

Crown Pastoral Land Tenure Review

Lease name : HUKARERE

Lease number : PO 009

Conservation Resources Report - Part 3

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.

4.3 Photographs



Photo 1. Pomahaka River – Devils Gorge



Photo 2. *Olearia fimbriata* in Pomahaka Valley



Photo 3. Little Parasol Shrublands



Photo 4. Mid Parsol Creek Shrublands



Photo 5. Upper Parasol Creek from near Leithen Bush



Photo 6. Looking down into Rough Gully (Parasol Tributary)

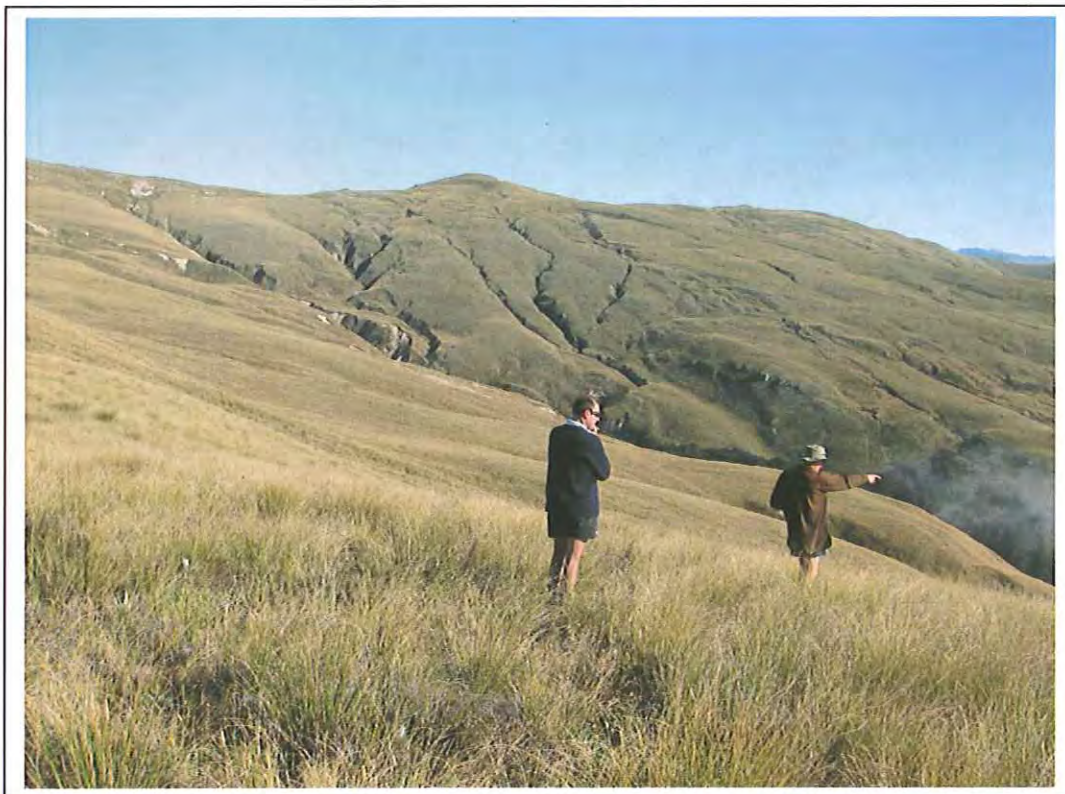


Photo 7. Upper Sandy Creek Catchment



Photo 8. Upper Leithen Burn (Rabbity Block) – Leithen Bush in Distance

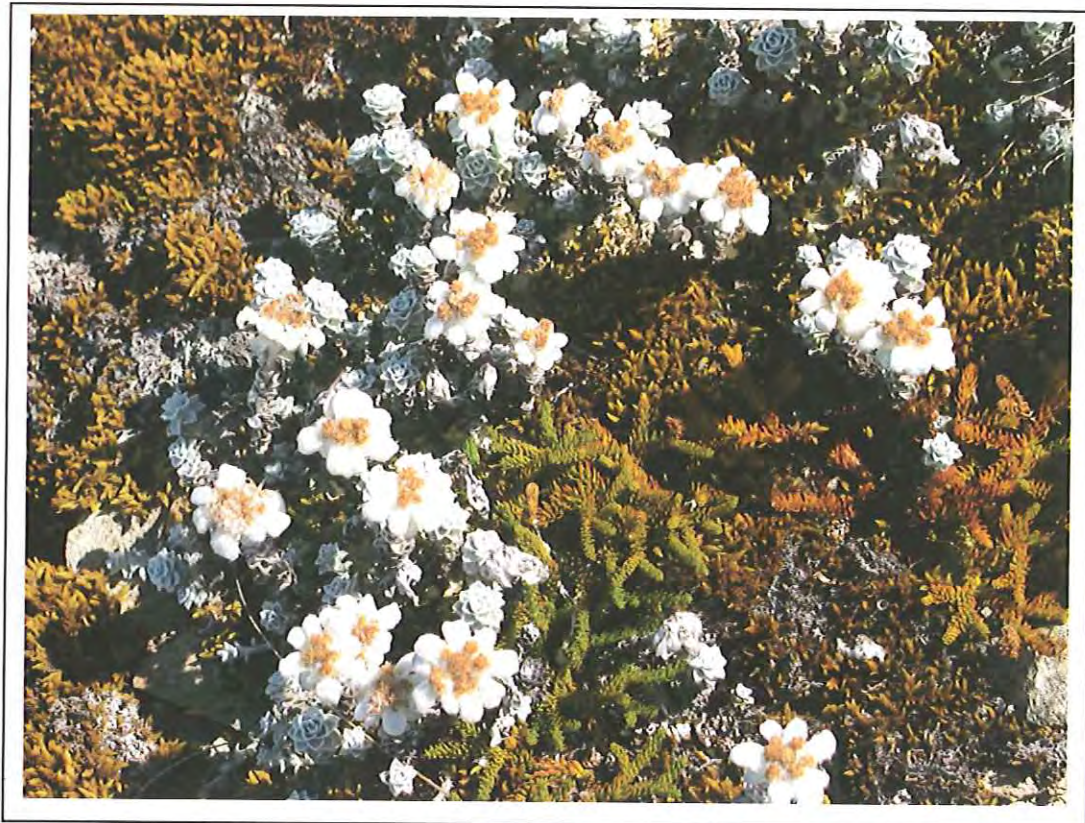


Photo 9. Edelweiss (*Leucogenes grandiceps*) on Sandy Hill Summit

4.4 Appendices

- Appendix 1 Dickinson KJM 1988: Umbrella Ecological District Survey Report for the Protected Natural Areas Programme. Department of Conservation, Wellington. Extract pp 93-96. and pp 119-121.
- Appendix 2 Description of Vegetation Communities
- Appendix 3 List of Plant Species
- Appendix 4 List of Invertebrate Records from Hukarere Pastoral Lease
Invertebrate Species List
- Appendix 5 Sampling data from streams within and nearby Hukarere Station. Summarised from an investigation report By R. Dungey winter 2007.
- Appendix 6 J Hamel 1989: Survey of the Historic and Cultural Values on Pastoral Leases on the Umbrella Ecological District and the Southern Old Man Range. Department of Conservation unpublished report. Extract figures 18-21

Appendix 1 – Extract from Umbrella Ecological District Survey Report for the Protected Natural Areas Programme.

93.

UMB 04 Leithen Burn Headwaters S161 892 870
SN 5693 D/4

Rock bluff vegetation	on ridge
Herb-tussockland	on colluvial slopes
Modified tussockland	(on colluvial slopes (on creek margins
Tussockland	(on colluvial slopes (on ridge
Cushion-tussockland	on ridge

Vegetation and flora

The majority of the area described here as the Leithen Burn Headwaters, and currently outside of the Leithen Bush Scenic Reserve, falls within the Group 9 community (mid- to high-altitude tussock grassland) differentiated using cluster analysis. Altitude covered ranges from c. 500 m to 1060 m and extends over a variety of slopes and aspects. Described variously under the Atkinson system as tussockland, herb-tussockland and modified tussockland, the community is dominated by narrow-leaved snow tussock (*Chionochoa rigida*) with varying amounts of the adventive species browntop (*Agrostis capillaris*), sweet vernal (*Anthoxanthum odoratum*), and catsear (*Hypochaeris radicata*) in the ground tier. In places browntop forms dense swards particularly on the margins of Leithen Burn and in small depressions, especially on the lower valley slopes. Cover of the herb *Celmisia semicordata* var. *aurigans* and subshrub snowberry (*Gaultheria depressa*) are generally high throughout with local abundance of *Celmisia densiflora* and the subshrub *Brachyglottis revoluta*. Creek margins particularly in the southern sections of the area identified also support limited shrub communities containing such species as inaka (*Dracophyllum longifolium*), mountain tauhini (*Cassinia vauvillierii*), mountain ribbonwood (*Hoheria glabrata*), manuka (*Leptospermum scoparium*), turpentine scrub (*Dracophyllum uniflorum*), *Hebe* aff. *rakaiensis* and *H. rakaiensis*.

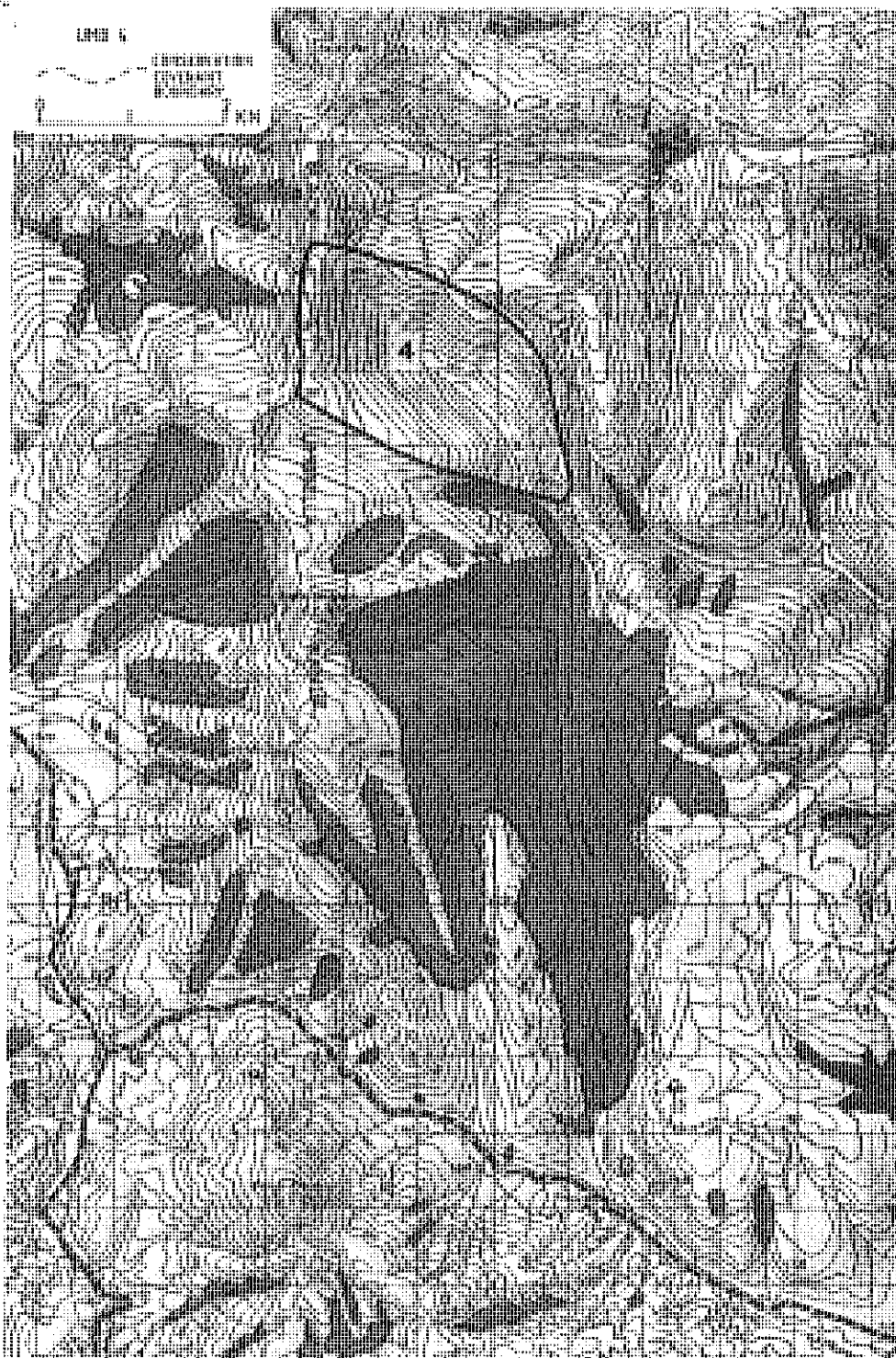
Rock outcrops (c. 880 m) for the most part support species also occurring in the surrounding tussockland. Exceptions include the shrub *Helichrysum selago*, subshrub *Parahebe lyallii*, herbs *Aciphylla lecomtei*, *Gingidia montana* plus the rush *Luzula banksiana*.

The cushion-tussockland community falls within Group 10 of the cluster classification and is represented by one site. Dominated in the canopy by narrow-leaved snow tussock (*Chionochoa rigida*), and by comb sedge (*Oreobolus pectinatus*) and the herb *Coproosma pumila* in the ground tier, the community is of limited extent. It covers several small areas on the ridge at the valley head (c. 1010 m).

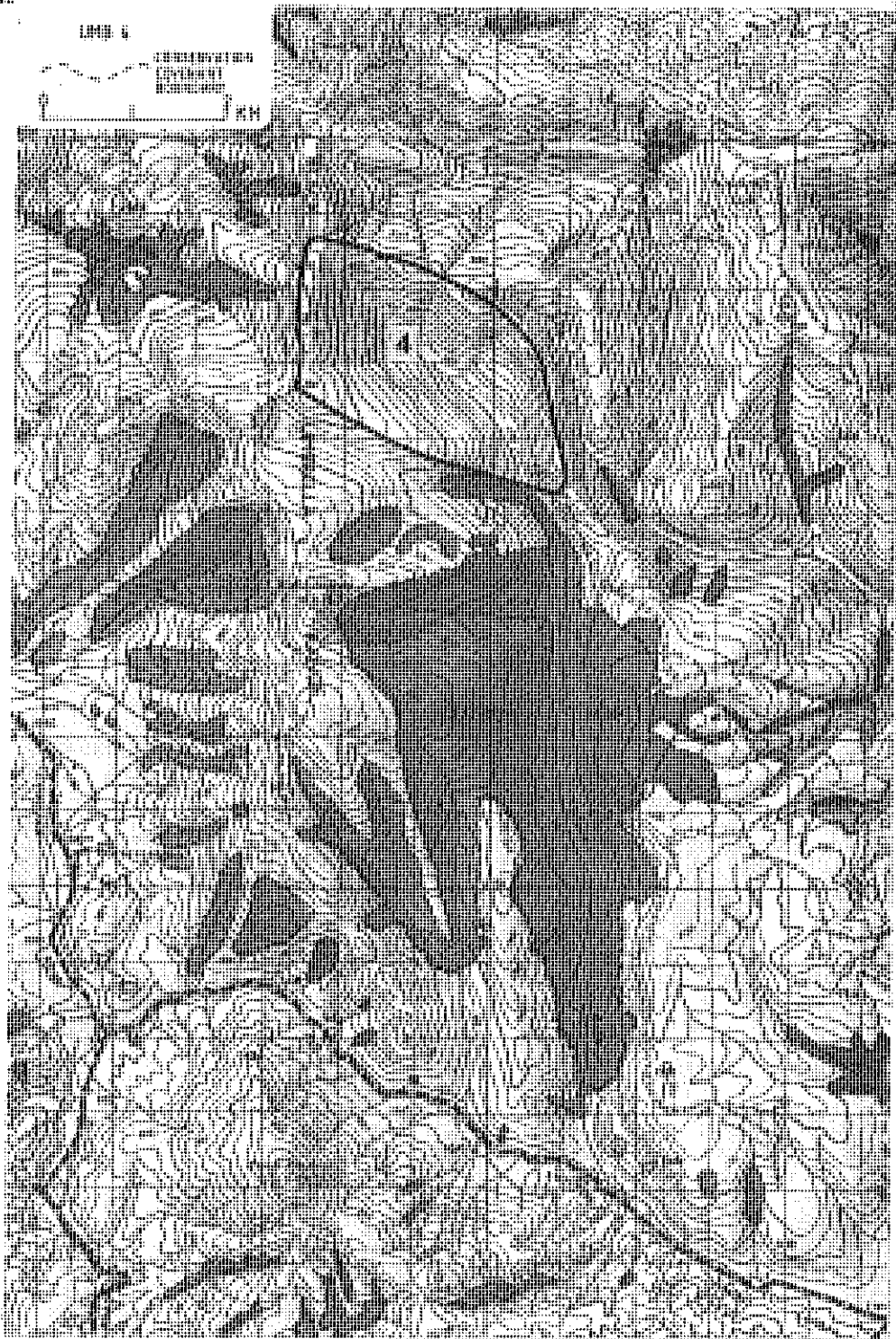
Landform

A deeply incised valley in semi-schist which contains the headwaters of the Leithen Burn. Steep colluvial slopes rise from the creek to both east and west. The valley head rises steeply to the main Black Umbrella Range which forms a narrow but prominent ridge. A few rock bluffs outcrop, mainly on the leading ridge which forms the eastern catchment boundary.

94.



94.



96.

Area c. 700 ha
Altitude range 500-1090 m
Aspect Valley head faces south but extensive slopes face
in both easterly and westerly directions
Plot cards 020, 022 to 025, 027 Group 9
021 Rock bluffs
026 Group 10
Refer also 017 to 019, 288 to 308
(Leithen Bush Scenic Reserve)
028 to 033 (Parasol Hill)
Tenure Pastoral lease

UMB 11

Devil's Gorge

S161 976 872
SN 5693 E/18

silver beech forest)
 mixed broadleaf forest) in deeply incised gorge
 rock bluff vegetation)

Vegetation and flora

Silver beech (*Nothofagus menziesii*) dominates in patches. Red beech (*N. fusca*) and a red-mountain beech (*N. fusca* X *solandri*) hybrid were recorded but only rarely. The tallest beech specimens (c. 15-20 m) occur on small terraces adjacent to the Pomahaka River. The beech forest grades into forest dominated by broadleaf (*Griselinia littoralis*) and marbleleaf (*Carpodetus serratus*), with a canopy height of c. 5-10 m. *Corokia cotoneaster*, *Coprosma crassifolia*, *C. parviflora*, *C. propinqua*, *Hebe rakaiensis*, *Helichrysum aggregatum*, *Matagouri* (*Diaccaria toumatou*) and manuka (*Leptospermum scoparium*) are abundant in the shrub layer whereas inaka (*Dracophyllum longifolium*) is only locally abundant. *Carmichaelia virgata*, lancewood (*Pseudopanax crassifolius*), fool's beech (*Gaultheria antipoda*), *Olearia aviceniifolia*, *O. odorata*, *O. arborescens* and mountain ribbonwood (*Hoheria glabrata*) are occasional. Rare tree and shrub species include *Teucrium parvifolium* (see Sect. 4.1), kowhai (*Sophora microphylla*), sweet brier (*Rosa rubiginosa*), elderberry (*Sambucus nigra*) and mountain tauhini (*Cassinia vauvilliersii*).

In the herb layer bracken fern (*Pteridium esculentum*), catsear (*Hypochaeris radicata*), *Hypolepis millefolium* and prickly shield fern (*Polystichum vestitum*) are abundant. Those species of sporadic occurrence include several adventives, for example sweet vernal (*Anthoxanthum odoratum*), browntop (*Agrostis capillaris*), white clover (*Trifolium repens*) and sheep's sorrel (*Rumex acetosella*) plus the native species *Phymatosorus diversifolius*, the spleenworts *Asplenium bulbiferum* and *A. flaccidum*, plus *Blechnum minus* and *Urocinna clavata*. Herbs occurring only rarely include *Urtica incisa*, the speargrass *Aciphylla scott-thomsonii*, *Raoulia tenuicaulis*, *Blechnum vulcanicum*, *Carex breviculmis*, the spleenworts *Asplenium flabellifolium* and *A. richardii* plus *Pyrrosia serpens*.

Landform

A deeply incised section through schist, cut by the Pomahaka River, the area consists of rock bluffs and steep debris slopes on both eastern and western banks.

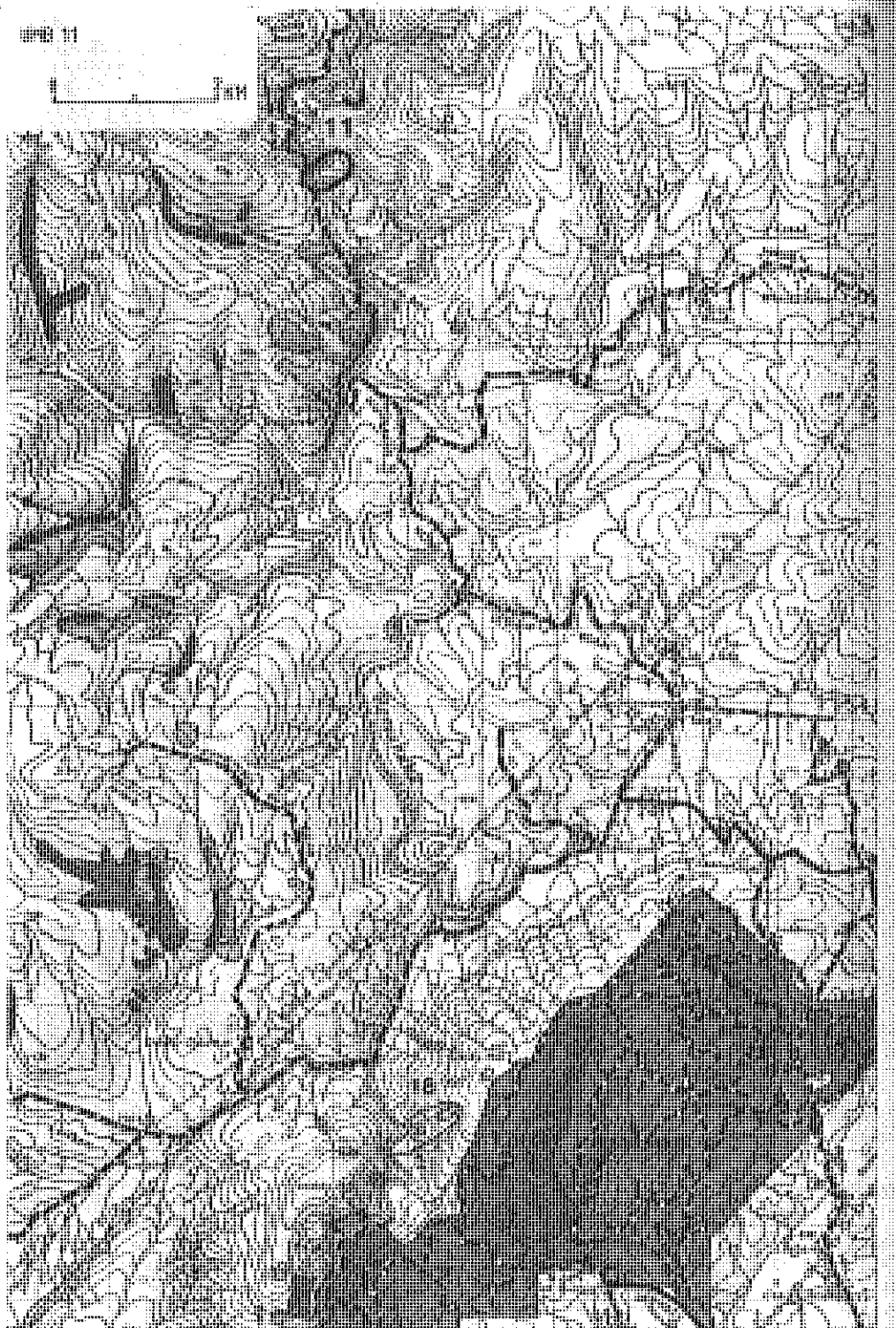
Lowland yellow-brown earths derived from schist and schist loess of silt loam and stony loam texture (Tuapeka soils) cover the reserve proposal.

Fauna

Birds recorded were fantail, New Zealand falcon, southern black-backed gull, redpoll. Wildlife Service personnel in February 1980 recorded grey duck, paradise shelduck, white-faced heron, bellbird, grey warbler, New Zealand pipit, black shag, silvereye, yellow-breasted tit, fantail, Australasian harrier, southern black-backed gull, goldfinch, yellowhammer, mallard and skylark in the Devil's Gorge area (Wildlife Service National Habitat Register).

No invertebrates were collected here.

120.



Discussion

The steepest sections and rock bluffs are generally inaccessible to stock. On the western banks the herb layer is generally sparse and the surface often very friable with unconsolidated rocks and soil. The litter layer, where undisturbed, is c. 5 cm in depth. In places, where the canopy opens adventive species are locally abundant. They are also common on the banks of the Pomahaka River where sheep tracks are evident. Of the *Chionocholea* species only *C. conspicua* is represented, and this but rarely. The area identified has some patches of forest dominated by broadleaf which are separated from the main shrubland and forest area by low-grade pasture. These stands have evidence of stock throughout, with an open understorey and an abundance of adventives.

Despite the high modification to the vegetation in places, the distinctive landform, combined with the plant associations of beech forest and broadleaf forest plus the occurrence of the generally rare shrub *Teucrium parviflorum* merit identification as Priority 1 status. The area should be fenced to exclude stock. Dusky Hill (UMB 18) is an analogous area assigned Priority 2 status.

Area	c. 35 ha
Altitude range	270-460 m
Aspect	Both easterly and westerly flanks of the Pomahaka River with also northerly and southerly facing slopes.
Plot cards	007 to 009
Tenure	Freehold and pastoral lease

Appendix 2 Hukarere PL – Plant list

- 1 Tenure Review survey, 10-11 March 1997
 2 Tenure Review survey, 8-10 March 2010
 # Recorded in the Umbrella ED PNAP survey report

Ferns

<i>Asplenium appendiculatum</i>		2
<i>Asplenium flabellifolium</i>	1	
<i>Asplenium flaccidum</i>		2
<i>Asplenium gracillimum</i>		2
<i>Asplenium hookerianum</i>		2
<i>Asplenium richardii</i>	1	2
<i>Blechnum fluviatile</i>		2
<i>Blechnum montanum</i>	1	2
<i>Blechnum novaezelandiae</i>		2
<i>Blechnum penna-marina</i>	1	2
<i>Blechnum procerum</i>		2
<i>Blechnum vulcanicum</i>	2	
<i>Cyathea colensoi</i>		2
<i>Gleichenia dicarpa</i>		2
<i>Grammitis billardieri</i>		2
<i>Grammitis poeppigiana</i>		2
<i>Histiopteris incisa</i>		2
<i>Hymenophyllum multifidum</i>	1	2
<i>Hypolepis millefolium</i>	2	
<i>Huperzia australiana</i>	1	2
<i>Lycopodium fastigatum</i>	1	2
<i>Lycopodium scariosum</i>		2
<i>Microsorium pustulatum</i>		2
<i>Pellaea rotundifolia</i>		2
<i>Polystichum vestitum</i>	1	2
<i>Polystichum neozelandicum subsp. zerophyllum</i>		2
<i>Pteridium esculentum</i>	1	2
<i>Pyrossia eleagnifolia</i>	#	

Podocarps

<i>Podocarpus hallii</i>	1	2
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Trees and shrubs

<i>Arcrothamnus colensoi</i>	1	2
<i>Aristotelia fruticosa</i>	1	2
<i>Aristotelia serratus</i>		2
<i>Brachyglottis revoluta</i>		2
<i>Carmichaelia petriei</i>	1	2
<i>Carpodetus serratus</i>	1	2
<i>Coprosma cheesemanii</i>	1	2
<i>Coprosma crassifolia</i>		2
<i>Coprosma dumosa</i>	1	2
<i>Coprosma perpusilla</i>		2

<i>Coprosma propinqua</i>	1	2
<i>Coprosma rhamnoides</i>		2
<i>Coprosma rigida</i>		2
<i>Coprosma rugosa</i>	1	2
<i>Coprosma tayloriae</i>	1	2
<i>Coriaria plumosa</i>	1	2
<i>Coriaria sarmentosa</i>	1	2
<i>Corokia cotoneaster</i>	1	2
<i>Discaria toumatou</i>	1	2
<i>Dracophyllum longifolium</i>	1	2
<i>Dracophyllum muscoides</i>		2
<i>Dracophyllum rosmarinifolium</i>	1	2
<i>Fuchsia x colensoi</i>		2
<i>Fuchsia excorticata</i>	1	2
<i>Fuchsia perscandens</i>		2
<i>Gaultheria antipoda</i>	1	2
<i>Gaultheria crassa</i>	1	2
<i>Gaultheria depressa</i> var. <i>novaezealandiae</i>	1	2
<i>Gaultheria macrostigma</i>	1	2
<i>Griselinia littoralis</i>	1	2
<i>Hebe odora</i>	1	2
<i>Hebe propinqua</i>	1	
<i>Hebe rakaiensis</i>	1	2
<i>Hebe salicifolia</i>	1	2
<i>Helichrysum lanceolatum</i>	#	
<i>Helichrysum intermedium</i>		2
<i>Hoheria glabrata</i>	1	2
<i>Kelleria dieffenbachii</i>		2
<i>Kelleria villosa</i>		2
<i>Leptospermum scoparium</i>	1	2
<i>Leucopogon fraseri</i>	1	2
<i>Melicope simplex</i>		2
<i>Melicytus</i> sp. aff. <i>alpina</i>	1	2
<i>Melicytus flexuosus</i>		2
<i>Myrsine divaricata</i>		2
<i>Nothofagus fusca</i>	1	2
<i>Nothofagus menziesii</i>	1	2
<i>Nothofagus solandri</i> var. <i>cliffortioides</i>		2
<i>Olearia arborescens</i>	1	2
<i>Olearia avicenniaefolia</i>		2
<i>Olearia bullata</i>	1	2
<i>Olearia fimbriata</i>	1	2
<i>Olearia lineata</i>	1	2
<i>Olearia odorata</i>	#	
<i>Ozothamnus vauvilliersii</i>	1	2
<i>Parahebe decora</i>	1	
<i>Parahebe lyallii</i>		2
<i>Pentachondra pumila</i>	1	2
<i>Pimelea oreophila</i>	1	2
<i>Pimelea poppelwellii</i>		2

<i>Pittosporum tenuifolium</i>	1	2
<i>Pseudopanax colensoi</i> var. <i>ternatus</i>		2
<i>Pseudopanax crassifolius</i>	1	2
<i>Pseudowintera colorata</i>		2
<i>Sophora microphylla</i>	1	2
<i>Teucrium parvifolium</i>	#	

Climbers and vines

<i>Clematis foetida</i>	1	2
<i>Clematis marata</i>		2
<i>Clematis paniculata</i>		2
<i>Muehlenbeckia australis</i>	1	2
<i>Muehlenbeckia axillaris</i>		2
<i>Muehlenbeckia complexa</i>	1	2
<i>Rubus cissoides</i>	1	2
<i>Rubus schmidelioides</i> var. <i>schmidelioides</i>	1	2
<i>Rubus schmidelioides</i> var. <i>subpauperatus</i>		2

Composite herbs

<i>Anaphalioides bellidioides</i>	1	2
<i>Brachyglottis southlandica</i>	1	2
<i>Celmisia densiflora</i>	1	2
<i>Celmisia glandulosa</i>		2
<i>Celmisia gracilentia</i>	1	2
<i>Celmisia</i> sp. "gracilentia rhizomatous"	1	2
<i>Celmisia graminifolia</i>		2
<i>Celmisia lyallii</i>	1	2
<i>Celmisia prorepens</i>		2
<i>Celmisia semicordata</i> ssp. <i>aurigans</i>	1	2
<i>Celmisia semicordata</i> ssp. <i>stricta</i>	1	2
<i>Dolichoglottis lyallii</i>	1	2
<i>Euchiton lateralis</i>	1	2
<i>Euchiton limosus</i>		2
<i>Euchiton ruahinicum</i>		2
<i>Euchiton traversii</i>		2
<i>Helichrysum filicaule</i>	1	2
<i>Lagenifera barkeri</i>		2
<i>Lagenifera cuneata</i>		2
<i>Lagenifera petiolata</i>	1	2
<i>Lagenifera pinnatifida</i>		2
<i>Lagenifera strangulata</i>		2
<i>Leucogenes grandiceps</i>		2
<i>Raoulia glabra</i>	1	2
<i>Raoulia apicinigra</i>		2
<i>Raoulia subsericea</i>	1	2
<i>Raoulia tenuicaulis</i>		2
<i>Senecio minimus</i>		2
<i>Senecio quadridentatus</i>		2

Dicot herbs other than composite herbs

<i>Acaena anserinifolia</i>		2
<i>Acaena caesiiglauca</i>		2
<i>Acaena juvenca</i>	1	2
<i>Acaena novae-zelandiae</i>		2
<i>Acaena profundeincisa</i>	1	
<i>Aciphylla aurea</i>	1	2
<i>Aciphylla glaucescens</i>	1	2
<i>Aciphylla lecomtei</i>		2
<i>Aciphylla scott-thomsonii</i>	#	
<i>Anisotome aromatica</i> var. <i>aromatica</i>		2
<i>Anisotome aromatica</i> var. <i>flabellifolia</i>		2
<i>Anisotome cauticola</i>		2
<i>Anisotome flexuosa</i>	1	2
<i>Cardamine debilis</i> agg.		2
<i>Colobanthus buechananii</i>		2
<i>Crassula sieberiana</i>		2
<i>Dichondra brevifolia</i>		2
<i>Drosera arcturi</i>		2
<i>Epilobium alsinoides</i>	1	2
<i>Epilobium atriplicifolium</i>		2
<i>Epilobium brunnescens</i>		2
<i>Epilobium glabellum</i>		2
<i>Epilobium insulare</i>		2
<i>Epilobium nummulariifolia</i>	1	2
<i>Epilobium pedunculare</i>		2
<i>Epilobium pubens</i>	1	2
<i>Euphrasia zelandica</i>	1	2
<i>Forstera tenella</i>	1	
<i>Galium propinquum</i>		2
<i>Geranium</i> sp. aff. <i>microphyllum</i>	1	2
<i>Geranium sessiliflorum</i>		2
<i>Gentianella grisebachii</i>	1	2
<i>Gentianella bellidifolia?</i>	1	
<i>Geum cockaynei</i>		2
<i>Gingidia montana</i>		2
<i>Gonocarpus aggregatus</i>		2
<i>Gonocarpus micranthus</i>	1	2
<i>Gonocarpus montanus</i>		2
<i>Gunnera monoica</i>		2
<i>Hydrocotyle heteromera</i>		2
<i>Hydrocotyle microphylla?</i>		2
<i>Hydrocotyle novae-zelandiae</i> ssp. <i>montana</i>		2
<i>Hydrocotyle novae-zelandiae</i> ssp.		2
<i>Lobelia angulata</i>	1	2
<i>Nertera depressa</i>		2
<i>Nertera villosa</i>		2
<i>Chaerophyllum colensoi</i>	1	2
<i>Chaerophyllum ramosa</i>	1	2
<i>Ourisia caespitosa</i>	1	2
<i>Oxalis exilis</i>		2

<i>Oxalis magellanica</i>		2
<i>Plantago unibracteolata</i>	1	2
<i>Pseudognaphalium luteo-album</i>		2
<i>Ranunculus ensysii</i>	1	
<i>Ranunculus cheesemanii</i>	1	
<i>Ranunculus foliosus</i>	1	2
<i>Ranunculus glabrifolius</i>		2
<i>Ranunculus maculatus</i>		2
<i>Ranunculus multiscapus</i>		2
<i>Ranunculus reflexus</i>		2
<i>Schizeilema trifoliolatum</i>		2
<i>Scleranthus brockiei</i>		2
<i>Scleranthus uniflorus</i>	1	2
<i>Stellaria parviflora</i>		2
<i>Urtica incisa</i>		2
<i>Viola cunninghamii</i>		2
<i>Viola filicaulis</i>		2
<i>Wahlenbergia albomarginata</i>	1	2
<i>Wahlenbergia rupestris</i>		2

Monocots

Grasses

<i>Agrostis muelleriana</i>		2
<i>Chionochloa conspicua</i>	1	2
<i>Chionochloa rigida</i>	1	2
<i>Chionochloa rubra</i>		2
<i>Cortaderia richardii</i>	1	2
<i>Deyeuxia avenoides</i>		2
<i>Dichelachne crinita</i>		2
<i>Echinopogon ovatus</i>		2
<i>Elymus falcis</i>		2
<i>Elymus solandri</i>		2
<i>Festuca novae-zelandiae</i>	1	2
<i>Hierochloe equiseta</i>		2
<i>Koeleria novo-zelandica</i>		2
<i>Poa cita</i>		2
<i>Poa colensoi</i>	1	2
<i>Poa breviglumis</i>	1	2
<i>Poa imbicilla</i>		2
<i>Rytidosperma australe</i>		1
<i>Rytidosperma gracile</i>	1	2
<i>Rytidosperma pumila</i>	1	2
<i>Rytidosperma unarede</i>		2

Sedges

<i>Carex breviculmis</i>		2
<i>Carex comans</i>		2
<i>Carex coriacea</i>	1	2
<i>Carex dissita</i>	1	2
<i>Carex echinata</i>	1	2

<i>Carex forsteri</i>		2
<i>Carex gaudichaudiana</i>		2
<i>Carex raoulii/solandri</i>		2
<i>Carex secta</i>		2
<i>Carex testacea</i>		2
<i>Carex wakatipu</i>		2
<i>Carpha alpina</i>	1	2
<i>Eleocharis acuta</i>	1	2
<i>Isolepis habra</i>	1	2
<i>Isolepis sp.</i>		2
<i>Oreobolus pectinatus</i>	1	2
<i>Oreobolus strictus</i>	1	2
<i>Schoenus pauciflorus</i>	1	2
<i>Uncinia clavata</i>		2
<i>Uncinia fascovaginata</i>	1	2
<i>Uncinia graclienta?</i>		2
<i>Uncinia rubra</i>	1	2
<i>Uncinia strictissima</i>		2
<i>Uncinia sp.1</i>		2
<i>Uncinia sp. 2</i>		2

Orchids

<i>Nematoceras trilobum</i>		2
<i>Nematoceras sp.</i>		2
<i>Microtis oligantha</i>		2
<i>Microtis unifolia</i>		2
<i>Prasophyllum colensoi</i>	1	2
<i>Simpliglottis cornuta</i>		2
<i>Thelymitra longifolia</i>		2

Other monocots

<i>Arthropodium candidum</i>		2
<i>Astelia fragrans</i>		2
<i>Astelia nervosa</i>		2
<i>Bulbinella angustifolia</i>	1	2
<i>Cordyline australis</i>	1	2
<i>Herpolirion novae-zelandiae</i>	1	
<i>Luzula banksiana var. migrata</i>		2
<i>Luzula rufa</i>		2
<i>Juncus edgariae</i>		2
<i>Phormium cookianum</i>	1	2

Exotic species

Conifers

<i>Pinus radiata</i>	radiata pine
<i>Pseudotsuga menziesii</i>	Douglas fir

Trees & shrubs

<i>Cotoneaster simonsii</i>	a cotoneaster
<i>Cytisus scoparius</i>	broom
<i>Leycesteria formosa</i>	Himalayan honeysuckle
<i>Rosa rubiginosa</i>	briar
<i>Salix fragilis</i>	crack willow
<i>Sambucus nigra</i>	elderberry
<i>Sorbus aucuparia</i>	rowan
<i>Ulex europaeus</i>	gorse

Climbers, vines & lianes

<i>Rubus fruticosus</i>	blackberry
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Composite herbs

<i>Cirsium arvensis</i>	Californian thistle
<i>Cirsium palustre</i>	marsh thistle
<i>Cirsium vulgare</i>	scotch thistle
<i>Crepis capillaris</i>	hawksbeard
<i>Hieracium lepidulum</i>	tussock hawkweed
<i>Hieracium pilosella</i>	mouse-ear hawkweed
<i>Hypochaeris radicata</i>	catsear
<i>Jacobaea vulgaris</i>	ragwort
<i>Mycelis muralis</i>	wall lettuce

Non-composite herbs

<i>Achillea millefolium</i>	yarrow
<i>Arctium minus</i>	burdock
<i>Cerastium fontanum</i>	mouse-ear chickweed
<i>Conium maculatum</i>	hemlock
<i>Digitalis purpurea</i>	foxglove
<i>Euphrasia nemorosa</i>	an eyebright
<i>Galium aparine</i>	cleaver
<i>Linum catharticum</i>	purging flax
<i>Lotus pedunculatus</i>	birds-foot trefoil
<i>Myosotis laxa</i>	water forget-me-not
<i>Parentucellia viscosa</i>	tarweed
<i>Plantago major</i>	broad-leaved plantain
<i>Polygonum sp.</i>	a herb
<i>Portulaca oleracea</i>	purslane
<i>Prunella vulgaris</i>	seal heal
<i>Ranunculus repens</i>	creeping buttercup
<i>Rumex acetosella</i>	sheep's sorell
<i>Rumex conglomeratus</i>	clustered dock
<i>Rumex crispus</i>	curled dock

Sagina procumbens
Spergularia rubra
Stellaria alsine
Stellaria media
Trifolium dubium
Trifolium repens
Verbascum thapsis
Vicia sativa

pearlwort
sand spurrey
bog stichwort
chickweed
suckling clover
white clover
woolly mullein
vetch

Grasses

Agrostis capillaris
Anthoxanthum odoratum
Bromus hordeaceus
Cynosurus cristatus
Dactylis glomerata
Glyceria declinata
Holcus lanatus
Lolium perenne
Poa annua
Poa pratense

browntop
sweet vernal
soft brome
crested dogs-tail
cocksfoot
blue sweet grass
Yorkshire fog
ryegrass
annual poa
Kentucky bluegrass

Sedges

Carex ovalis

oval sedge

Rushes

Juncus articulatus
Juncus bufonius
Juncus effusus
Juncus tenuis

jointed rush
toad rush
soft rush
slender rush

Appendix 3: Description of Vegetation Communities

Silver beech forest: This forest is dominated by silver beech with few if any other species in the canopy. The understory includes scattered trees of broadleaf, marbleleaf, Hall's totara and tree fuchsia (*Fuchsia excorticata*) and locally mountain beech (*Nothofagus solandri* var. *cliffortioides*). The shrub tier is generally sparse with occasional *Coprosma rhamnoides*, *C. colensoi* and prickly shield fern (*Polystichum vestitum*). Ground cover includes some hard fern (*Blechnum procerum*), the hook grass *Uncinia clavata*, along with occasional clumps of water fern (*Histiopteris incisa*), *Lagenifera strangulata*, the pennywort *Hydrocotyle heteromera*, *Schizeilema trifoliolatum* and a few other species locally. Along streams the vegetation is generally more diverse, often containing mountain ribbonwood, with the ferns *Blechnum chambersii*, *Cyathea colensoi* and hen and chicken fern (*Asplenium gracillimum*), along with the herbs *Nertera villosa*, *Epilobium pedunculare* and *Viola filicaulis*.

This forest is most extensive in the mid Parasol Stream, Rough Creek and Doakes Stream, with several other scattered smaller sites. This forest occurs as discrete stands scattered along the Pomahaka River (c. 280 m) up to c. 760 m in the head of Sandy Creek. Silver beech forest is found in land units 1, 3, 4, 8, 9, 10, 11, 12 and 13.

Mixed beech forest: This forest is generally dominated by silver and mountain beech with red beech found locally. The composition of this community is similar to that of silver beech forest.

A variation of this vegetation type is riparian forest along the Pomahaka River. This site although heavily browsed contains *Coprosma crassifolia*, *Lagenifera pinnatifida*, *Acaena juvenca* and little hard fern (*Blechnum penna-marina*).

This forest is restricted to two localities, being the mid Parasol Creek catchment (land units 7 and 9) and along the Pomahaka River (unit 14).

Halls totara forest: This forest is very localised, being restricted to a south facing branch of Doakes Stream (land unit 11). It is associated with a rubbly fire refuge site and is regenerating from past disturbance. Halls totara forests are rare within Southland and this site is the only location known within the Umbrella ED. The site was not surveyed in detail.

Mixed hardwood forest: This is a successional community and the composition reflects the age of the community. Younger examples contain an abundance of shrub species with emergent tree species. Older examples have a canopy of tree species. The community generally contains much black mapou, broadleaf and marbleleaf. Other species that are at locally present include silver beech, Hall's totara, wineberry (*Aristotelia serratus*), tree fuchsia, lancewood and cabbage tree (*Cordyline australis*).

It is expected that these mixed hardwood forests will increase in extent where areas are fenced and protected from fire and grazing. This forest type is found in land units 6, 7, 10, 11, 12 and 13.

Exotic plantation: The major exotic plantation species is Douglas fir (*Pseudotsuga menziesii*), with some radiata pine (*Pinus radiata*). Exotic plantations are restricted to land units 10 and 11.

Olearia shrubland/low forest: The tree daisy *Olearia fimbriata* can grow into a small tree and locally it forms a distinct community. This community varies from dense relatively extensive shrublands to localised small stands of trees. Canopy height averages 2-4 m in younger stands, whilst isolated specimens can measure 5m or more. This community generally contains much *O. fimbriata* and mingimingi (*Coprosma propinqua*), with some corokia (*Corokia cotoneaster*), native broom (*Carmichaelia petriei*), mountain wineberry and inaka. Locally *Olearia lineata* and forest tree species may be found.

This is a rare community. It is restricted to land units 10, 14 and 15.

Grey shrubland on sunny faces: This shrubland is dominated by mingimingi and/or matagouri; other commonly occurring species include corokia and porcupine shrub (*Melicytus* aff. *alpinus*). Additional species that may be present include tree daisies *Olearia fimbriata*, *O. lineata*, native broom, *Coprosma rugosa*, *C. crassifolia* and bracken (*Pteridium esculentum*).

Sunny aspect shrublands have generally been heavily modified through burning and grazing. Many of the best remaining examples are associated with rubbly slopes which offer some protection from fire and stock. Locally present on rubble slopes are kowhai, *Melicope simplex*, *Pellaea rotundifolia* and *Polystichum neozelandicum* subsp. *zerophyllum*.

This shrubland is found in units 6, 7, 9, 10, 11, 12 and 13.

Grey shrubland of shady faces: This community is generally dominated by mingimingi, with some inaka, *Coprosma tayloriae*, *C. rigida*, *C. dumosa*, cottonwood, manuka (*Leptospermum scoparium* – locally), native broom, koromiko (*Hebe salicifolia*), *H. rakaiensis*, *Olearia fimbriata*, *O. lineata*, mountain flax, *Aciphylla glaucescens*, prickly shield fern and mountain hard fern (*Blechnum montanum*).

This shrubland is found within land units 6, 7, 8, 10, 11 and 12.

Mixed riparian shrubland: This shrubland is richer than other shrubland communities. The community is generally dominated by mingimingi. Other common components include koromiko, mountain ribbonwood, native broom and mountain wineberry. Less common components are silver beech, broadleaf, *Olearia fimbriata*, *O. lineata*, mountain flax, prickly shield fern and mountain hard fern.

This shrubland is found within land units 6, 7, 8, 9, 10, 11, 12, 13 and 14.

Manuka shrubland: Manuka varies from young, short (1-2 m tall), semi open to dense, rapidly regenerating stands, to older, well established, tall shrublands (c. 4 m). Dense stands generally have few associated species. Manuka shrublands will eventually succeed into taller forest.

This vegetation type is found within units 6, 9 and 10.

Upland shrubland: This shrubland is of two main types, that dominated by inaka and a more diverse type. The diverse upland shrubland is composed of *Coprosma tayloriae*, *C. rugosa*, *C. dumosa*, cottonwood, boxwood (*Hebe odora*), inaka, mountain flax and prickly shield fern.

This vegetation type is relatively restricted despite the general abundance of shrublands. It is found in units 1, 3 and 6.

Narrow-leaved snow tussockland: This community is dominated by narrow-leaved snow tussock. The community contains a wide range of associated native species including *Celmisia prorepens*, *C. densiflora*, *C. gracilentia*, *Raoulia subsericea*, and snow berry (*Gaultheria depressa* var. *novae-zelandiae*). At lower altitudes browntop (*Agrostis capillaris*) becomes more common.

This community dominates areas above c.800 m. Generally, tussocklands are in moderate to good condition. Cover is tall and dense on cooler south and east aspects and on all aspects at higher altitude. On sunny aspects with decreasing altitude, strong *C. rigida* cover yields to a brown top, blue tussock, sweet vernal grassland.

Tussocklands on damper cooler aspects contain a higher proportion of woody shrub species, the most common being boxwood and cottonwood. On scattered boulder fields and exposed ridges, tussock yields to a more diverse cover of native subshrubs, herbs, ferns and grasses.

This vegetation type is found in land units 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12 and 15. The most intact tussocklands are found in units 1, 2, 3 and 4. More modified examples found in blocks 5, 6, 11, 12 and 15.

Red tussockland: This is localised and contains a mix of both red tussock and hybrid red - narrow-leaved snow tussock. This community is found on damper sites within narrow-leaved snow tussocklands. The composition is similar to that of the narrow-leaved snow tussockland, however includes more *Schoenus pauciflorus* and Maori onion (*Bulbinella angustifolia*).

This community is somewhat modified and was not examined in detail. This unit is thought to be restricted to unit 12.

Modified tussockland: This community is dominated by browntop with scattered narrow-leaved snow tussockland and fescue tussock (*Festuca novae-zelandiae*). The community retains a range of native species.

Areas of modified tussockland are found in units 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 & 15, though mainly in units 1 to 6.

Pasture: Improved pasture areas are confined to lower altitudes and more gentle slopes. They tend to be on sunny faces. Generally these areas have limited plant diversity with few native species remaining.

This community is largely confined to units 10, 11, 12 and 15.

Lowland/montane fire refuges comprising rock faces/gorges/rock outcrops: This community tends to be associated with woody vegetation and retains a number of notable species. The community generally contains the more common shrubland elements, however less common/more notable species include the woody plants - kowhai, *Coprosma crassifolia*, *Coprosma dumosa*, *Melicope simplex*, *Gaultheria antipoda*, *Helichrysum lanceolatum*, *Hebe rakaiensis* and *Fuchsia perscandens*; the herbs *Gingidia montana*, *Brachyglottis southlandicus*, *Senecio quadridentatus*, *Wahlenbergia rupestris* and *Epilobium pubens*; the ferns *Asplenium richardii*, leather leaved fern (*Pyrrosia eleagnifolia*), *Blechnum vulcanicum* and hounds tongue fern (*Microsorium pustulatum*); and the grasses *Dichelachne crinita* and *Rytidosperma unarede*. Forested areas contains the ferns *Asplenium richardii*, *A. flabellifolium*, hounds tongue fern and more locally *Pellaea rotundifolia* and *Polystichum neozelandicum* subsp. *zerophyllum*.

This community was noted in units 6, 7, 8, 9, 10, 11, 12, 13 and 15. The best examples are in units 10, 11, 12 and 13.

Upland rock faces/gorges/rock crops: Again this is found in fire refuges. Some species present are specialised to this habitat whilst others were more widespread prior to land clearance by fire. Some interesting records include *Anisotome cauticola*, *Aciphylla lecomtei*, *Geum cockaynei*, *Celmisia lyallii*, *C. semicordata* ssp. *stricta*, edelweiss (*Leucogenes grandiceps*), *Koeleria novo-zelandica* and *Luzula banksiana* var. *migrata*.

This community is found in units 1, 2, 3, 6, 8 and 12.

Valley floor wetlands: These are generally relatively small but widespread. They are often impacted on by stock and generally dominated by pasture grasses, soft rush (*Juncus effusus*), and jointed rush (*J. articulatus*). The most common species is cutty grass (*Carex coriacea*) with spike rush (*Eleocharis acuta*) locally abundant in wetter sites. Other characteristic native species include *Carex virgata*, *Epilobium insulare*, *Euchiton limosus* and *Ranunculus glabrifolius*. Species of more local occurrence include *Juncus edgariae*, *Carex secta*, *C. gaudichaudiana*, *Montia fontana*, *mingimingi*, *Gonocarpus aggregatus*, *G. micranthus*, *Gentiana grisebachii*, *Lobelia angulata* and *Olearia lineata*.

This community is found in units 6, 10, 11, 12 and 15.

Seepages and flushes: This community tends to contain an abundance of bryophytes and *Schoenus pauciflorus*, along with a variety of native herbs including *Euchiton lateralis*, *Ranunculus cheesemanii*, *Epilobium brunnescens*, *Hydrocotyle novae-zelandiae* ssp. *montana*, *Plantago unibracteolata* and *Viola cunninghamii*. These are found scattered within most blocks, however they are generally much modified at lower and mid altitudes. The most intact examples are found in the upper altitude units (i.e. 1, 2, 3 and 4).

Cushionbogs: Cushionbogs were noted on the uppermost sections of gentle ridges running east-west off the crest of the Black Umbrella Range amongst narrow-leaved

tussocklands. Comb sedge (*Oreobolus pectinatus*) is the dominant species. Other common species include the insectivorous sundew *Drosera arcturi*, *Dracophyllum muscoides*, and *Celmisia gracilentia*.

Fellfields: This vegetation type is limited to discrete areas on exposed sections of Black Umbrella Range crest. These areas comprise considerable bare ground and pavement surfaces. Common species include edelweiss, *Celmisia densiflora*, *Anistome flexuosa*, *Raoulia subsericea* and a variety of native and exotic grasses.

Appendix 4. List of invertebrate records from Hukarere Pastoral Lease

Insect order	Species	Date	Locality	Reference	Comment
Coleoptera	<i>Agonum otagensis</i>	Mar-2010	Parasol Creek 480 m, forest	G. Ledgerd/J. Barkla collectors	
Coleoptera	<i>Mecodema laeviceps</i>	Mar-2010	Parasol Creek 480 m, forest	G. Ledgerd/J. Barkla collectors	
Coleoptera	<i>Mecodema sculpturatum</i>	1985 - 1986	Parasol Hill and Black Umbrella	B. Barratt in Dickinson 1988 & in Dickinson et. al. 1998	Critically endangered - Hitchmough (2005). Populations extinct in Central Otago but previously two (now three) relict populations known. One population from Waikaia Forest nearby is on public conservation land and from a site in North Otago Kakanui Ranges is on Pastoral Lease.
Coleoptera	<i>Megadromus bulliatus</i>	1997	Black Umbrella tops	1997 Tenure Review Resources Report	
Coleoptera	<i>Oregus aereus</i>	1985 - 1986	Parasol Hill and Black Umbrella	B. Barratt in Dickinson 1988 & in Dickinson et. al. 1998	
Coleoptera	<i>Anagotis lewisi</i>	1997	Black Umbrella tops	1997 Tenure Review Resources Report	
Coleoptera	<i>Artystona obscura</i>	Mar-2010	Parasol Creek 480 m, forest	G. Ledgerd/J. Barkla collectors	
Lepidoptera	<i>Aponotrebis orphnaea</i>	1985 - 1986	Parasol Hill and Black Umbrella	B. Patrick in Dickinson 1988 & in Dickinson et. al. 1998	
Lepidoptera	<i>Asaphodes cinnabari</i>	1997	Black Umbrella tops	1997 Tenure Review Resources Report	
Lepidoptera	<i>Chloroclystis nereis</i>	1985 - 1986	Parasol Hill and Black Umbrella	B. Patrick in Dickinson 1988 & in Dickinson et. al. 1998	
Lepidoptera	<i>Dasyuris transaurea</i>	1985 - 1986	Parasol Hill and Black Umbrella	B. Patrick in Dickinson 1988 & in Dickinson et. al. 1998	
Lepidoptera	<i>Bityla defigurata</i>	Mar-2010	Parasol Creek 480 m, forest	G. Ledgerd/J. Barkla collectors	
Lepidoptera	<i>Capua semiferana</i>	1985 - 1986	Parasol Hill and Black Umbrella	B. Patrick in Dickinson 1988 & in Dickinson et. al. 1998	
Lepidoptera	<i>Gelophaula</i> n.sp. (Patrick)	1985 - 1986	Parasol Hill and Black Umbrella	B. Patrick in Dickinson 1988 & in Dickinson et. al. 1998	
Lepidoptera	<i>Heterocrossa cryodana</i>	1985 - 1986	Parasol Hill and Black Umbrella	B. Patrick in Dickinson 1988 & in Dickinson et. al. 1998	
Lepidoptera	<i>Eudonia chalara</i>	1985 - 1986	Parasol Hill and Black Umbrella	B. Patrick in Dickinson 1988 & in Dickinson et. al. 1998	
Lepidoptera	<i>Eudonia ferodayi</i>	1985 - 1986	Parasol Hill and Black Umbrella	B. Patrick in Dickinson 1988 & in Dickinson et. al. 1998	
Lepidoptera	<i>Eudonia sabulosella</i>	1985 - 1986	Parasol Hill and Black Umbrella	B. Patrick in Dickinson 1988 & in Dickinson et. al. 1998	
Lepidoptera	<i>Orocrambus aethonellus</i>	1985 - 1986	Parasol Hill and Black Umbrella	B. Patrick in Dickinson 1988 & in Dickinson et. al. 1998	

Inhabits fertile flush wetland in Southland and Otago mountains

Appendix 4.
continued

Insect order	Species	Date	Locality	Reference	Comment
Lepidoptera	<i>Orocrambus militastes</i>	1985 - 1986	Parasol Hill and Black Umbrella	B. Patrick in Dickinson 1988 & in Dickinson et. al. 1998	
Lepidoptera	<i>Scoparia tuicana</i>	1997	Black Umbrella tops	1997 Tenure Review Resources Report	Inhabits alpine flush wetland and rarely recorded
Lepidoptera	<i>Lycaena</i> sp.	1985 - 1986	Parasol Hill and Black Umbrella	B. Patrick in Dickinson 1988 & in Dickinson et. al. 1998	
Lepidoptera	<i>Stenoptilia orites</i>	1985 - 1986	Parasol Hill and Black Umbrella	B. Patrick in Dickinson 1988 & in Dickinson et. al. 1998	
Mecoptera	<i>Nannochorsta philpotti</i>	1997	Black Umbrella tops	1997 Tenure Review Resources Report	
Orthoptera	<i>Hemideina maori</i>	1997	Black Umbrella tops	1997 Tenure Review Resources Report	Southern range limit at Black Umbrella Range for a species known from eastern ranges of Canterbury and Otago.
Orthoptera	<i>Sigauss ?obelesci</i>	Mar-2010	Parasol Creek upper	G. Ledgard/J. Barkla collectors	Endemic to ranges from Hector Mountains south to Umbrella Mountains
Plecoptera	<i>Zealandobius foxi</i>	1997	Black Umbrella tops	1997 Tenure Review Resources Report	
Plecoptera	<i>Zealandobius macburneyi</i>	1997	Black Umbrella tops	1997 Tenure Review Resources Report	
Plecoptera	<i>Zealandobius n.sp.</i>	1997	Black Umbrella tops	1997 Tenure Review Resources Report	
Psocidae	a book louse sp. Psocidae	Mar-2010	Parasol Creek 480 m, forest	G. Ledgard/J. Barkla collectors	
Trichoptera	<i>Psilochorema cheirodes</i>	1997	Black Umbrella tops	1997 Tenure Review Resources Report	

Appendix 5. Sampling data from streams within and nearby Hukarere Station. Summarised from an investigation report By R. Dungey winter 2007.

Table 1. Site position, stream name, and fish species for sites fished.

Gx=*Galaxias* species 'D', Bt=brown trout, Trib=tributary

Site No.	Stream	GPS	Fish Species
18	Leithen top	2201018-5490020	No Fish
19	Leithen mid	2202697-5481077	Bt
20	Parasol top	2200098-5492859	Gx
21	Sandy Ck	2201688-5495072	Bt
22	Parasol	2202974-5492975	Gx, Bt
23	Parasol Trib	2203126-5493191	No Fish
24	Parasol	22033489-5491430	Gx, Bt
25	Parasol	2203435-5490025	Gx, Bt
26	Parasol	2205716-5488063	Gx, Bt
27	Parasol low	2207194-5487736	Bt, Gx
28	Nth Twin Low	2211676-5502147	Bt, Gx
29	Nth Twin Top	2211014-5501801	No Fish

Table 2. Water quality parameters of each site, TDS= Total Dissolved Solids, Temperature, °C, Conductivity μ/m^2 .

Site No.	Stream	Cond. μ/m^2	Temp. °C	TDS, ppm
18	Leithen top	19.8	1.2	0.0229
19	Leithen mid	26.5	1.4	0.0307
20	Parasol top	19.6	2.7	0.0225
21	Sandy	20.1	2.3	0.023
22	Parasol	16.7	1.8	0
23	Parasol Trib	25.8	1.8	0
24	Parasol	38.2	2.2	0.0248
25	Parasol	21.5	2.9	0.0241
26	Parasol	22.8	0.7	No measure
27	Parasol low	22.7	0.2	No measure
28	Nth Twin Low	26.6	0.5	No measure
29	Nth Twin Top	No measure		

Table 3. Invertebrate genera at each site as assessed during electrofishing. *Nesameletus* species, *Ameletopsis perscitus*, *Deleatidium* species, *Coloburiscus humeralis*, *Stenoperla* species, *Acroperla* species, *Zealandoperla* species (abbreviated to fit).

Site No.	Stream	Abundance	Invertebrate Species
18	Leithen top	High	<i>Nesam</i> , <i>Stenop</i> , <i>Acroperla</i> , <i>Zealandoper</i> , <i>Dobson</i> , <i>Deleatidium</i>
19	Leithen mid	low	<i>Deleatidium</i>
20	Parasol top	High	<i>Nesameletus</i> , <i>Zealandoperla</i> , <i>Deleatidium</i>
21	Sandy Ck	Mod	<i>Nesameletus</i> , <i>Zealandoperla</i> , <i>Deleatidium</i>
22	Parasol	Low-mod	<i>Colob</i> , <i>Zealandoperla</i> , <i>Deleatid</i> , <i>Zephlebia</i>
23	Parasol Trib	High	<i>Nesameletus</i> , <i>Colob</i> , <i>Zealandop</i> , <i>Deleatid</i>

24	Parasol	High	<i>Nesam, Stenop, Zephlebia, Deleatid, Colob</i>
25	Parasol	Mod	<i>Nesameletus, Zealandoperla, Zephlebia</i>
26	Parasol	Low	<i>Nesameletus, Zealandoperla, Zephlebia, Dobson</i>
27	Parasol low	Low	<i>Nesam, Stenop, Acroperla, Dobson, Deleatidium, Olinga, Aoteapsyche</i>
28	Nth Twin Low	Low	<i>Deleatidium</i>
29	Nth Twin Top	High	<i>Nesameletus, Zealandoperla, Deleatidium</i>

Table 4. Site substrate, Mean width and depth of survey sites.

Site No.	Stream	Dominant Substrate	Mean Width (m)	Mean depth (m)
18	Leithen top	Cobble	3.09	0.24
19	Leithen mid	Cobble	10.03	0.20
20	Parasol top	Coarse Gravel	1.81	0.14
21	Sandy Ck.	Coarse Gravel	3.48	0.25
22	Parasol	Cobble	4.00	0.29
23	Parasol Trib	Coarse Gravel	0.97	0.12
24	Parasol	Coarse Gravel	7.91	0.19
25	Parasol	Coarse Gravel	2.43	0.32
26	Parasol	Coarse Gravel	8.95	0.25
27	Parasol low	Cobble	4.41	0.43
28	Nth Twin Low	Cobble	1.26	0.31

Appendix 6

Survey of the Historic and Cultural Values on Pastoral Leases on the Umbrella Ecological District and the Southern Old Man Range. Extract figures 18-21

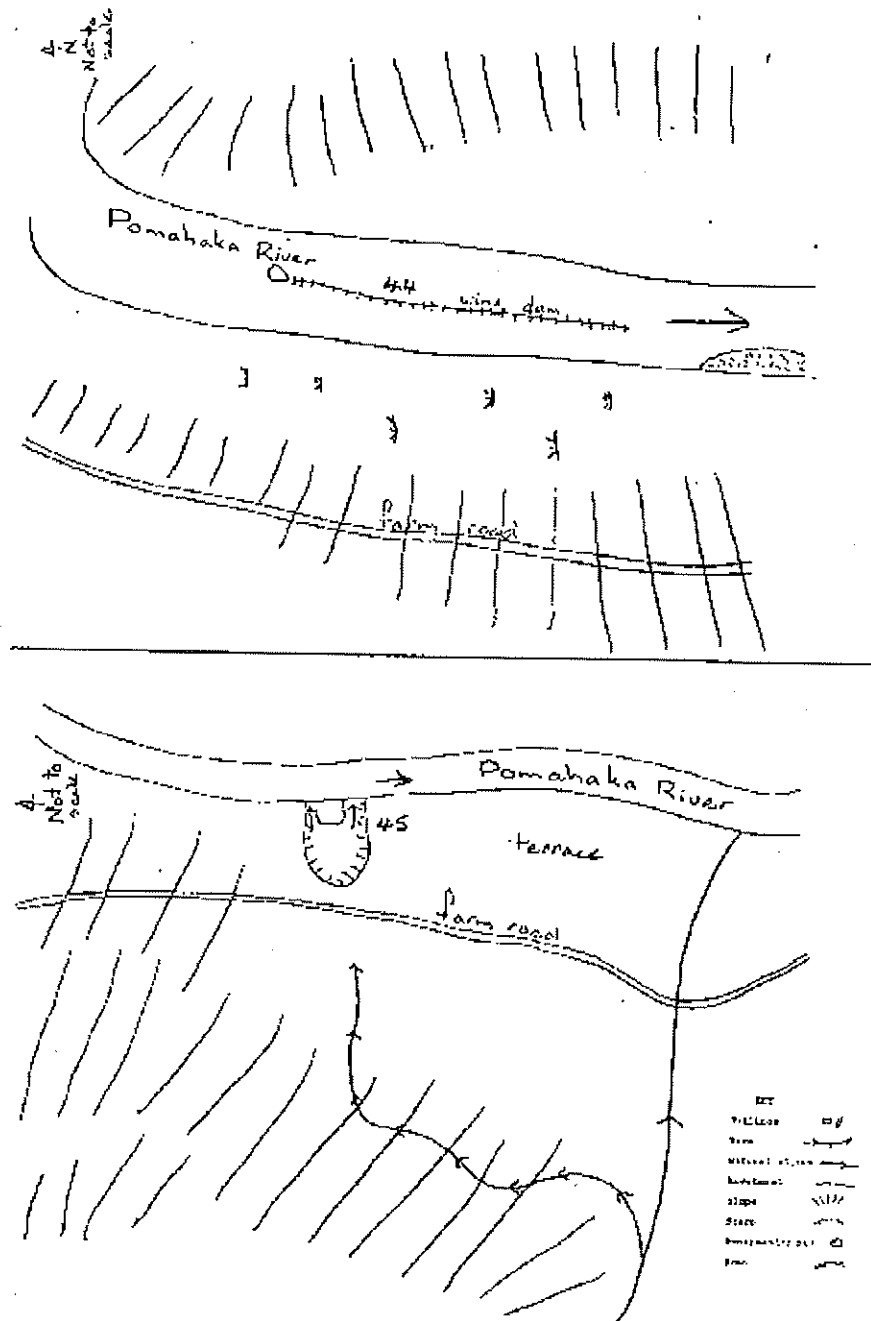


Figure 18 Upper: The first of the long wing dams in the Hukerere section of the Pomahaka River. Lower: the only sluice pit seen in the Hukerere section. A dam marked on the 1882 map (Fig. 1) was not located.

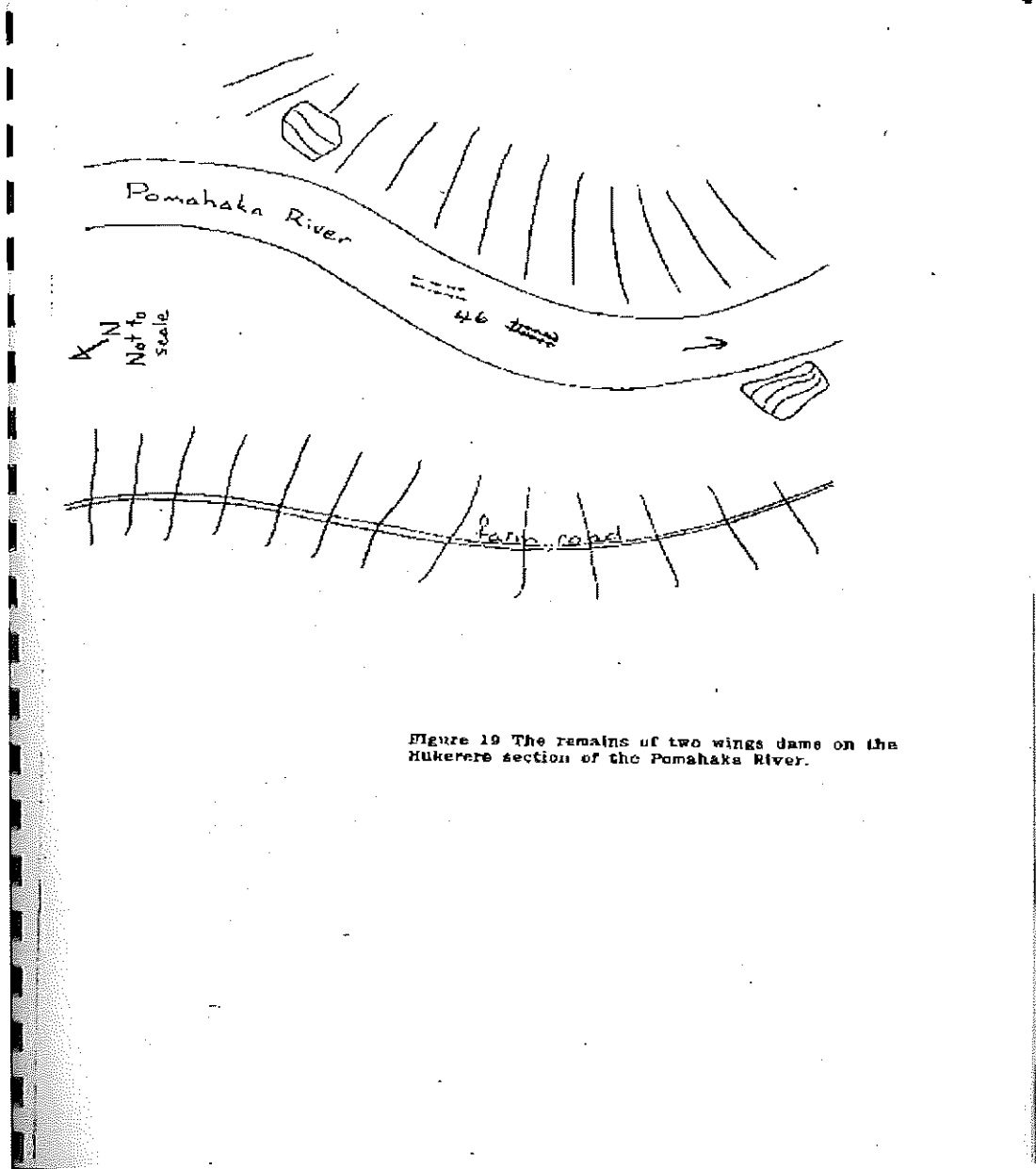


Figure 19 The remains of two wings dam on the Hukerere section of the Pamahaka River.

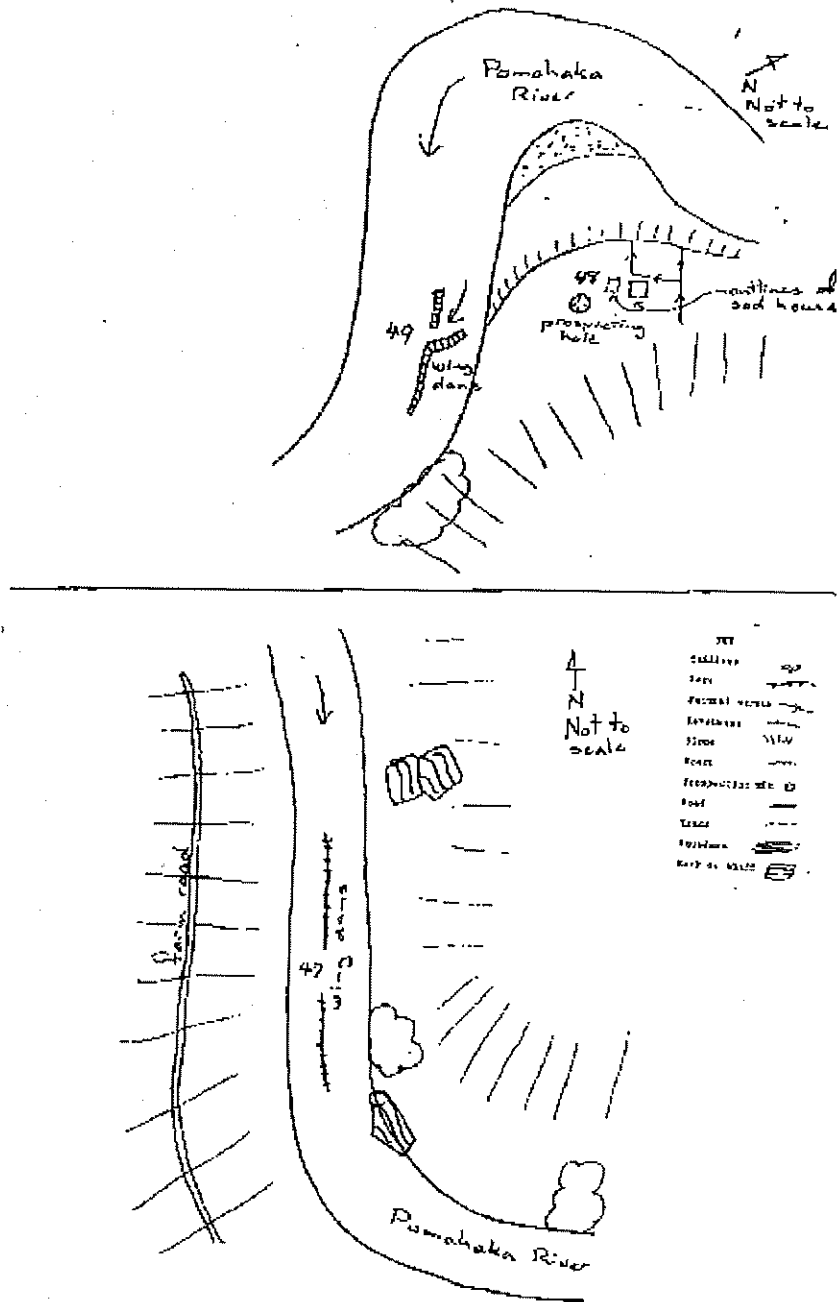


Figure 20 Upper: The double wing dam near to at least two sod house sites. Lower: This may be the remnant of the longest wing dam (200m) seen on the river

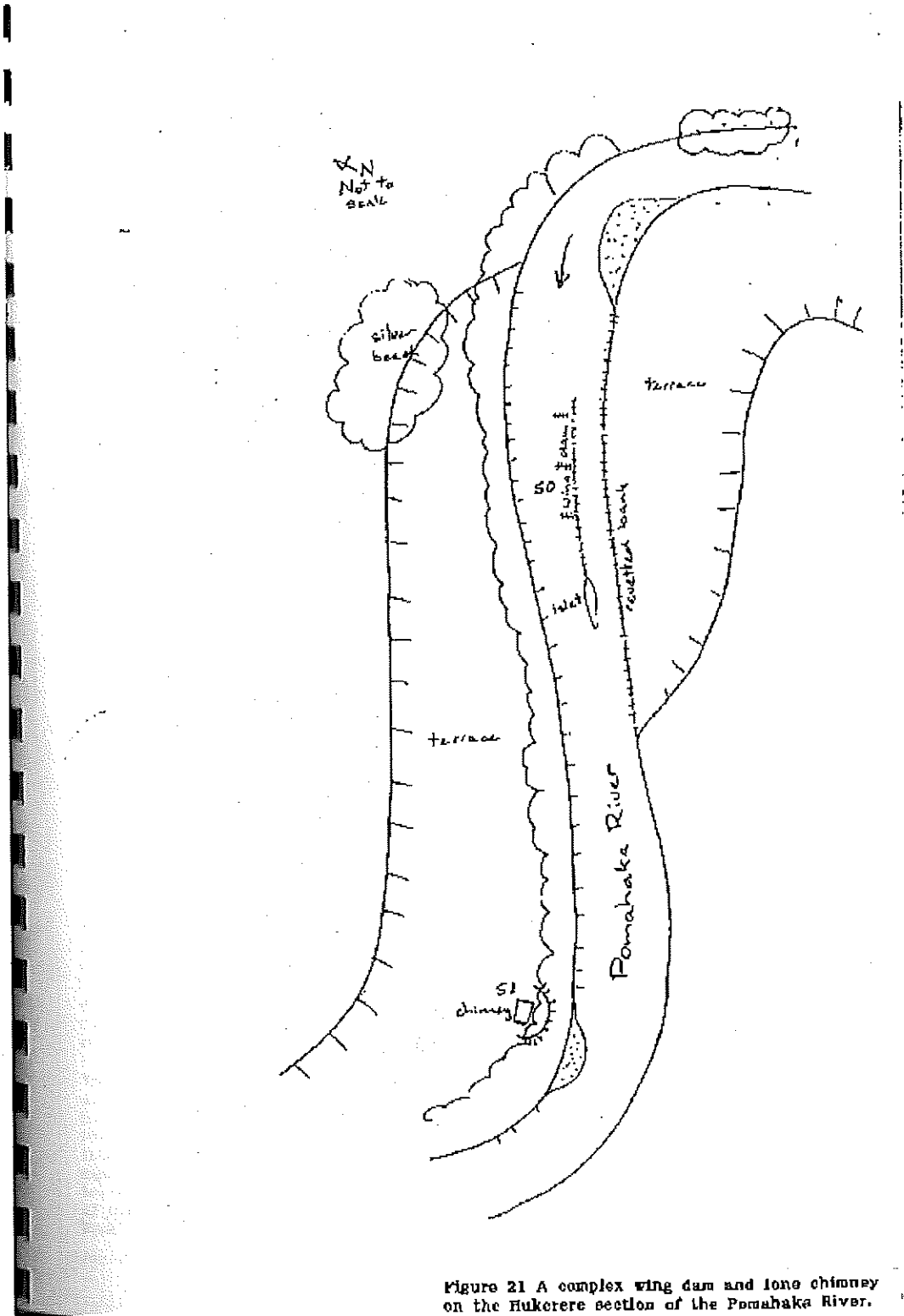


Figure 21 A complex wing dam and lone chimney on the Hukerere section of the Pomahaka River.