficulty Pastoral lease has applied to the Commissioner of Crown Lands for a review of tenure. The property has been inspected and reported on by relevant DOC staff and their assessments have been incorporated into this conservation resources report.

Some of these individual assessments were undertaken in 1991 when the property was considered for partial reclassification as a pilot study to develop the current tenure review process.

Mt Difficulty lies within the Old Man Ecological District which underwent a Protected Natural Areas Survey in 1984/5. Three recommended areas for protection (RAPs) were identified during that survey, namely :-

RAP OM 1/1	Mt Difficulty	400 ha	Priority 1
RAP OM 1/1	Long Gully Bluffs	380 ha	Priority 1
RAP OM 2/1	Slapjack Creek	630 ha	Priority 2

The 1991 partial tenure review investigation resulted in the following outcomes being negotiated :

**1 Mt Difficulty Management Agreement**

An area of 1500 ha including RAP OM 1/1 Mt Difficulty and the Kawarau Gorge faces between Walker Creek and Roaring Meg was protected by way of a 5 year term agreement under Section 29 Conservation Act 1987.

**2 Long Gully Bluffs Conservation Area**

A gazetted conservation area protecting 295 ha of the Long Gully Bluffs RAP. Boundaries were adjusted to conform with existing fenced boundaries, on the advice of the Protected Area Scientific Advisory Committee (PASAC) which reviewed the Old Man Ecological District PNAP survey results. A gazetted walkway provides limited public access from the Bannockburn Sluicings Otago Goldfield Park site at Bannockburn. The walkway agreement provides for restrictions on use during rabbit poisoning operations and during lambing.

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## Slapjack Creek Conservation Area

An area of 26 ha of this second priority RAP was gazetted as conservation area. The RAP is an analogue to RAP OM 1/1 Mt Difficulty. It has been extensively modified by pastoral development since survey, except for the conservation area which protects the major ecological feature present, ie a significant population of the rare local endemic species *Lepidium kawarau* on a rock bluff system. There is minimal grazing available and natural barriers, ie landform appears to limit grazing effects. There is no current justification for excluding stock by erecting boundary fencing.

### 4 Approximately 197 ha of land suited to more intensive land uses was freeholded

The balance of the property being 5281 ha remained as pastoral lease.

Mt Difficulty pastoral is a medium sized property, located at Bannockburn 10 km from Cromwell. It is run in conjunction with the neighbouring pastoral leases, ie Wentworth, Waitiri, Eastburn and Lowburn Valley by the lessee, Lake District Trust. Adjacent to Mt Difficulty is the small Gees Flat Recreation Reserve which is part of the Otago Goldfields Park and it is managed by a concessionaire as a commercial tourist enterprise.

## PART II

### 1 LANDSCAPE ASSESSMENT

A DOC landscape architect has previously assessed the property as part of the earlier partial tenure review.

#### Landscape character - description

For ease of description the property has been divided into 4 distinct Landscape Management Units (LMU):

- 1 Kawarau Faces
- 2 Slapjack Creek
- 3 S E Slopes
- 4 Summit Ridge

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## i Kawarau Faces

Kawarau Faces form part of the north and west flank of the Carrick Range and a major part of the distinctive landscape of the Kawarau Gorge. A rocky terrace of varying width extends above the river along most of the Gorge. Mt Difficulty rises steeply above the terrace. The slopes are typically colluvial of impressive bluffs, buttresses and steep unstable slopes. A distinctive feature is the contrasting smooth colluvial slopes and rugged rocky bluffs. Rocky outcrops and bluffs are especially impressive on the Walkers Creek to Roaring Meg section.

Rock cut linear watercourses occur at intervals. Landslide topography is characteristic of the western flank.

The Kawarau Faces are characteristically barren, dry and in many areas degraded. Erosion, both natural and accelerated by human influence, is a dominant feature. The impact of rabbits is very evident.

The terrace country is predominantly briar intermixed with matagouri, bracken fern, mixed grassland and introduced herbs. The appearance of the briar covered terraces changes with the seasons from a bright green in spring and summer to yellow/red in autumn to predominantly red in winter. Some broom and lupin have established opposite Gentle Annie.

The landcover on the western flank of Mt Difficulty is primarily bracken, matagouri, briar, patches of grass and herbaceous species. Higher up is fescue tussockland with large areas sheet eroded.

Thyme is the dominant cover in places, eg the steep face below the Nevis-Kawarau confluence. Also below the confluence are small clumps of remnant flax confined to damp sites.

The north flank below Roaring Meg has less briar with thyme dominant on the lower slopes. On upper slopes there is much bare ground with sparse native broom and localised scrub confined mainly to gullies.

Isolated wilding pines occur opposite Waitiri homestead and near Walkers Creek. Some Douglas fir are spreading on the terraces across from Roaring Meg.

Historic/cultural features are an essential part of the Kawarau Gorge landscape (particularly the section from Roaring Meg downstream to the end of the Gorge). Gold mining tailings, huts, earth dams and plantings are dotted along the river terrace. The latter include a group of poplars above Whata to Rere (the Natural Bridge) downstream to the start of the Gorge.

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Modern day mining has occurred above Roaring Meg on the terrace. An insensitive constructed track has been bulldozed in recent years, descending Mt Difficulty summit to the terrace. The terrace known to be a kaika nohoaka or temporary campsite which is situated at a pivotal stage on the old Maori trail system.

## ii Slapjack Creek

Slapjack Creek drains west into the Nevis River. The landscape is steep, bluffy, and unstable. Slapjack Creek is deeply entrenched. Gully and sheet erosion are common on sunny slopes. Landcover is predominantly depleted fescue and silver tussock with matagouri and fescue tussock on the mid slopes and denser matagouri, *Coprosma*, and *Olearia* shrubland lining the creek. The eastern face of Slapjack Creek has comparatively better cover than the dry, depleted west face. Exotic grasses and herbs are common throughout.

Power pylons ascend Slapjack Gully to the saddle. Access tracks are visually prominent.

## iii S E Slope (Including Walkers Creek)

The SE slopes are typically ripply landscape. Landcover is mainly modified snow tussock and fescue tussockland which has been oversown and top-dressed. Lower slopes have been extensively modified and comprises a mixture of native and exotic scrub and grasses. These include sweet briar, elderberry, matagouri, *Coprosma*, *Olearia*, *Carmichaelia*, fescue tussock and introduced grasses.

## iv Summit Ridge

Mt Difficulty summit comprises a narrow zone of deflated ridge tops with a rapid rocky transition to moderately steep sheet eroded slopes. The sheet eroded slopes are visible from the Cromwell area and beyond. A patch of mixed snow tussock - fescue tussock survives on the southern sheltered crest of Mt Difficulty. Northern summit faces have little vegetation cover.

## Threats

The main threats to landscape values of the Kawarau Faces are from mining, hydro development and tracking. The recent track down the face to the mining site at Roaring Meg is a classic example of visual degradation. Other threats to landscape values include tree spread, further vegetation depletion and poorly sited structures and utilities.

There is potential for landscape improvement with rabbit control and reduced sheep grazing levels which would improve vegetation cover.

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Rabbit control may trigger a briar explosion. Briar however is already established and accepted as part of the gorge landscape and while further spread may alter the character, it would not necessarily degrade the visual resource.

### **Significance of the Landscape**

Mt Difficulty has high visual and scenic values. Approximately 60-70% of the property is visible from the State Highway and large areas visible from the Cromwell area.

The most important visual and scenic values are contained within the Kawarau Faces LMU. The Kawarau Faces of Mt Difficulty are a large and integral part of the Gorge landscape. The combination of impressive physical characteristics and past human activity together create a nationally recognised riverscape setting for the wild and scenic Kawarau River. The importance of the Gorge as a scenic corridor and entrance to the Wakatipu Basin is well recognised.

The Kawarau Faces also provide an important backdrop setting for the Kawarau Gorge Recreation Reserve and for recreational use of the river. Recreational use of the river is primarily by thrill seekers, eg rafting, canoeing, bungy jumping and commercial jet-boating.

The Nevis River Gorge LMU is an area of Mt Difficulty considered to have significant visual and scenic value which require recognition and protection.

## **2 LANDFORM AND GEOLOGY**

The property varies in altitude from 215 metres to 1285 metres asl.

### **a Geology**

Basement rock in the Old Man Ecological District is comprised of block faulted terrain of the Haast Schist Group, metamorphosed to textural zone IV in the north of the Ecological District, which includes Mt Difficulty, at the end of the Carrick Range. This range is a westward tilted block reduced by the landsliding along the Kawarau and Nevis Valleys.

### **b Topography**

The Carrick Range is a block mountain landscape typical of the Ecological District, trending north-south. The present drainage system has been partially superimposed into this topography, chiefly along linear structural weaknesses, as faults and joints. Deep antecedent gorges occur along the Nevis and Kawarau Rivers - typically asymmetric (steep resistant derivative slopes opposing extensively slumped slopes).

### **c Soils**

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Yellow grey silty-sandy loams dominate the sides of the Carrick Range. These soils occupy the lower hills, valleys and basins, up to 900 metres.

Soils are chiefly derived from schist, loess and alluvium. Main soil types include the following:

Carrick Hill, Conroy Hill and Blackstone Hill soils with moderate fertility. Steepland soils include Alexandra a brown grey earth on lower slopes, Dunstan and Arrow are upland and high country yellow brown earths. These soil types have moderate fertility but are drought prone. They are poorly weathered soils with shallow profiles and weakly developed structure. Dunstan Steepland soils are of low natural fertility. These are very friable and prone to sheet erosion when vegetation is burnt or intensively grazed. Water conservation is the prime use of this soil type.

#### **d Landforms of RAPs**

##### **(i) RAP OM 1/1 Mt Difficulty**

The RAP is a transect of the north end of the Carrick Range, with derivative and slumped landscapes formed on opposing flanks of Mt Difficulty.

The steep north-east facing Cascade Creek was formed by fluvial down cutting at a high angle to the schistosity. Major landforms are steep colluvial slopes and rock cut cascading watercourses. The overall gully profile is convex with steep bluffs in the lowest reaches.

The west facing catchment occurs within landslide topography where schistosity subparallels slope. It has an asymmetric profile. South flanks are craggy with rubblefields, block slumps and isolated earthflow chutes. Northern flanks are ripply with slump and earthflow features dominant.

A descending altitudinal sequence of yellow-brown (Carrick, Dunstan) yellow grey (Arrow, Blackstone) and brown grey (Alexandra) hill/steepland soils. These are locally sheet eroded on upper steep and exposed aspects of Mt Difficulty. Sheet and slip erosion are likely to have been accelerated by human influences from pre-European times. The area is particularly prone to these erosion forms on steep and/or exposed aspects.

##### **ii RAP OM 2/1, Slapjack Creek**

A deeply incised re-entrant catchment draining the western slopes of the Carrick Range above the Nevis-Kawarau Rivers confluence.

Extensive mass movement topography is present over the catchment, formed through rapid fluvial down cutting and faulting.

The southern and eastern slopes are ripply, slump features of small and large dimensions occurring throughout, and a large earthflow is located at the catchment head. Rubbly landslide debris mantles the western flanks. Northern slopes have complex slumping in three large features: eastern ripply topography; mid catchment gravity faulting (five faults) and rubbly blockslumping/landsliding with mass movement caverns, large boulders and slump terracing to the west.

The main channel is deeply entrenched into the landscape and north-east trending, probably following a fault that has produced a bluffy scarp and alluvial backup in the gully below Slapjack saddle.

Steep gorge derivative flanks occur in the lower catchment.

A descending altitudinal sequence of yellow-brown (Carrick, Dunstan) and yellow-grey (Arrow) hill/steepland soils. These are locally sheet and gully eroded on sunny steep aspects.

### **Significance of the Landforms**

The deep antecedent gorge and steep asymmetric slopes of the Kawarau Gorge are a notable landform feature, creating a distinctive landscape.

RAP OM 1/1 landform represents the variation in landform over much of the dry northern Carrick Range. Cascade Creek forms part of the large derivative landscape of the Kawarau Gorge. The western catchment is an example of landsliding, part of the Mt Difficulty landslip which is a large feature by world standards. Ripply slopes dominate the landscape here with significant areas of derivative slopes on north-westerly aspects.

RAP OM 2/1 landform features are typical of the Carrick Range with dramatic mass movement topography over much of the Slapjack Creek catchment and derivative slopes cover the lower reaches.

There are no Geopreservation Inventory sites located on the property, however the Kawarau Gorge adjacent is a listed site, record ID No. LAN200. This gorge landform is part of the setting of Mt Difficulty. Its importance is ranked B, ie of national importance and has a vulnerability rating of 2 (moderately vulnerable to modification by humans). It is a spectacular steep gorge notable for the volume and fast flowing nature of its water. The gorge is continually being modified by landslides.

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### 3 CLIMATE

The inland rain shadow location of the Ecological District is reflected in the continental climate of the Carrick Range. Annual precipitation is between 300-400 mm with much falling as snow. The property spans relatively low altitude and snowfall is usually of short duration. The climate displays strong semi-arid characteristics. Clear blue skies with a high incidence of frosts are typical features. Winters are severe with severe frosts and summers are hot and dry and subject to north west winds. High wind speed events are frequent events in exposed parts of the property.

### 4 VEGETATION

#### (a) PNAP Survey Results

Mt Difficulty lies in the northern part of the Old Man Ecological District on the Carrick Range. The Ecological District as a whole contains a spectacular and notably distinctive landscape for New Zealand. It has some of the most scientifically and aesthetically significant Quaternary landform features in New Zealand. The vegetation shows a rich species and community diversity which closely correlates with landscape. In the northern part of the ecological district, extremely harsh environments prevail with extremes of temperature and dryness, resulting in a distinctive flora and vegetation. Much of the property is considered to be semi arid.

Two RAPs remain on the property, namely RAP OM 1/1 Mt Difficulty and its analogue RAP OM 2/1 Slapjack Creek. A small part of the latter RAP covering 26 ha has been gazetted as a conservation area as an outcome of the 1991 partial tenure review. The RAP OM 1/1 Mt Difficulty was given interim protection by way of a short term Section 29 Conservation Act management agreement, also as an outcome of the 1991 tenure review.

A summary of the key features of the RAPs is detailed below and a copy of the full PNAP survey report description is appended.

(See extracts pp 40-43 and pp 96-99, "Old Man Ecological District - Survey Report for the New Zealand Protected Natural Areas Programme by CF Brumley et al, 1986).

#### (i) RAP OM 1/1 Mt Difficulty

The vegetation consists of dry tussockland and scrub communities.

Fescue tussocklands dominate the middle slopes of Mt Difficulty with golden spaniard prominent on steep, more unstable slopes.

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The western faces have extensive outcrop and rubble which support a variety of scrub and herb species including native broom, *Pimelea oreophila*, *Coprosma propinqua*, *Cassinia vauvilliersii*, *Gaultheria* species, *Helichrysum selago* and numerous fern species. Dense scrub in the lower gullies is mainly matagouri with increasing briar towards the base of the catchment. South-facing slumped slopes are dominated by fescue tussocklands with blue tussock and Maori onion abundant; scattered flushes in damp depressions are dominated by cutty grass and exotic grasses.

North eastern faces have more extensive, though sparse, cover of silver and fescue tussock across the mid slopes, giving way to *Rytidosperma* grassland on lower faces. Scrub communities are localised: scattered *Pimelea aridula* on ridge crests, native broom on the terrace above the Kawarau River and pockets of matagouri - *Olearia* along the stream gullies.

A patch of mixed snow tussock - fescue tussock survives on the southern sheltered crest of Mt Difficulty. Northern summit faces have little vegetation cover.

Flora of note include the presence of *Pimelea aridula* and the native broom *Carmichaelia compacta* which are confined to this very dry part of the ecological district. *Rytidosperma gracilis* grassland is the only dense stand of this species in the Ecological District. *Helichrysum selago* is abundant on rock bluffs.

#### (ii) RAP OM 2/1 Slapjack Creek

The vegetation consists of fescue and silver tussock lands which dominate the catchment, with a variety of scrub communities.

Fescue tussocklands occur mainly on the north-facing slopes, while silver tussock is more prominent on damper south-facing slopes. Introduced grasses and herbs dominate the understorey.

Distinctive open matagouri shrubland over fescue tussockland dominates the central valley slopes. Denser matagouri - *Coprosma* - *Olearia* scrub lines the bouldery stream channel.

Fault bluffs support a variety of scrub and herb species including the local endemic, *Lepidium kawarau* and dense patches of native broom (*C. petriei*, *C. compacta*).

Patches of narrow leaved snow tussock occur around the ridgeline tors and debris above the headbasin. Blue tussock, golden spaniard, and a variety of

scrub species including *Pimelea* species, *Cyathodes* species, *Carmichaelia vexillata* and coral broom are also prominent.

Mid catchment ridge crests and north facing slopes have very sparse vegetation cover. *Raoulia* species are prominent on upper slopes with thyme becoming abundant towards the lower catchment.

The flora is notable for the presence of *Lepidium kawarau* on endangered species endemic to the Kawarau Valley. Coral broom is at its southern limit in the ecological district and *Carmichaelia vexillata* has a southern extension of its previously known range.

**(b) PASAC Recommendations**

PASAC (Protected Areas Scientific Advisory Committee), reviewed the RAPs during a site inspection in February 1987. The group noted the then new lessees plans for property development and took these into consideration. PASAC recommended as follows:-

**(i) RAP OM 1/1 Mt Difficulty**

"PASAC recognises the RAP as laid out in the PNAP survey report with an extension to include snow tussock and modified snow tussock grassland to 3000 ft in the Upper Walker Creek Basin as the best existing for nature conservation in the Old Man Ecological District.

Should this area be unachievable in its entirety an alternative area could be negotiated to exclude the northern side of the Waitiri Basin and to include the southern half of the Waitiri Basin extending across the two interfluves to the stream emerging at grid ref 687 686. (NZMS 1.S133).

The area accepted would be subjected to planned grazing management sequences but would not be subject to oversowing or topdressing. Burning to be carried out subject to permission of the appropriate authorities and only after consideration of nature conservation values."

**(ii) RAP OM 2/1 Slapjack Creek**

"In the event of negotiations for a protected natural area being successful for RAP OM 1/1 Mt Difficulty, PASAC would see no requirement for the major part of RAP OM 2/1 Slapjack Creek. However, it was noted that some *Olearia* shrublands in Slapjack Creek may be protected for nature conservation as a result of the lessee's proposed fencing developments.

(c) **Additional Areas of Vegetation Interest**

(i) **Rare Plant Species**

Two species have been recorded from Mt Difficulty, ie:

- \* *Pleurosorus rutifolius* - a few plants in vertical crevices and under slight overhangs on a rock face east of Nevis Mouth. The small population does not warrant specific protection.
- \* *Lepidium kawarau* - three sites in Slapjack Creek

This latter species locations are within RAP OM 2/1 Slapjack Creek and were reconfirmed as two sites in the middle of the catchment where up to 6 plants were recorded over a large area, and a compact site on a series of rock bluffs in the upper part of the catchment. This site contained 40+ plants and has been protected as a conservation area as a consequence of the 1991 partial tenure review. The lower sites were considered to not warrant specific protection.

(ii) **DSIR Botany Division Report**

In 1984, DSIR plant ecologist Dr P N Johnson undertook a survey of the Kawarau Gorge. He identified areas of high biological importance on Mt Difficulty pastoral lease as being :-

- (a) Hill faces along the western side of Mt Difficulty due to the diversity of landforms, substrates and vegetation types.
- (b) Hill faces along the north east side of Mt Difficulty due to diversity of vegetation types and its scenic value.
- (c) Bluffs and steep faces near the Nevis Mouth due to diversity of vegetation types, rare plant species surviving on steep slopes.
- (d) Hill faces and terraces in the vicinity of Gees Flat.
- (e) Sites of rare plants or of localised plant communities. eg *Pleurosorus rutifolius* and *Lepidium kawarau*.

(iii) **Review of Vegetation**

As described above, there are several different vegetation descriptions, for various parts of the property. Some of these descriptions are up to 12 years old. At the time of field inspection for this tenure review application a decision was made to

engage an independent consultant to provide a specialist evaluation of the botanical conservation values of Mt Difficulty pastoral lease. The justification for this was based on knowledge of vegetation changes between 1987 and 1996 as a consequence of pastoral development occurring in parts of the property, including oversowing, topdressing and subdivisional fencing, especially in Slapjack Creek. Also periodic staff inspections had noted a substantial invasion of parts of the property by problem plant species such as briar and especially *Hieracium* species. There had also been three different lessees in occupation between 1987-1996 with changes occurring to the management of the property. These factors were considered likely to have affected the condition of native vegetation communities present on the property.

**(a) Landcare Research Report**

Dr R B Allen of Landcare Research, Dunedin was contracted to do the review. His report is as follows :-

Mt Difficulty Station was visited on 21 and 22 March 1996 with staff from the Department of Conservation, Otago, to determine if changes in the vegetation since 1986 had resulted in significant changes to the conservation values of OM 1/1, the PASAC extension, and OM 2/1.

**Vegetation changes since 1986**

In general, the vegetation of the RAP OM 1/1 and PASAC recommended areas is almost identical with that recorded in the PNA report (Brumley *et al.* 1986), with a few major exceptions.

On the mid-slopes up to about 1000 m of the north-eastern half of the catchment of Walkers Creek (the PASAC recommended extension to RAP OM 1/1), tussock hawkweed (*Hieracium lepidulum*) has almost completely displaced all other vegetation, and it is scattered at 20-30% cover through the south-western half of the upper catchment. This species was not recorded in the PNA report, or in 1992, when only mouse-ear hawkweed (*H. pilosella*) was noted as recently invading (Lee *et al.* 1993), although scattered plants identified as king devil (*H. praealtum*) by the author in 1991 amongst snow tussocks were probably tussock hawkweed. Snow tussock provides 20-30% cover above about 1000 m in the south-western part of the catchment, where it is regenerating under light grazing (0.2 stock units/ha/yr; Lee *et al.* 1993). North and eastwards around the catchment at this elevation there is 50-70% cover of blue tussock (*Poa colensoi*), with a diverse intertussock cover of native herbaceous and cushion species, scattered catsear (*Hypochoeris radicata*) and sweet vernal (*Anthoxanthum odoratum*), and patches of mouse-ear hawkweed.

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The upper steep slopes of the western catchment of RAP OM 1/1 have been heavily grazed, resulting in a reduction of plant cover to about 10%, mainly blue tussock and *Raoulia subsericea*. Cover is less affected on the rolling spurs below, where there is about 30% bare ground, 30% cover of sweet vernal, and the balance is heavily-grazed blue tussock, *Raoulia subsericea* and other native herbaceous species.

Below about 1000 m the vegetation of RAP OM 1/1 remains only lightly grazed, and similar to that described by Brumley *et al.* (1986), except that briar now provides at least 50% of the scrub cover below about 700 m elevation in the lower catchment, and is invading the remaining areas of grassland there. Immediately to the south of this catchment of the RAP, contiguous, predominantly native, scrub covers the extensive mid-slopes of the massive landslide opposite the Waitiri peninsula. As in the RAP, briar increases at lower elevation towards the Kawarau River.

Outside the RAP, scrub vegetation between Cascade Creek and the Nevis River is a mixture of briar and native species, especially matagouri, *Olearia odorata* and *Coprosma propinqua*. Briar has increased its dominance since a 1983 study of the area (Partridge *et al.* 1991).

RAP OM 2/1 retains vegetation similar to that described by Brumley *et al.* (1986), except that thyme (*Thymus vulgaris*) has spread up to the head of the catchment and now provides a substantial proportion of the cover on dry slopes, roadsides and rock outcrops. On the last it occupies habitat similar to that of *Lepidium kawarau*, which may thus be disadvantaged.

#### Discussion and conclusions

The conservation values of parts of RAP OM 1/1 and its PASAC recommended extension have changed as a result of vegetation change since 1986. The north-eastern part of the PASAC recommended extension to RAP OM 1/1 in Walkers Creek above about 1000 m elevation, where tussock hawkweed is dominant, and the lowest part of the western catchment of RAP OM 1/1, where briar is dominant, could both be excluded from further consideration without loss of botanical conservation values.

Mixed briar and native scrub between Cascade Creek and the Nevis River is similar to that of the lower western catchment of RAP OM 1/1, and has relatively low botanical conservation values.

The conservation value of parts of RAP OM 2/1, particularly on slopes and rock outcrops, has been diminished by thyme invasion. Thyme may be a threat to *Lepidium kawarau*, which is confined to rock outcrops.

In the absence of grazing, the heavily grazed vegetation of the upper western catchment of RAP OM 1/1 should recover. Snow tussock should continue to increase in density where it is present, and to extend into adjacent short tussock grassland.

Native shrub species, particularly matagouri, along with briar, will continue to displace short tussock grassland and introduced grasses in the middle elevations of the western catchment of RAP OM 1/1. The area of this predominantly native scrub which has high botanical value could usefully be extended by including that at similar elevation on the landslide to the south of the RAP opposite the Waitiri peninsula.

Several herds of up to 25 feral goats were seen in RAP OM 1/1 and adjacent parts of the Kawarau faces. Goat control will be required to maintain the condition of the vegetation, along with a reduction in or cessation of sheep grazing in the upper catchments.

In conclusion, it is clear that most of the RAP areas evaluated still have the high conservation values noted by Brumley *et al.* (1996) and endorsed by PASAC in 1987. With the exclusions noted above, the RAP as recommended by Brumley *et al.* (1986) and PASAC, along with the possible inclusion of native shrubland opposite the Waitiri peninsula, should achieve the aims of the Protected Natural Areas Programme for Mt Difficulty Station.

## (b) Departmental Assessment

### Western Faces - Roaring Meg to Nevis Mouth

#### Justification : Ecological diversity

The western gorge is a dip slope of c.35°, with deeper colluvial, and mostly stable, but erosion-prone, soils. Bluffs with steep screes are much less prominent than on the eastern escarpment slope with its predominantly 60°. The Kawarau Gorge contains a wide range of vegetation communities along "marked moisture and altitudinal gradients, and on a wide range of landforms and substrates" (Partridge *et al.* 1991). Partridge *et al.* (1991) found a number of factors influencing vegetation diversity and pattern, including position within the valley, altitude, aspect, rabbit grazing, gravel, soil acidity, soil carbon, and the nutrients potassium and magnesium.

Williams (1980), Wilson (1989), Hubbard and Wilson (1988), Wilson *et al.* (1989), Partridge *et al.* (1991), and Walker *et al.* (1995) all attributed the vegetation pattern of Central Otago primarily to the effects of differential soil moisture deficiency. The overall effect of soil moisture (determined locally by aspect, slope, and altitude) is judged to be more varied and dramatic on the western aspect than the eastern because of the deeper soils and microtopographical variation. Greater community variation is therefore expected in future

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vegetation, and is to some extent already evident because the existing shrublands already reduce soil evaporation losses. In addition, the refugial properties of rock outcrops for rare plants (Johnson & Hewitt 1991) (potentially *Pleurosorus rutifolius*, *Carmichaelia vexillata*, *C. compacta*, *Ischnocarpus novaezelandiae*) are enhanced with deeper surrounding soils (Walker et al. 1995). In a regional context two climates and associated vegetation types meet in the gorge; a semi-arid continental climate in the east and a more mesic climate in the west (Partridge et al. 1991).

The inevitability of change in the vegetation of the gorge is demonstrated in the seral relationship between grassland and shrubland, and even relatively long-lived species such as thyme (*Thymus vulgaris*) may not represent permanent features of this semi-arid landscape (Walker et al. 1995). The long-term reconstitution of diverse woody vegetation will require sensitive management and adoption of the view that briar may not pose a threat to this process succeeding. Briar will be limited generally to land below 700 metres. Although dominated by briar and matagouri, many other woody species are present in the developing shrublands, including *Aristotelia fruticosa*, *Carmichaelia compacta*, *C. petriei*, *Cassinia fulvida*, *Coprosma propinqua*, *Melicytus alpinus*, *Muehlenbeckia complexa*, *Olearia lineata*, *O. odorata*, *Pimelea aridula*, *Rubus schmidelioides*, and *R. squarrosus* (pers. obs.; Johnson 1985), pointing to diverse communities in the future. Furthermore, scattered bracken may act as a 'nurse' for indigenous broad-leaved and small-leaved shrubs on wetter sites, by stabilising, melanising, and moisturing soils. Sporadic bracken also attests to the water retention properties of the soils, to the presence of previous forest of some description, and to the future development of diverse woody vegetation. Rare plant habitats on bluffs will improve as surrounding shrubland insulates or buffers extremes of climate and soil moisture deficits.

Threats include further burning of woody communities, associated rill and gully erosion, and afforestation. All will impact severely upon slope stability and siltation, and scenic and ecological values - rare plants and their habitats, diverse shrublands and insect habitat.

In summary, environmental diversity is much higher on the western than eastern slopes and accordingly, Johnson (1985) recommended protection of the hillslopes along the western side of Mt Difficulty, due to diverse landforms, substrates, and vegetation communities.

#### **North East Faces - Roaring Meg to Walkers Creek**

The Old Man Range PNA report states that the vegetation of RAP 1/1 Mt Difficulty is "vulnerable to disturbance by grazing or erosion". This observation is supported based on DOC research observations. Both shrublands and *Festuca* grasslands are in poor condition caused by mainly sheep grazing. The extensive erosion on these faces will not be helped by continued sheep presence.

A study done on sheep diet in hill country at Omarama (Hughes 1975) showed that sheep eat *Festuca* and *Rytidosperma* native grasses. *Festuca* was ranked first in preference and *Rytidosperma* sixth. Shrubs such as matagouri ranked fourth.

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This information indicates that sheep grazing may have an impact on the survival of the significant *Festuca* grasslands on these slopes.

Significant shrubs present are :

- Coral broom at its southern distributional limit.
- *Carmichaelia compacta* - a Central Otago endemic - best populations are here.

Heenan (1995) rates the plant as nationally rare.

- *Carmichaelia vexillata* - at its southern limit. A rare plant in Otago, nowhere protected. A low growing native broom.

Heenan (1995) states that sheep grazing is preventing regeneration of *C. compacta* in Central Otago and causing early senescence in older plants.

These three broom species along with the more common *C. petriei* form a unique assemblage of native brooms in one place. Together with *Olearia odorata*, *Pimelea aridula*, *Cassinia fulvida* and *Coprosma propinqua* they form a valuable association, especially important for native insects. None of these plant species benefits from sheep grazing.

### Significance of the Vegetation

#### (a) RAP OM 1/1 Mt Difficulty

The RAP and its PASAC extension is a key site for nature conservation. It contains a complex array of vegetation features typical of the north Carrick Range included in two catchments, one oriented to the west, the other oriented to the east, with a comparatively small summit area. Notable features include:-

- the most intact and diverse examples of semi arid tussockland, grassland and shrubland in the Ecological District.
- Fescue tussocklands are extensive and shown a variety of dry community associations.
- *Rytidosperma* grasslands are extensive and intact on north east faces. The only dense stand recorded in the Ecological District.
- *Pimelea* and *Carmichaelia* shrublands are characteristic of the dry Kawarau faces and are the most extensive along the gorge. These shrublands are confined to the drier parts of the Ecological District.
- *Chionochloa rigida* tussocklands are actively regenerating.

The Landcare Research vegetation review indicates that the vegetation in the upper part of the western catchment of the RAP, notably the blue tussock, should recover if grazing ceases. The review suggests the RAP boundaries be amended to exclude the area below 700 m in the

western catchment and the area where tussock hawkweed is dominant in the head of Walker Creek. The predominantly native shrubland extending across the Waitiri landslide south of the western catchment of the RAP, generally above 700 m is also a significant feature.

**(b) Western Faces - Roaring Meg to Nevis Mouth**

This area is significant for the following reasons:

- It possesses high environmental diversity due to the variations in landforms, substrates and vegetation communities.
- It contains important rock outcrop refugia for rare plant species.
- It is already displaying and has long-term potential to develop into a diverse predominantly native species dominant shrubland.
- The development of a woody vegetation cover including briar will reduce soil evaporation losses and will enhance the development of a more diverse mixed native shrubland over time.

**(c) North Eastern Faces - Roaring Meg to Walkers Creek**

This area is significant for the following reasons :

- Unique assemblage of four native broom species, three of which are either endemic or at southern distributional limits. *Carmichaelia compacta* populations are the best known for this nationally rare species. *C. vexillata* is not protected elsewhere in Otago.
- These broom species form a valuable association with other native shrubland species, especially important for native fauna conservation.

**5 FAUNA**

**(a) PNA Survey Results**

The PNA survey did not report comprehensively on fauna and the property has not been studied in detail by ornithologists. However some records were noted and are included in this report on the basis that the records are incomplete. There is no invertebrate survey information contained in the PNAP survey.

**RAP OM 1/1 Mt Difficulty**

New Zealand Falcon and Australasian Harrier were recorded from upper catchments. The former species is listed as a second priority species for conservation action, ie a Category B species (see "Setting Priorities for the Conservation of New Zealand's Threatened Plants and Animals", 2nd edition October 1994, Mollon and Davis, DOC).

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Pipit, skylark and blackbird were common over mid slopes. In 1986, a New Zealand Wildlife Service lizard survey recorded the common skink ("spotted" form) on rocky slopes.

#### **RAP OM 2/1 Slapjack Creek**

The common gecko and skink were abundant around rock outcrops. Bird species included grey warbler and red poll in scrub patches and yellow hammer and skylark in open country. Australasian harriers were recorded in the main valley.

Californian quail favour sheltered gullies throughout the property and there are old records of chukar but few have been sighted in recent years.

#### **(b) Invertebrate Surveys**

A major year long Lepidoptera survey was completed in early 1991 of the Kawarau Gorge part of the property, extending from the gorge entrance to the Nevis River mouth. Its findings are summarised as follows :-

- a list of 272 species was recorded
- many of these species were linked to host plant species
- presence of rare or endangered species
- survey noted the significance of other species for biogeographical reasons
- discovered species new to science, so far confined to the Kawarau Gorge

#### **Key features**

Key ecological features for the native Lepidoptera fauna in this part of the Kawarau Gorge are :-

##### **(i) Rock bluffs**

These support a highly distinctive moth assemblage that is not found elsewhere together. Some species are totally restricted to the Kawarau Gorge (eg *Dichromodes* n.sp) while other species are restricted to Central Otago but most common and typical of the Kawarau Gorge (eg *Helastia christinae*). This species has its type locality in the gorge.

Some species such as the large moth *Gingidiobora subobscurata* are now very local in occurrence as they depend on highly palatable herbs that live on ledges in this habitat. The enormous size and frequency of the rock bluffs in the Kawarau Gorge has enabled this and many like species to survive here in contrast to less prominent sites in the South Island.

##### **(ii) Shrublands (Native)**

These support a highly distinctive moth fauna, much larger in terms of numbers of species than the rock bluffs but similar in terms of distinctiveness. Key plant species supporting the larvae of moths are :-

***Olearia odorata*** - Supports the rare *Pasiphila cotinaea*, *Pseudocoremia cineracia*, a nationally rare species and *Pasiphila* n.sp, endemic to Central Otago; the rare *Meterana exquisita* and *M. grandiosa*, *Pyrgotis* n.sp. and *Protosynaema* n.sp, both discovered here and only known elsewhere close to the study area; *Declana* n.sp. endemic to the Kawarau Gorge.

***Carmichaelia compacta*** - supports an undescribed *Scythris* sp., *Pasiphila* sp and *Pseudocoremia melinata*. All are widespread species but very common here. Also the very rare *Theoxena scissaria* and *Kiwaia pharetria*.

***Meliccytus alpinus*** - supports an undescribed *Harmologa* sp. that is common here but rare elsewhere, the local noctuids *Andesia pessota* and *Homohadena fortis*.

***Pimelea aridula*** - supports a low altitude population of the noctuid *Meterana meyricki* and the diurnal and widespread *Notoreas* n. sp. aff. *perornata*.

Other significant species present for which the host plant is as yet unknown are :-

- ***Asaphodes stinaria*** - endangered species Category A (Sherley 1989), suffering a retraction of range. Only known from 2-3 sites in New Zealand. One specimen found here. Part of an ongoing research programme to identify key areas for its survival.
- ***Bityla sericea*** - rare in Otago, only known population is in Kawarau Gorge where it is uncommon.
- ***Asaphodes chlamydota* and *Helastis tripbragma*** - are both local species which are found here.
- ***Pseudocoremia* n.sp.** - a distinct new species found in reasonable numbers known from the study area only.
- ***Horisme suppressaria*** - an uncommon new species found rarely at the study area, larvae on Corokia. In addition, many widespread shrubland moth species are exceedingly common in the Kawarau Gorge reflecting the habitat quality.

### (iii) Open Communities

Open communities of tussock (*Poa cita*, *Festuca* spp, *Raoulia* spp, *Vittadinia* spp and various native herbs) support a large number of native moth species. Key species include :-

- *Xanthorhoe bulbulata* - an endangered moth species Category A (Sherley 1989), one specimen only found. This is the second record in sixty years. This is the only known population of a once widespread species. Critical importance.
- *X. orophylla* - a low altitude population of this normally alpine species.
- *Ichneutica notata* and *Aletia nobilia* - low altitude populations of these uncommon alpine species, both at their eastern limit of distribution in Otago.
- *Asaphodes recta* and *A. belias* - dependent on short tussock cover which nurtures the host plant herbs. The former is confined to Otago and is uncommon. The latter is typical of alpine wet gullies and eastern Otago forests.
- Excellent populations of a large number of *Kiwata* species that feed on *Raoulia* mats (eg *K. schematica*, *K. lithodes*).
- *Rbigognostis sera* - only known occurrence in southern New Zealand larvae on *Rorippa* in seepages, etc.
- Many other characteristically Central Otago moth species are common in these open sites, eg *Eurythecta zelaea*.

#### c Carabid Beetle Survey

The property was surveyed for carabid beetle species on 21 and 22 March 1996. Searches involved turning rocks and searching the bases of shrub and tussock.

#### Results

Below 600 m, pasture and shrub predominate on both the western and eastern sides of Mt Difficulty and some patches were dominated by brier (*Rosa rubiginosa*) or thyme (*Thymus vulgaris*). Smaller carabids (*Agonum otagoense*, *Holcaspis* sp.) were common. Non-carabid beetles; St Johns wort beetle (*Chrysomela hyperici*), the tenibronid beetle (*Mimopeus opaculus*) and common chafer (*Costelytra zealandica*) were found here. These species were also at higher elevations where blue tussock (*Poa cita*) is occasional in a mosaic of sweet vernal (*Anthoxanthum odoratum*), clover (*Trifolium repens*), fescue (*Festuca novae-zealandiae*), *Olearia* spp. shrubs, matagouri (*Discaria toumatou*) and brier. Above 800 m fescue tussock was common and regenerating in places. *Holcaspis* sp. carabids were more common and on Slapjack Saddle (820 m) and at higher elevations *Holcaspis* sp. *Megadromus sandageri*, *Mecodema sculpturatum* and *Oregus aureus* were found. These carabids occurred in fescue, snow tussock (*Chionochloa rigida*) and areas of rock in tussock. In addition, the remains of a large brown and black carabid (*Mecodema chiltoni*) were found near a rock tor (figure 1 red x). This find from the northern Nevis valley extends the known range for the species. *Mecodema chiltoni* is ranked as category C in Molloy and Davis's list of endangered species and

has a restricted distribution through the forests and grasslands between the Eyre Mountains and Nevis Valley.

Extensive areas of Hawkweed (*Hieracium lepidulum*) in the upper Walkers Creek catchment appear to contain a low diversity of large ground invertebrates. On the western side, within RAP OM 1/1, intensive grazing and dry north-west winds may have contributed to the appearance of exposed soils, mobile rocks and sparse vegetation. However, *Mecodema chiltoni*, other carabid beetle species and ground weta (*Hemiandrus* sp.) were found there.

#### **d Aquatic Fauna**

The NIWA freshwater fish database has no records for streams on Mt Difficulty. The two major streams, Slapjack Creek and Long Gully were surveyed. No fish were found in Slapjack Creek, while rainbow trout were very rarely encountered in Long Gully.

The property has no conservation value for native freshwater fish.

#### **Significance of the Fauna**

The presence of New Zealand Falcon, a category B species for conservation, is notable.

The major Lepidoptera survey undertaken in 1990/91 in the Kawarau Gorge produced highly significant results of importance for invertebrate conservation. The gorge is a significant site for the following reasons :-

- large number of species (272) collected.
- presence of many nationally rare and endangered moths with good and secure populations.
- only known population of three nationally endangered moth species.
- significance of other species for biogeographical reasons, ie endemism, restricted distributions.
- discovered a moth species new to science, so far confined to the Kawarau Gorge.
- large populations of Central Otago species.
- secure populations of South Island species that are decreasing.
- low altitude populations of alpine species.
- uncommon Otago endemic species dependent on short tussock grassland.

The carabid beetle survey revealed the presence of the large carabid *Mecodema chiltoni*, a category C species for conservation in the upper parts of RAP OM 1/1. This discovery is an important extension of the distribution of this species.

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## 6 HISTORIC VALUES

### a Iwi Perspective

The small terrace near the Natural Bridge (Whata to Rere) is known to be a kaika nohoaka or temporary campsite which is situated at a pivotal stage on the old Maori trail system.

### b Archaeological and Historic Values

Archaeological and historic features of this property have been assessed and described in the DOC unpublished report titled "Mt Difficulty Revisited - An Archaeological Assessment", J Hamel, 1996. A summary of this assessment is contained below.

#### Maori sites

There is only one Maori site recorded on Mt Difficulty Station. A greenstone boulder is said to have been found among the rock shelters near the natural bridge and is now in private hands. Information about the traditional site may be available from the Ngai Tahu Central File Keeper, Joy Ellison. The general area has been badly damaged by mining, especially during the 1980s. Trevor Howse, Ngai Tahu, inspected the area with the Otago Regional Council prior to rehabilitation work being carried out this year (Grant Richards; pers. comm.) and considers it to be an important traditional site.

#### European sites

There are no sites on Mt Difficulty that are known to be connected with nineteenth century farming, and it is unlikely that there are any.

The gold mining sites along the true right of the Kawarau have been surveyed three times in 1978, 1991 and 1996. They are mostly sluicings on terrace sediments lying 25 m above the river which is entrenched through the gorge. At Gees Flat and south past Bannockburn an old bed of the river has been worked down to the present river level. The early mining records indicate that the sites were worked from 1862 onwards, with sporadic mining throughout the twentieth century, the last being Hammond's work opposite the Roaring Meg in the 1980s.

The workings can be broken up into discrete groups. Opposite the Gentle Annie confluence there are herring bone tailings, 200 m long, with a well-preserved stone hut ruin at the south end (Fig 1,A). About 1.2 kilometres downstream, there is another large area of tailings with a revetment and dam (Fig 1,B). About 800 m downstream again, there are two earth walled reservoirs, with sluicings below them and a rock shelter nearby (Fig 1,C). Just upstream of the Natural Bridge, there is a site which once spread over about 500m (Fig 1,D). It consisted of sets of tailings, a large shallow reservoir, a complex of races and huts near a group of poplars. Most of the tailings have been destroyed by mining in the 1980s. The reservoir, some of the races and the huts at the poplars are likely to be still intact. South of the poplars there are rock shelters under large boulders close to the Natural Bridge and in the vicinity of the traditional Maori site (see above).

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Opposite the confluence of the Roaring Meg there is a good 500 m long section of the revetted pack track which ran right up the true right of the river. Ritchie also recorded tailings running for 500 m along the river bank here (site 513) but they are no longer visible in the briar. Immediately downstream there is large complex of sites extending over about 800 m and centred around Cleghorn's hut set in bluegums with a dense ground cover of periwinkle (Fig 1,E). Midden material was dated to the 1870s. Behind the hut there is a long irregular sluice face with tailings below it, set at a higher level on the hillside than the other workings in the gorge. The rest of the broad sloping terrace has been worked over, with two concentrations of workings north and south of trees. This is the most northern workings with clear evidence of the use of drives into the cemented alluvium that was too high and hard to be sluiced. The most conspicuous heap of debris from a drive is just beyond the southern end of this terrace.

The gorge is even steeper over the next section where there are three sets of workings hung on the side of the gorge (Fig 1, F, G, H). Each has drives, tailings and small reservoirs. At the middle one of these sites, a well-preserved Chinese rock shelter (Flax Grove) was excavated by Ritchie, and dated to 1880-1910.

The largest and most interesting complex of workings in the gorge is at Gees Flat which extends for about 2.5 kilometres downstream past Masons and Gees Creeks (Fig 1, J, K). Some of the workings are enclosed in the Otago Goldfields Park Reserve and an adjacent area held by Contact Energy and leased to Peter Egerton. Important workings and features associated with the Reserve lie on pastoral lease land north and west of the Reserve/Egerton lease.

Water was always in short supply on Gees Flat and as early as 1863 water was brought across from the Meg Sidlings on the true left, especially from Scrubby Stream. There is a small revetment marking where one of the siphons came across (Fig 15), and traces of head races and one reservoir above the northern workings. These are irregular tailings, tunnels and channels extending for 800 m along the terrace past Masons Creek (Fig 1,J). Close to Masons Creek, there is the most distinctive house ruin in the whole gorge - Ritchie's cottage (Fig 1, 485). The walls still stand up to 2 m high and the chimney 4 m high. The stone work is of an unusually high quality, especially the chimney which is similar to Murrell's hotel on Mt Pisa Station. Above Ritchie's Cottage, there is an anomalous site - a large tunnel drilled into the hillside by Electricorp as a test for a tunnel through to Waitiri.

South of Masons Creek the Reserve boundary runs along the terrace and then turns sharply up into Gees Creek. A line of drives above the workings lies half in the pastoral lease and half in the Reserve. There is an intake in Gees Creek for the two main reservoirs within the Reserve (Fig 11), which includes both an old stone wall and concrete walling. The reserve boundary runs sharply downhill and turns along the terrace edge, leaving three earth walled features on flat unworked ground in the pastoral lease. These features are a holding paddock or garden (44 x 45 m) and two large rectangular reservoirs of similar sizes. The remains of the earth walls round them are very low, less than 30 cm, except for curious transverse walls, up to 1.8 m high outside and about 30 cm on the inside of their respective reservoirs. These features seem to have been so severely silted up that their form is now almost obscured. They were probably filled with water directly from Gees Creek.

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At the south end of the Flat there are two living sites. One is a small complex of rough stone and sod walling about 8 x 6.5m, and the other is a shelter cut into a steep clay hillside high above the terrace. It is small but carefully constructed.

The race systems supplying Gees Flat from the true right of the Kawarau River all originate from Walkers Creek. A high race taking four heads from both branches of Walkers Creek runs for three miles high round Mt Difficulty and drops water into Gees Creek. The license (WR10284Cr) for this race is still active and held by DOC. The earliest date for it is 1966 but it could well be older. There is also a licence (WR11422Cr) for a four inch pipe from the mouth of Walkers Creek, held by DOC, which ran along the cliffs and just had sufficient height to reach the lowest of the two rectangular reservoirs (dated 1966). There is a third live licence (WR2095Cr) held by Contact Energy for a race starting one mile up Walkers Creek and crossing the river by pipeline, originally used for irrigation and domestic purposes on Strain's property. The pipeline is derelict, but the line of the race within Walkers Creek is still apparent. The earliest date for this race is 1906.

There are five or six minor sites at the mouth of Walkers Creek, consisting of:

- A dam and some small sluice pits right in the mouth of the creek.
- A very roughly built chimney and outline of a hut on the true left of the creek.
- An abutment for a pipe to cross Walkers Creek.
- A small reservoir fed by a race out of Walkers Creek which would have been used for the early and extensive sluicings running for three kilometres south along the bank of the Kawarau River past the mouth of Long Gully.
- A stone hut below the reservoir which was not relocated.

All these sites are likely to have been associated with the three kilometres of Kawarau River sluicings, situated on land taken by Electricorp for electricity generation. Though each of the sites on this part of Mt Difficulty are relatively small, they are part of a large and important complex.

Slapjack Creek does not seem to have been actively mined but a race comes into the lower part of it from the Nevis for some unknown purpose. High in the creek and 80 m (vertically) below Slapjack Saddle there is a very fine ruin of a stone hut still relatively intact. Its corrugated iron roof has fallen half inside the hut and the walls still stand 1.8 m high. There is no obvious reason why the hut should be there, but there is a causeway, track and stand of trees about a kilometre further down the gully.

Antimony mines at the head of Long Gully and in Shingle Gully on Kawarau Station were worked in at least three places, but only Buchans Lode on Antimony Saddle extended on to Mt Difficulty Station. The historic workings there were destroyed by modern mining with bulldozers in 1979.

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The only other historic site in Long Gully is the major race to Menzies Dam in the Bannockburn Sluicings. This race was formed in the 1870s, and part of it lies on Mt Difficulty Station.

The three live water race licences on the station are owned by DOC and Contact Energy (see Appendix 1). Recent mining licences include R L Bodger's on the flat opposite Waitiri (Fig 1, A) which was surrendered six months ago; the Hammond Brothers near the Natural Bridge and now held by the Ministry of Commerce and recently "tidied up" by a bulldozer, and a licence to mine the bed of the Kawarau River still held by the Ryan brothers and expiring in 2004. The latter is not being actively worked.

### **Significance of the Historic Values**

The historic sites along the true right of the Kawarau Gorge have high heritage values as early gold fields sites which are still relatively intact. Main stem river edge sites throughout the Clutha catchment are being destroyed at an increasing rate and it is important to preserve good examples of the sites that remain.

The value of these sites is enhanced by their surrounding landscape, which is often dramatic and little changed from the time of the earliest mining activity.

The following sites or clusters of sites are considered to be significant:

#### **(i) All sites on Gees Flat**

These sites are linked to the sites contained within the Otago Goldfields Park reserve and include the bench for the pipeline from Walkers Creek, and the high level water race from Walkers Creek to Gees Creek. The rocky slopes behind the flat extending to the summit ridge are an important landscape setting for the Gees Flat sites. The Electricorp tunnel above Ritchies Cottage is an example of the ongoing history of the area and is a safe tunnel for visitors to enter.

#### **(ii) All sites along the Kawarau Gorge as defined in Map 2A**

A to H except for part of D have high historic value. The landscape setting for these sites is also an important feature. Pt Area D is Hammonds rehabilitated site. Ideally this landscape setting should extend to lie well back up the rocky slopes as seen from the highway, from opposite Scrubby Stream to Hammonds mine site. From the Natural Bridge to the Nevis the boundary should lie above any visible water races or at least 40 vertical metres above the flats.

This strip would include the traditional site at the Natural Bridge. At the south end of the gorge this strip should extend up Walker Creek to encompass the cliffs and water races upstream as well as the sites recorded at the mouth of the creek.

#### **(iii) The sites along the Kawarau Gorge upstream of the Goldfields Park Reserve have untapped potential for public access and interpretation.**

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The historic pack track would provide an ideal route through these sites, with a possible extension as far as the Nevis River mouth. A bridge crossing could link this track to the access easement negotiated as part of the Wentworth pastoral lease tenure review which exits near the Victoria Bridge.

- (iv) **The water race from Long Gully to Menzies Dam** is significant because of its association with the Bannockburn Sluicings, another Otago Goldfields Park site. Most of the length of this race is now contained within the Long Gully Bluffs Conservation Area and only a short section (approx. 1 km) is located on Mt Difficulty Station. It is protected under the Historic Places Act.

## 7 EXISTING LAND STATUS

### a Legal Roads

An unformed legal road extends the full length of the Kawarau River frontage from the southern boundary of the Gees Flat Recreation Reserve upstream to the Nevis River mouth and thence up the Nevis River to beyond the property boundary. The legal road along the Kawarau River downstream of Gees Flat is submerged under Lake Dunstan.

There are no legal roads, formed or unformed, within the property. DOC has a vehicle access easement for management purposes over the "hydro road" from Long Gully to the Slapjack Creek Conservation Area.

### b Marginal Strips

There are no marginal strips on any of the creeks within the property. It is unlikely, given their small size, that any watercourse warrants marginal strips being laid off on disposal of the property.

### c Other Occupations

Telecom owns a recently constructed cellular phone installation near the summit of Mt Difficulty. The company has an access easement for the site. New Zealand Police have been negotiating with LINZ to purchase an adjacent site for their proposed telecommunications facility. A strip of land taken for generation of electricity extends along the shoreline of Lake Dunstan from the southern boundary of the Gees Flat Recreation Reserve to the lease boundary.

### d District Plan

The property is covered by the Central Otago District Council and the Vincent section of the council's transitional plan is currently operative. The relevant zoning of the property is Rural 1. This zone recognises landscape amenity as one of the criteria for formulating rural zoning policies.

## **Landscape Protection Objectives**

The plan recognises the scenic quality of the Central Otago landscape: the rocky and dry mountain views, the contrast between open valley and enclosed gorge landscape, the special interest created by the remnants of dwellings, gold workings, water races and other relics left by goldminers.

## **Landscape Protection Policies**

Policies place emphasis on generating public awareness of the value of the landscapes with the ultimate intention of revising zoning boundaries to create specific landscape protection zones.

## **Ordinances**

The Rural 1 zone predominant uses are primarily for land used for primary production, but includes provision for reserves as defined by the 1977 Reserves Act.

Conditional uses provide for agricultural services and production forestry.

## **e Otago Conservancy CMS Statement**

The Otago Conservancy of DOC has produced a draft Conservation Management Strategy (CMS) which is nearing final approval after a lengthy planning effort involving extensive public consultation.

The CMS identifies 41 special places of conservation interest in the Otago conservancy. The Kawarau Gorge is one such special place. The description of this special place covers the entire gorge, from the river outlet of Lake Wakatipu to the Clutha Kawarau river confluence at Lake Dunstan. Many of the values of this special place relate to the surrounding land including several pastoral leases as well as Mt Difficulty. Parts of the special place text relevant to Mt Difficulty pastoral lease and its tenure review are stated below:

### **Kawarau Gorge - Special Place No. 24**

#### **Description**

The Kawarau River for most of its course from the outlet of Lake Wakatipu to its confluence with the Clutha Catchment at Lake Dunstan is incised in a spectacular gorge. Its bed is relatively steep and the river carries high volumes of water, so has exciting white water characteristics. From the Nevis to Lake Dunstan steep mountain sides, prone to erosion and landslips, rise up to 1500 metres on either side.

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The valley carries State Highway 6, the main access from the east to Queenstown and the Wakatipu Basin. The valley is therefore a major corridor and gateway to the Wakatipu Basin so is of special significance for tourism.

With the formation of Lake Dunstan, which has flooded the Cromwell Gorge, the Kawarau Gorge is the last major remaining spectacular semi-arid rocky gorge in Otago. Narrow terraces, especially on the south side of the gorge section, are composed of gold bearing glacial outwash gravels. These supported small historic mining settlements. At the Kawarau Gorge Mining Centre a commercial operation makes use of the location and past mining relics to provide an interesting tourist attraction, with gold sluicing, panning and old buildings and machinery as well as horse riding and jetboating and a tea room.

### Values

The flow characteristics of the Kawarau as an outstanding waterway has been given interim protection by the draft Kawarau Water Conservation Order. The Order identified outstanding values for the Kawarau River as its wild and scenic characteristics; natural characteristics, particularly the return flow in the upper section when the Shotover is in high flood; scientific values; recreational purposes, in particular rafting, and kayaking.

The Kawarau Gorge has high scenic value due to its rocky outcrops, swift river, deep entrenchment and high surrounding mountains giving a feeling of enclosure. It has a colourful history having been used as a route by both Maori and early Europeans to gain access to the Wakatipu Basin. There are also stone huts, dams, sluicings and historic plantings in the gorge.

Whata to Rere is the traditional Maori name of the Natural Bridge which it is said spanned all but a metre of the river but eroded or collapsed in the 1870s. This crossing of the Kawarau gave access to the Wakatipu Basin and beyond to the pounamu sources. Another trail went from Whata to Rere via the Roaring Meg into the Orau (Cardrona Valley) and then down to Wanaka. A kaika nohoaka was situated in the vicinity where travellers rested.

The flow characteristics make the river valuable for jetboating and kayaking below Roaring Meg Creek to Lake Dunstan.

Special plants in the gorge include *Carmichaelia compacta*.

Part of Mt Difficulty was recommended for protection in the Old Man PNA Survey.

### Management Issues

- Managing the river margins to retain natural character of the river.
- Lack of practical access to the river margins on the true right except at Kawarau Gorge Mining Centre.
- Protection of the special plant species of the area.

- Protection and restoration of historic features.
- Protection and conservation of cultural features of importance to Kai Tahu.
- Retention of high scenic values in the light of past scarring from mining and associated roading and protection from similar onslaughts in the future.
- Natural large scale erosive processes and instability.
- Wilding exotic trees and increasing density of briar.
- Telecommunications sites on summits, and adverse landscape impacts.

### **Objective**

To protect the values of the Kawarau Gorge as a scenic corridor along with associated natural Maori cultural and historic resources, with a small range of recreational and commercial opportunities which are compatible and sustainable.

### **Implementation**

- Priority will be given to interpretation of selected historic features to increase public appreciation and enjoyment.
- Careful consideration will be given to commercial development of the Kawarau Gorge to protect its significance as a gateway between Central Otago and the Wakatipu Basin.
- Pastoral lease tenure reviews in the area will be utilised to improve negotiated protection of and public access to key areas.
- Mining which results in adverse effects on the scenic and historic character of the gorge is inappropriate for land administered by the department, and will be objected to in relation to other land.
- Co-siting of telecommunications facilities will be encouraged and adverse visual effects required to be minimised.
- Concessionaires occupying sites on land administered by the department will be encouraged to contribute to the conservation and interpretation of the area. Interpretation will incorporate Maori traditional material where appropriate, in consultation with Kai Tahu. Maori place names will be promoted.
- When informed of the nature and location of waahi taoka and waahi tapu on land administered by the department, consult with Kai Tahu about the appropriate management of that site.
- The protection of significant natural and historic resources in the area will be advocated in Resource Management Act and other statutory processes.

### **Priorities**

Activities contributing to Landscape protection and the enhancement of public appreciation of the area will be priorities in this Special Place.

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## 8 RECREATION/ACCESS

### a Access

A walkway provides limited access from the Bannockburn Sluicings (Otago Goldfields Park site), via Kawarau and Mt Difficulty Stations to the Long Gully Bluffs Conservation Area. This walkway was negotiated at the time of the partial tenure review of Mt Difficulty in 1991 when strenuous efforts were being made through the RLMP to obtain control of the rabbit problem. The walkway is subject to closure during rabbit poisoning operations, lambing and at other times, is only open for public use on Sundays and Mondays.

The Kawarau Gorge Mining Centre, an Otago Goldfields Park site, is available for public use under a concession and entry to the reserve is subject to a charge. Access is available from State Highway 6 via a footbridge over the Kawarau River.

There are two cableways near the Roaring Meg and Gentle Annie across the Kawarau River but these are not publicly available and are unsafe to use.

### b Recreation Use

Limited active recreation use currently occurs on the property. The Long Gully Bluffs Walkway attracts a low level of use in part due to its limited availability for use. Some goat hunting occurs periodically.

The most significant passive use is appreciation of the Mt Difficulty landscape by tourists travelling the Kawarau Gorge especially the setting of the river and the Kawarau Gorge Mining Centre, from the gorge entrance to Roaring Meg in particular.

The river on this section of the gorge hosts commercial jet boating and rafting activities and an international canoe and kayak slalom course.

The landscape setting enhances the quality of the recreation/tourism experience for visitors.

Potential uses could involve increased opportunities for walking, especially along the river margins and possibly to the summit of Mt Difficulty and a round trip via Slapjack Creek and Long Gully. It is likely that activities involving use of the Kawarau Gorge may be more popular and contribute to the developing "Kawarau Experience".

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## 9 MANAGEMENT CONSIDERATIONS

### a Wild Animals

Goats are the only wild animal ungulate on the property and these have been controlled partly by the Department of Conservation in the Long Gully catchment and by station management on other parts of the property.

At present, goats have been removed from the Long Gully catchment and the Long Gully Bluffs conservation area. Surrounding pastoral leases have been controlled to stop re-infestation of the conservation area. The rest of the station has been spasmodically controlled by station staff in conjunction with helicopter rabbit control operations.

Control operations occurred in autumn 1996 and reduced goat numbers in the Slapjack Creek catchment and on the Kawarau Faces.

Complete eradication from Long Gully and a zero population in Slapjack catchment is an operational goal, with low populations (to prevent re-infestation), on the rest of the station. Once the above goals are achieved regular monitoring with back up control operations would be needed.

Possoms are distributed throughout the property in particular on sunny bluff faces and in shrubby areas. Control could be readily achieved by rabbit control operations, eg by slightly increasing the toxin application if could be used effectively and at minimal additional cost.

Hares are present at higher altitudes but not in sufficient numbers to warrant specific control.

### b Animal Pests

#### (i) Rabbits

21 ha of the property is rabbit prone and was included in the Rabbit and Land Management Programme (RLMP). Proneness is extreme/severe.

#### Otago Regional Council Comment

Most of the station has suffered from rabbit plagues in the past and although at present rabbit populations are generally low, increases in the population are inevitable. This particularly applies to the Kawarau Faces, especially from Walkers Creek to the confluence of the Nevis-Kawarau Rivers. This large block of steep faces and river terraces has a chronic rabbit problem.

### *Control Costs*

Land in the Meg (Kawarau Faces) North (opposite Roaring Meg) and Waitiri Blocks below 700 metres is within the RLMP. (Rabbits are present at potential problem levels on all land below 900 metres).

	<u>Total Block Area</u>	<u>RLMP Area</u>
Meg Block	800 ha	570 ha
North Block	519 ha	444 ha
Waitiri Block	550 ha	130 ha
Upper Walkers Block	344 ha	0 ha

In 1991, a major 1080 poison operation occurred on the RLMP land on the property. This cost more than \$100,000 and will probably need to be repeated every four years. This operation with good secondary control has resulted in the current contained rabbit populations on some parts of the property only. In intervening years secondary control operations will be required. Effective secondary control on these blocks is extremely limited due to limited access over difficult terrain.

The Otago Regional Council consider most of this rabbit prone country should not be grazed, especially because of the extent of the sensitive C VII land contained in the blocks. If grazing were to be discontinued, control costs could be reduced as rabbits could be allowed to increase to a level to compensate for the removal of grazing without risk to soil erosion. ORC also suggests that the removal of grazing will only partially produce a rankness of vegetation which could act as a discouragement for rabbits to increase. In other words, rabbits will always tend towards high populations on this class of country, without the influence of effective biological control.

The ongoing cost of secondary control with a primary (poisoning) control operation every 4th year is estimated to be on land included in the RLMP in these blocks:

- as \$19/ha per annum (averaged 1° and 2° costs)
- NB: costs are real costs, post RLMP

Costs of rabbit control on land between 700 metres and 900 metres is calculated to be up to \$7/ha per annum. Rabbit control on this property has been expensive and although some gains have been made the extensive grasslands and dry sandy soils combined with a large area of steep inaccessible terrain means rabbit control costs will remain high and ongoing.

### **DOC Comment**

The department generally accepts the broad comment of the Otago Regional Council but as a consequence of more recent inspections and further consultation with council pest control staff has observed the following situation:

Land below 700 metres on the Kawarau Faces currently has a rabbit population of Maclean scale 5-7. On land 700-900 metres rabbits are up to Maclean scale 8-9 on the faces from Masons Gully around to opposite the Waitiri Homestead. Whilst rabbit density is not uniform at this level, the population is expanding rapidly outwards, especially on high sunny faces up to 1000 metres along the ridges from Mt Difficulty towards the Roaring Meg. Control costs of hot spots is likely to exceed \$30 per hectare. The population has yet to peak.

Rabbit numbers are at a level in the shrubland belt that briar frequently has been bark stripped, native shrubs are heavily browsed and no regeneration of either is occurring. At higher levels severe over-grazing by stock has created ideal conditions for breeding even over the winter months. Bare ground and ground-hugging vegetation has replaced short tussock over an extensive area.

In summary, the departmental view is that rabbits on this part of the property are clearly out of control and the cost of achieving and maintaining control is and will continue to be extremely expensive.

#### **(ii) Others**

The usual array of rabbit predators, ie cats, ferrets and stoats, are present. Numbers fluctuate dependent on peaks and troughs of the rabbit population.

### **c Plant Pests**

#### **(i) Briar**

This species has long been a major problem plant at lower altitudes especially on shady faces and where moisture levels are highest through the property. Its spread has periodically been checked by high rabbit numbers but it is currently filling in the gaps in its potential range where rabbit numbers are low enough to allow this to happen. Control costs are high.

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**(ii) Thyme**

This species is confined to sunny dry low mid altitude country and is steadily increasing its range. It is distributed along the Kawarau Faces and is extending up Slapjack Gully. There appears to be no cost effective control method.

**(iii) Hieracium**

Hawkweeds are relatively recent arrivals on the property. In the earlier vegetation surveys, ie up to 1991, tussock hawkweed (*Hieracium lepidulum*) occurred as scattered plants only, up to 1000 metres in the Walkers Creek catchment. In the 1996 survey, this species had displaced almost all other vegetation in the north-eastern portion of the catchment, and is scattered at 20-30% cover through the south western half of the upper catchment.

Mouse eared hawkweed (*H. pilosella*) was, prior to 1992, widespread in the upper tussocklands and herbfields, but has diminished markedly since then. It remains a frequent but minor component of the native vegetation around the summit ridge of Mt Difficulty.

**(iv) Gorse, Broom and Tree Lupins**

Very localised pockets of these weeds are scattered along the Kawarau Faces round to the Nevis River. They are spreading very slowly and could readily be controlled.

**(v) Wilding Pines**

Scattered lightly along the Kawarau Faces especially from Roaring Meg to the Nevis River. Main species appear to be *Pinus radiata* (widespread) and a pocket of spreading Douglas fir opposite Roaring Meg.

**d Fire**

Mt Difficulty, being semi arid, has a high fire risk over an extended summer season. There are two rural fire authorities. Most of the property is covered by Central Otago District Council except within 1 km of conservation lands where DOC assumes this responsibility.

Fire has been used periodically to control woody weeds especially after spraying.

**e Fencing**

Adequate and relatively new stock proof fencing exists around the boundaries of the Long Gully Bluffs conservation area. There may be a need to put rabbit netting on the lower boundary fence to better control rabbits.

The Slapjack Creek Conservation Area and the Gees Flat Recreation Reserve are unfenced with sheep grazing occurring on accessible parts. Grazing is not affecting conservation values of either protected area and no fencing is required.

Block fencing throughout the property is of a generally high standard although little has been rabbit-netted.

**f Modern Mining**

Recent gold mining has occurred on the terrace upstream of the Natural Bridge. This activity was poorly controlled, resulting in damage to significant historic values both Maori and early European mining sites. The claim was not rehabilitated for a lengthy time after mining had ceased. Access to the claim was via a badly sited and constructed access road cut down hill from the summit of Mt Difficulty to the river terrace. This road is very visible from the State Highway and impacts on the scenic value of the Kawarau Gorge landscape.

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### PART III

#### CONSULTATION

An early warning meeting occurred on 23 May 1996 with non governmental organisation (NGOs) which represent public conservation/recreation interests. Organisations such as Forest and Bird Society, Federated Mountain Clubs, Public Access New Zealand and local environmental/recreational groups participated.

Key points raised were as follows :

- Access for foot and mountain bikers to top of Mt Difficulty via Slapjack Saddle and Walkers Creek tracks.
- Mountain bike access along hydro road with a linkage via Carrick Range tops to Duffers Saddle.
- Foot access from Bannockburn to Roaring Meg along Kawarau riverbank.
- Improve access availability of the Long Gully Bluffs Walkway.
- Protect Olearia shrublands in Slapjack Creek.

Additional written comment has been received from Mike Floate, representing Federated Mountain Clubs. His comments are as follows:

- Land above 1000-1100 m to go to DOC.
- All LUC Class VIII and most Class VII land to go to DOC.
- DOC/Freehold boundary to be consistent (landscape) with neighbouring/related runs.
- Foot (and mountain bike?) access from Bannockburn, through Slapjack Saddle and/or over Mt Difficulty to historic sites beside Kawarau River, and to cableways across Kawarau River (info map 260 F41 : 981675 and 999707).
- Foot and mountain bike access via 4WD track along the foot of the Kawarau Faces from Bannockburn to Gees Flat, Masons Gully and other historic sites in the Kawarau Gorge.
- All water courses greater than 3 m to have marginal strips laid off.

**PART V****ATTACHMENTS****1 Appendices**

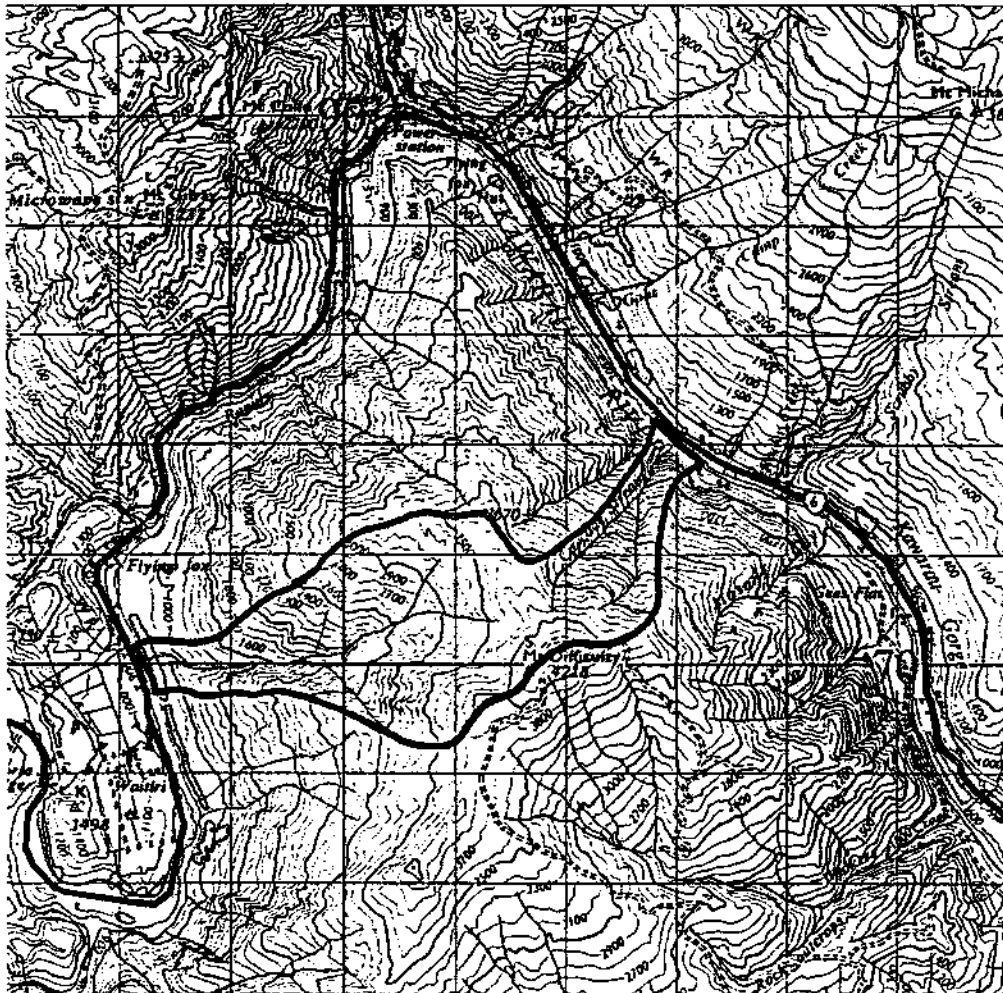
- a** Brumley C F, Stirling M V, Manning M S 1986. Old Man Ecological District.  
Survey Report for the Protected Natural Areas Programme. Department of Lands and Survey, Wellington. Extract pp 40-43.
- b** Submission from Mike Floate for Federated Mountain Clubs.

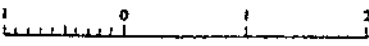
**2 Photos of Areas of Conservation Interest on Mt Difficulty Pastoral Lease.****3 Illustrative Maps**

- Map 1 Cadastral map
- Map 2A Map of Historic Sites
- Map 2B Topographic Map - Conservation Values
- Map 2C Map of DOC Water-races and Intakes
- Map 3 Topographic Map - Recommendations

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1/1: MT DIFFICULTY



SCALE :  Kilometres  
GR CENTRE : NZMS1 S133 910705  
AREA : 400 ha  
ALTITUDINAL RANGE : 200m - 1280m  
TENURE : Crown land ; pastoral lease.  
DATA REFERENCE : Study Areas 22, 23, 25.

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1/1 : MT DIFFICULTY , ECOLOGICAL UNIT CHECKLIST

BIOCLIMATIC ZONE	VEGETATION COMMUNITY	ECOLOGICAL UNIT	ALTITUDINAL RANGE	REP. AREA	SAMPLE SITE NO.	PRIORITY AREAS w. SIMILAR UNITS
Low-alpine	Mixed tussock	CHIRIG - FESNOV on colluvial crests	1130-1210m	S	22-13; 25-21	1/4,7,9; 2/1,2,3
"	Fescue tussock	FESNOV tussockl'd on colluvial slopes and crests	1010-1280m	M	22-08,14,15; 25-20,24	1/3,4,7,9; 2/1,2
"	Blue tussock	POACOL + ERYPUM on colluvial slopes	1210m	S	25-23	1/1,5,7,10,11;
"	Herbfield	ACIAUR - FESNOV, FESMAT on colluvial slopes	1010-1210m	M	22-10; 25-22,25	1/4,5; 2/1,2
"	Wetland	Carex-moss bog on seepage	980-1130m	M	25-16,18	1/5,6,7; 2/4,6
Sub / Low alpine	Scrub	Diverse scrub on derivative slopes	760-1210m	L	22-06,09	1/3 2/1,2
"	Silver tussock	POALAE tussockl'd on colluvial slopes	880-1190m	M	(22); 25-11,15,19	1/2,3,5; 2/1
"	Fescue tussock	FESNOV tussockl'd on ripply colluvial slopes	650-1160m	L	22-02,11	1/2,4,7; 2/2,3
Subalpine	Shrubland	PIMARI - POALAE on colluvial slopes	820-1010m	L	25-12,14	none
"	Wetland	Sedge/Rush flush on seepage	830- 910m	S	22-03,04; 25-11	1/3,4,7,13; 2/1,2,3
"	"	" on alluvial surface	880m	S	25-13	1/4,7; 2/1,2
Montane	Scrub	Dense DISTOU on colluvial slopes	700- 820m	M	22-01	1/4
"	"	Diverse scrub on outcrop & rubble	550- 820m	M	25-07,10	1/3; 2/1,2
"	"	OLEDDO - DISTOU-COPPRO on derivative slopes	610- 760m	M	25-08,09	1/2
"	Grassland	RYTGRA grassland on colluvial slopes	460- 580m	L	25-05,06	none
"	Shrubland	HEBspp - mixed veg. on stream channel	310- 610m	S	25-04	1/13; 2/7
"	"	CARCOM shrubland on derivative slopes	270- 370m	L	25-03	none
"	"	" on alluvial surface	210- 270m	L	25-01	none

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LANDFORM

Transect of the north end of the Carrick Range, with derivative and slumped landscapes formed on opposing flanks of Mt Difficulty.

Steep northeast-facing Cascade Creek was formed by fluvial downcutting at a high angle to schistosity. Major landforms are steep colluvial slopes and rock cut cascading watercourses. Overall gully profile is convex with steep bluffs in the lowest reaches.

The west-facing catchment occurs within landslide topography where schistosity subparallels slope. It has an asymmetric profile. South flanks are craggy with rubblefields, block slumps and isolated earthflow chutes. Northern flanks are ripply with slump and earthflow features dominant.

Descending altitudinal sequence of yellow-brown (Carrick, Dunstan), yellow-grey (Arrow, Blackstone), and brown-grey (Alexandra) hill/steepland soils. These are locally sheet eroded on upper steep and exposed aspects of Mt Difficulty.

VEGETATION

Dry tussockland and scrub communities.

Fescue tussocklands dominate the middle slopes of Mt Difficulty with golden spaniard prominent on steep, more unstable slopes.

The western faces have extensive outcrop and rubble on north-facing slopes which support a variety of scrub and herb species including native broom, Pimelea oreophila, Coprosma propinqua, Cassinia vauvilliersii, Gaultheria spp, Helichrysum selago, and numerous fern species. Dense scrub in the lower gullies is mainly matagouri with increasing briar towards the base of catchment. South-facing slumped slopes are dominated by fescue tussocklands with blue tussock and Maori onion abundant ; scattered flushes in damp depressions are dominated by cutty grass, exotic grasses.

Northeastern faces have more extensive, though sparse cover of silver and fescue tussock across the mid slopes, giving way to Rytidosperma grassland on lower faces. Scrub communities are localised: scattered Pimelea aridula on ridge crests, native broom on terrace above the Kawarau, and pockets of matagouri-Olearia along the stream gullies.

A patch of mixed snow tussock-fescue tussock survives on the southern sheltered crest of Mt Difficulty. Northern summit faces have little vegetation cover.

FLORA

Pimelea aridula - silver tussock ) two communities  
Native broom (Carmichaelia compacta) ) drier part of District  
Rytidosperma gracilis - the only dense stand species  
recorded in the District.

Helichrysum selago - abundant on western bluffs

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## DISCUSSION

This area represents the variation in landform over much of the dry northern Carrick Range.

Cascade Creek forms part of the most extensive derivative landscape in the District which overall spans 1200m in altitude and 6 km of the northeast faces of Mt Difficulty.

The western catchment is an example of landsliding, part of the Mt Difficulty landslide which is a large feature by world standards. Ripply slopes dominate the landscape here with significant areas of derivative slopes on northwesterly aspects.

Sheet and slip erosion are likely to have been accelerated by human influences from pre-European times. The area is particularly prone to these erosion forms on steep and/or exposed aspects.

The area contains the most intact and diverse examples of semi-arid tussockland, grassland and scrub associations in the District. Vegetation cover is sparse over much of the upper faces and vulnerable to disturbance by grazing or erosion. Fescue tussocklands are extensive and show a variety of dry community associations. Rytidosperma grasslands are extensive and intact on the northeastern faces. Pimelea and Carmichaelia shrublands are characteristic of the dry Kawarau gorge faces, and were the most extensive stands recorded along the gorge.

Several herds of goats were seen on the Nevis valley slopes and individuals recorded above the Kawarau gorge. Rabbits are common throughout. The common skink ("spotted" form, 1986) was commonly seen on rocky slopes. New Zealand falcon and harriers were recorded over the upper catchments; pipit, skylark and blackbird over the mid-slopes.

## CRITERIA SUMMARY

REPRESENTATIVENESS	- H	- Semi-arid tussockland, grassland, scrub communities.
DIVERSITY	- H	- Both aspects of range (with variety of species and communities).
NATURALNESS	- M	- Native canopy reasonably intact; many exotics in ground cover.
SPECIAL FEATURES	- M	- <u>Pimelea</u> , <u>Carmichaelia</u> shrublands. - Block-slump, gravity fault features in western catchment; buttress ridge in northeastern catchment.
VIABILITY	- M	- Extensive communities, exotic component moderate.
BUFFERING	- M	- Prominent catchment boundaries; surrounding vegetation highly modified, particularly at lower levels.
THREAT	- M	- Erosion of upper slopes by grazing disturbance.
LANDFORM	- H	- Representative of Mt Difficulty - northern Carrick Range, asymmetric gully/ridge form. Extensive slump/landslide and derivative slopes.

Pastoral Lease Tenure Reviews May 1996

Notes for Early Warning Meeting 23 May 1996

CONTRIBUTION FROM MIKE FLOATE FOR FMC

Mt Difficulty (Po 257)

Land above 1000-1100m to go to DOC

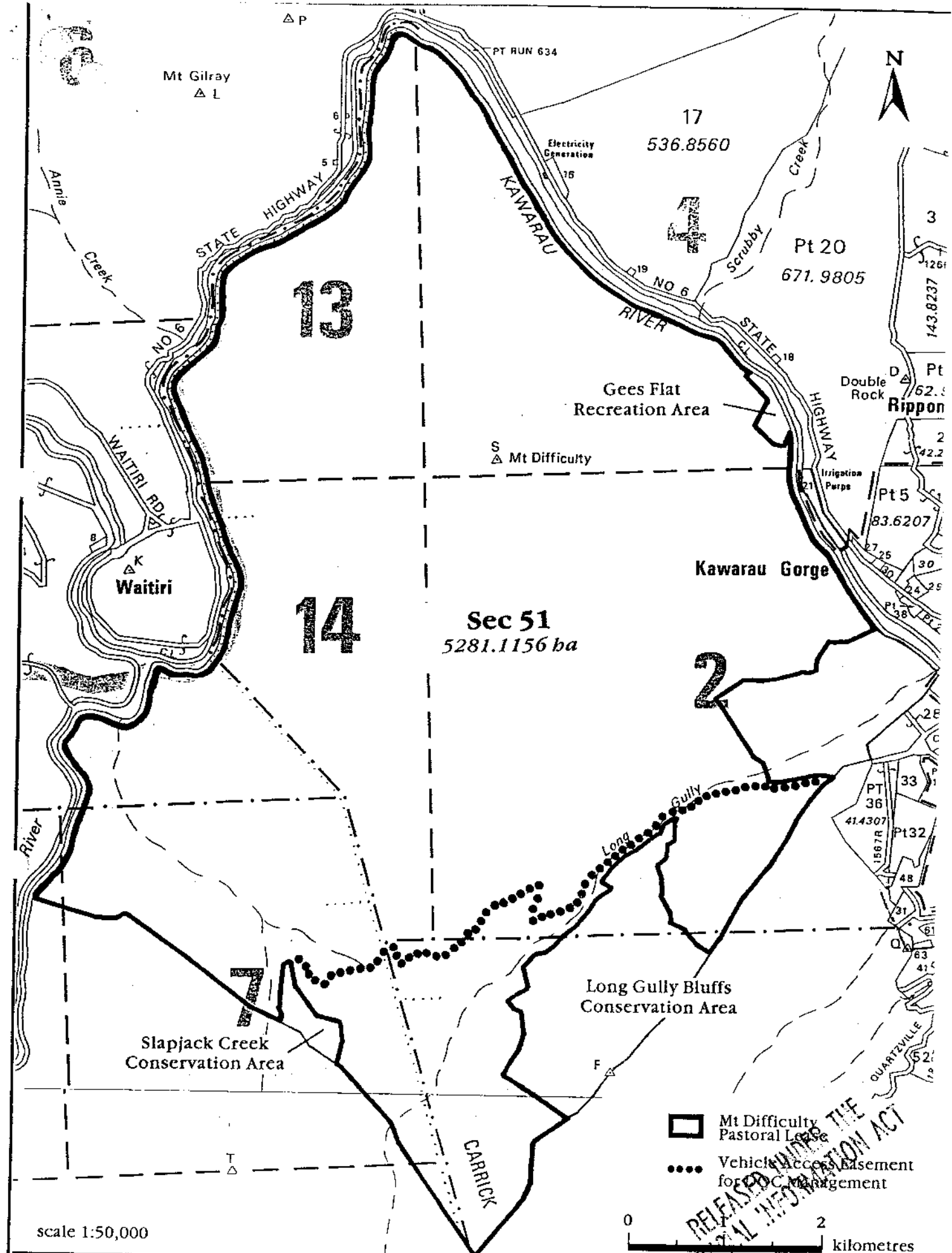
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across Kawarau River (Infomap 260 F41: 981.675 and 999.707)

Foot and mountain bike access via 4WD track along the foot of the Kawarau faces from  
Bannockburn to Gees Flat, Masons Gully and other historic sites in the  
Kawarau Gorge.

All water courses greater than 3m to have marginal strips laid off

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scale 1:50,000

- Mt Difficulty Pastoral Lease
- Vehicle Access Baseline for C Management

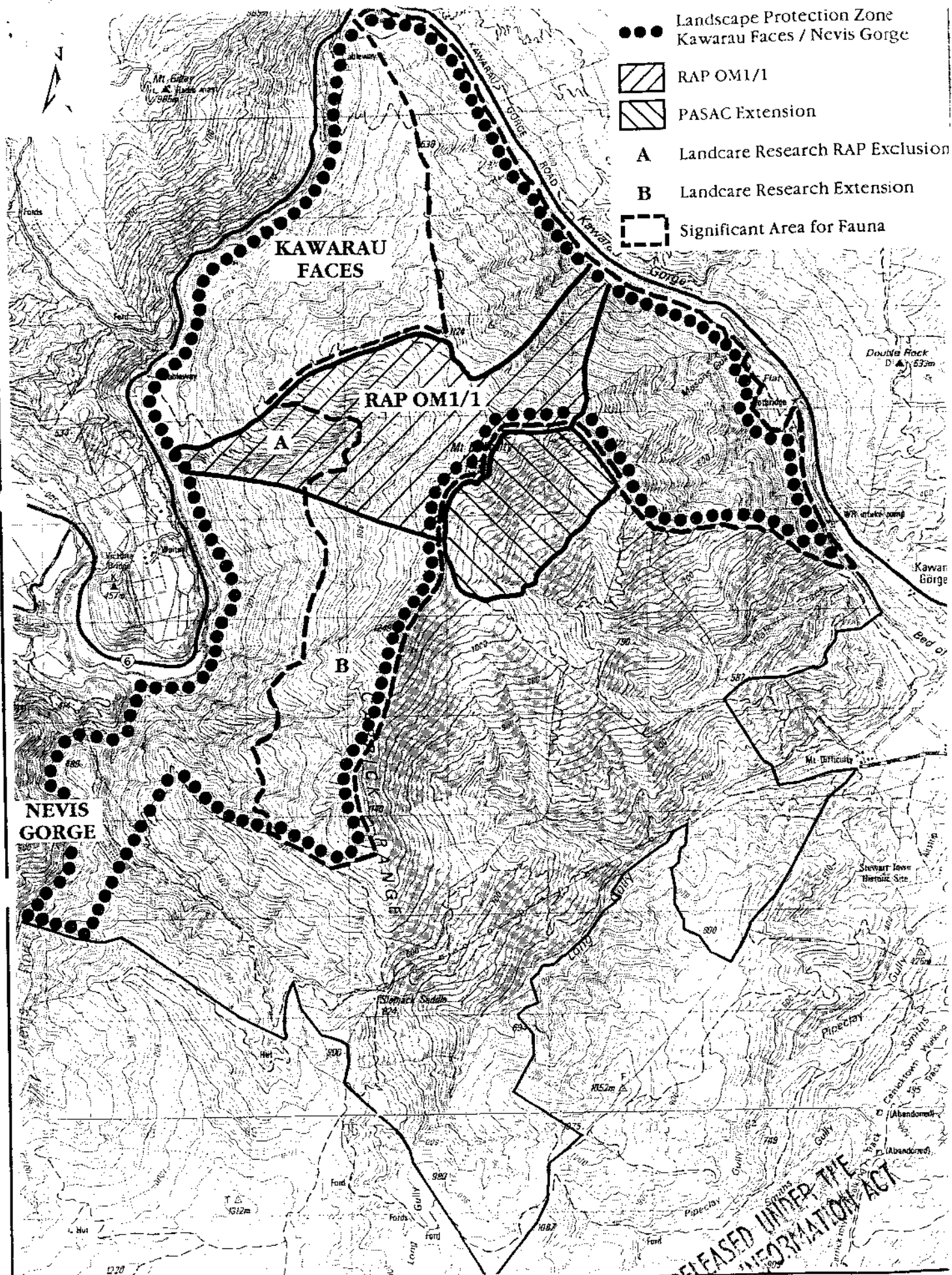


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 Map Ref: F41, F42

### Map 1 Mt Difficulty Pastoral Lease



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- Landscape Protection Zone  
Kawarau Faces / Nevis Gorge
- ▨ RAP OM1/1
- ▩ PASAC Extension
- A Landcare Research RAP Exclusion
- B Landcare Research Extension
- ⋯ Significant Area for Fauna

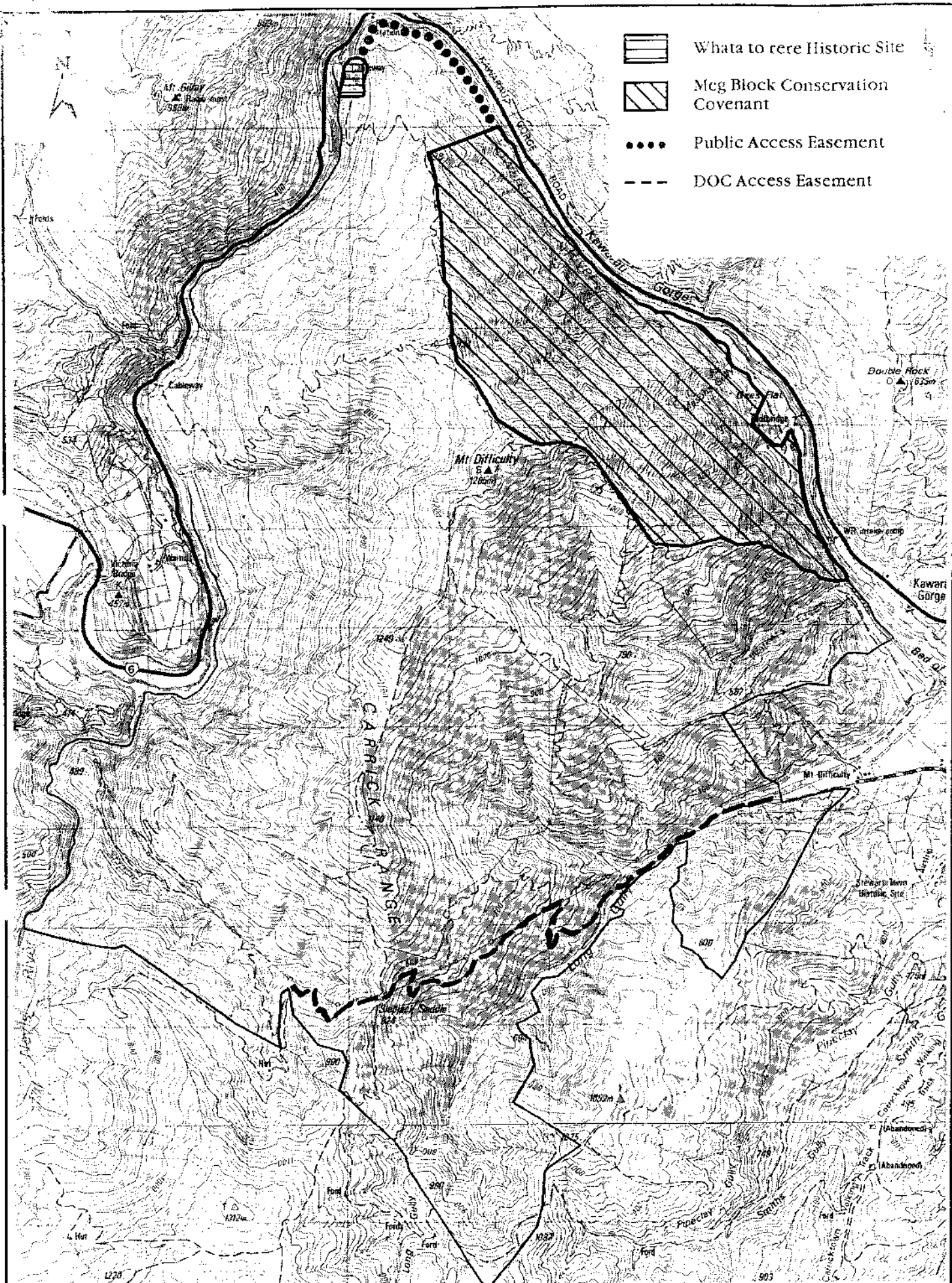
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



## Map 2 Mt Difficulty Pastoral Lease Conservation Values

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-  Whata to revere Historic Site
-  Meg Block Conservation Covenant
-  Public Access Easement
-  DOC Access Easement



File Ref : P 353 C/T : 13A/632  
 Map Ref : F41, F42

### Map 3 Mt Difficulty Pastoral Lease Recommendations



DEPARTMENT OF  
 CONSERVATION  
 TE PAPA ATAWHAI