Toitu te whenua
Land Information
New Zealand

Crown Pastoral Land Tenure Review

Lease name : HAPPY VALLEY

Lease number : PO 361

Conservation Resources Report - Part 5

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

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

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

August 06

APPENDIX 3

Soil Sites of Significance

(333) Sutton Salt Lake

REGIONAL/CITY COUNCIL(S): Otago **ECOLOGICAL DISTRICTS(S):** 67–04 Maniototo
LOCALITY and GRID REFERENCE: Sutton, 8 km SSW of Middlemarch H43 826106
AREA(ha): 140 **ALTITUDE(m):** 240 **RAINFALL(mm):** 600
TOPOGRAPHY: rolling peneplain with schist tors and ridges; flat lake bed (seasonal) **PARENT MATERIAL:** schist and loess **VEGETATION:** short tussock grassland; halophytic vegetation
SOILS: yellow–grey earths (Pukerangi Matarae), gley soils (Ardlui)
IMPORTANCE: 1 **SIGNIFICANCE:** (i) represents soils of the dry inland schist country, including saline soils. Similar sites are uncommon internationally.
VULNERABILITY: 3 **MODIFICATIONS/THREATS:** lake edge has been grazed; walkway and information panels
TENURE: scenic reserve **OWNER/MANAGER:** Department of Conservation
CONTACT PERSON: Peter McIntosh **DATE OF INFORMATION:** February 1990
NOTES: The lake is seasonally dry. Saltiness is the combined result of weathering of the surrounding schist and the fact that the basin has no outlet. The reserve contains the only inland salt lake in New Zealand. Soil samples are from sites adjacent to the reserve.
REFERENCES: Department of Conservation (1990) Peat (1991) McIntosh (1990) Ragg and Miller (1978)

(334) Wilsons Rd

REGIONAL/CITY COUNCIL(S): Otago **ECOLOGICAL DISTRICTS(S):** 67–04 Maniototo
LOCALITY and GRID REFERENCE: 15 km SW of Ranfurly H42 735487 **ALTITUDE(m):** 395 **RAINFALL(mm):** 400
TOPOGRAPHY: flat to undulating floodplain **PARENT MATERIAL:** Holocene alluvium **VEGETATION:** halophytic vegetation
SOILS: brown–grey earths (Linnburn)
IMPORTANCE: 3 **SIGNIFICANCE:** (i) important site because no obvious Tertiary influence on parent material or groundwater is apparent locally.
VULNERABILITY: 3 **MODIFICATIONS/THREATS:** has been drained, grazed and top–dressed
TENURE: private land, covered by a conservation covenant
CONTACT PERSON: Peter McIntosh **DATE OF INFORMATION:** October 1989
NOTES: Type site for Lepidium kirkii.
REFERENCES: McIntosh et al. (1990a)

(335) Bannock Burn - Old Woman Range

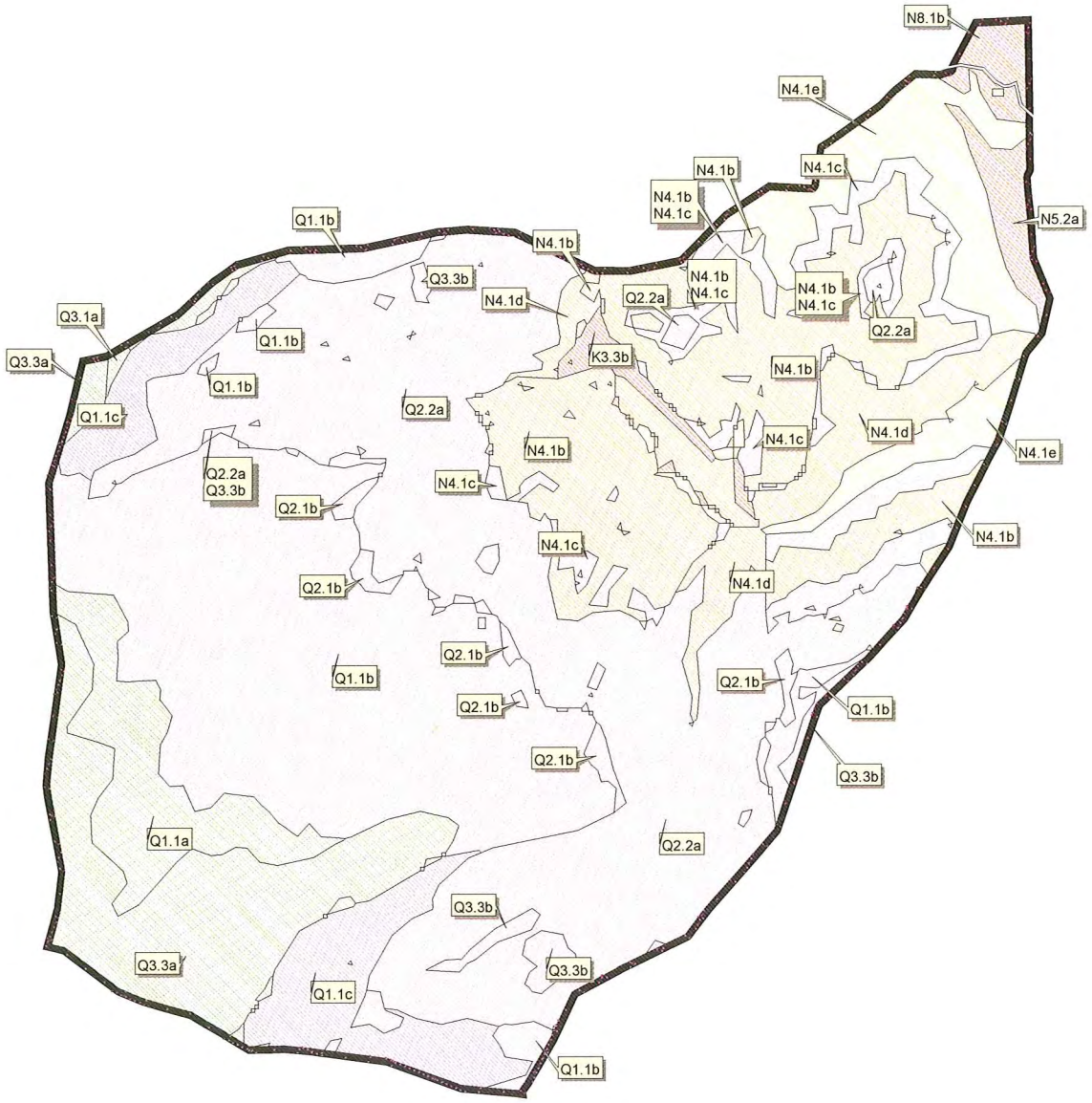
REGIONAL/CITY COUNCIL(S): Otago and Southland **ECOLOGICAL DISTRICTS(S):** 67–05 Old Man
LOCALITY and GRID REFERENCE: 20 km W of Alexandra F42 014456
AREA(ha): 2700 **ALTITUDE(m):** 600-1740 **RAINFALL(mm):** 1600-2000
TOPOGRAPHY: high summit plateaux, outlier cirque basins and a deep gully **PARENT MATERIAL:** schist and derived colluvium **VEGETATION:** cushionfield; herbfield; snow tussock grassland; short tussock grassland; matagouri–broadleaved shrubland
SOILS: upland yellow–brown earths (Carrick Dunstan), yellow–grey earths (Arrow Blackstone), brown–grey earths (Alexandra)
IMPORTANCE: 2 **SIGNIFICANCE:** (i) excellent altitudinal sequence of soils under some of the least modified vegetation in Central Otago.(ii) pedologically interesting soils formed on periglacial landforms.
VULNERABILITY: 2 **MODIFICATIONS/THREATS:** lower parts have been burned and oversown – still are threats
TENURE: pastoral lease, recommended area for protection **OWNER/MANAGER:** Cairnmuir Station, Carrick Station, Happy Valley Station, Hawksburn Station
CONTACT PERSON: Peter McIntosh **DATE OF INFORMATION:** December 1987
REFERENCES: Brumley et al. (1986)

(336) Chapman Road I

REGIONAL/CITY COUNCIL(S): Otago **ECOLOGICAL DISTRICTS(S):** 67–05 Old Man
LOCALITY and GRID REFERENCE: 2 km SW of Alexandra G42 252435 **ALTITUDE(m):** 150 **RAINFALL(mm):** 350
TOPOGRAPHY: rolling to undulating peneplain **PARENT MATERIAL:** schist **VEGETATION:** halophytic vegetation
SOILS: brown–grey earths (Chapman)
IMPORTANCE: 2 **SIGNIFICANCE:** (i) one of the few sites in McIntosh et al. (1990) classified as saline rather than alkaline.(ii) close to type site for Manorburn soil.(iii) excellent vegetation zonation.
VULNERABILITY: 1 **MODIFICATIONS/THREATS:** holding paddock next to homestead
TENURE: private land **OWNER/MANAGER:** Mr McGregor

APPENDIX 4

LENZ Level IV Map and Characteristics of LENZ Table



Level IV LENZ data
- Acutely Threatened
- Critically Underprotected
- Chronically Threatened
- At Risk
- Underprotected
- No Threat Category

4.2.4 LENZ level 4
Happy Valley

0.5 0 0.5 1 1.5 Kilometers

N

Happy Valley

Shape	Lvl-4	Count	First_Ind_Cover	First_Threat	Ind Cover	% remain	Ha
Polygon	K3.3b	13	Acutely Threatened	Critcal	7	5	23.24
Polygon	N4.1B	30	Chronically Threatened	Critical	17	1	424.791
Polygon	N4.1c	52	Critically Underprotected	Critical	49	1	150.716
Polygon	N4.1d	8	Chronically Threatened	Critical	19	3	121.55
Polygon	N4.1e	10	At Risk	Critical	24	3	188.04
Polygon	N5.2a	1	Acutely Threatened	Critical	1	0	36.44
Polygon	N6.2a	4	Chronically Threatened	Critical	18	6	26.67
Polygon	N8.1b	1	Acutely Threatened	Critical	5	2	30.338
Polygon	Q1.1a	2	No Threat Category	>20% protected	98	25	125.823
Polygon	Q1.1b	10	Critically Underprotected	Critical	77	8	708.58
Polygon	Q1.1c	3	Underprotected	Underproted	91	18	179.914
Polygon	Q1.2a	4	No Threat Category	>20% protected	99	37	2.101
Polygon	Q2.1b	15	Critically Underprotected	Critical	66	4	25.233
Polygon	Q2.2a	12	Critically Underprotected	Critical	40	4	891.885
Polygon	Q3.1a	9	No Threat Category	>20% protected	67	36	5.957
Polygon	Q3.3a	2	No Threat Category	>20% protected	97	26	274.564
Polygon	Q3.3b	30	Critically underprotected	Critical	81	1	46.082

Characteristics of Land Environments of New Zealand (LENZ) Units on Happy Valley PL.
From: Leathwick, J., F. Morgan, G. Wilson, D. Rutledge, M. McLeod and K. Johnstone. 2002: Land Environments of New Zealand . Technical Guide. Ministry for the Environment.

LENZ Level IV Environments	Characteristics
K3.3b	Central Otago, gently undulating floodplains. Soils imperfectly drained of moderate fertility from schist alluvium and colluvium. Mild temperatures and moderate annual water defic8its. 365m
N4.1b	Central Otago, Alexandra locations on rolling lower hill slopes and valley floors. Soils well drained on Schist and greywacke. Colder temps and undulating plains. 495m
N4.1c	Central Otago, Alexandra locations on rolling lower hill slopes and valley floors. Soils well drained on Schist and greywacke. Lower annual moisture deficits and steep hills. 495m
N4.1d	Central Otago, Alexandra locations on rolling lower hill slopes and valley floors. Soils well drained on Schist and greywacke. Warmer winter temperatures and steep hills. 495m
N4.1e	Central Otago, Alexandra locations on rolling lower hill slopes and valley floors. Soils well drained on Schist and greywacke. Warmer temperatures and much higher annual water deficits. 495m
N5.2a	Central Otago, Alexandra locations on gently undulating plains. Imperfectly drained saline soils of high fertility from calcareous mudstone. Cool temperatures, high annual water deficits. 415m
N6.2a	Central Otago, gently undulating plains. Cool temperatures and high annual water deficits. Recent, imperfectly drained soils of high fertility from fine schist and greywacke alluvium. 445m
N8.1b	Plains surrounding Clutha from Alexandra to Luggate. Older well drained soils from schist alluvium and colluvium, saline alluvium and greywacke gravels with some loess. 245m
Q1.1a	Mountains of inland Otago; of strongly rolling mountainous terrain. Well drained soils of moderate fertility from greywacke, schist; 1095. Much colder temperatures, lower vapour pressure deficits, low monthly water balance ratios and slight annual water deficits.
Q1.1b	As for Q1.1a but cold temperatures
Q1.1c	As for Q1.1a, but of very steep mountainous terrain but very steep mountainous terrain.
Q1.2a	South-eastern Hill Country and Mountains including Harris Mountains; of very steep mountains. Well drained soils of moderate fertility from greywacke rock, colluvium and basalt. 1305
Q2.1b	As for Q1.2a

Q2.2a	Steep mountain ranges of inland Otago. Well drained soils of moderate fertility from greywacke. 640m
Q3.1a	Eyre, Thompson Mountains and the southern end of the Garvie Mountains. Imperfectly drained soils from greywacke. Steep mountains and cool temperatures, low monthly water balance rations, slight annual water deficits. 690m
Q3.3a	Undulating mountains of South Otago with imperfectly drained soils of moderate natural fertility from schist 990m
Q3.3b	Same as Q3.3a but slightly warmer temperatures, cooler winter temps, higher vapour pressure deficits, lower monthly water balance ratios and much higher annual water deficits.

APPENDIX 5

List of Plant Species

Higher Plant Species List

List number	OTA 21
Location	Happy Valley Pastoral Lease - Old Woman Range
Grid reference	F42 040500
Date of visit(s)	5 - 7 December 2005
Author(s)	John Barkla
Description of site	Eastern slopes of Old Woman Range immediately to south of Nevis Road encompassing several tributaries of the Bannock Burn.
Size of site (ha)	c. 3254
Elevation of site	420 - 1473 m
Fragmentation of site (low, moderate, high)	moderate
Fenced/protected?	
Number of indigenous species	190
Number of exotic species	26
Total number of species	216
Percentage exotic species	12.0
% abundance exotic	#DIV/0!

Abundance class	Descriptor	Probable proportion of site flora
Previously present	Recorded by previous visitors, but not recorded during the current list	Unknown
Rare	Infrequently seen during visit and in very low numbers	<1%
Local	Only seen at few areas within sites visited, but could be quite common within these areas	<5%
Occasional	Individuals were scattered throughout site or were in widely scattered clumps	5-20%
Common	Frequently encountered during visit, but not a dominant part of the flora	20-60%
Abundant	A dominant part of the flora	>60%

Number of threatened species	Critical	Endangered	Vulnerable	Serious Decline	Gradual Decline	Sparse	Range Restricted	Data Deficient	Regionally Significant	Locally Notable
14	0	1	0	1	3	3	1	1	0	4

Threatened species rank x abunda 0.0

Note:

Printed: 10/03/2006

					Gymnosperms
Gymnosperms	Abundance at site	Notes	Threat ranking	Common name	Family
Podocarpus nivalis	Rare	Three patches on rock talus at E2202765 N5552759	Locally Notable	snow totara	Podocarpaceae

Dicotyledonous trees, shrubs and vines	Abundance at site	Notes	Threat ranking	Common name	Dicotyledonous trees, shrubs and vines Family
Acrothamnus colensoi (ex. *Leucopogon colensoi/L. suaveolens*)	Rare		Not threatened		Ericaceae
Aristotelia fruticosa	Occasional	riparian shrublands	Not threatened	small-leaved wineberry	Elaeocarpaceae
Buddleja davidii	Rare	Duffers Gully @ E2204027 N5552319	Exotic	buddleia	Buddlejaceae
Carmichaelia crassicaule	Local	short tussocklands @ 1100 m	Gradual Decline	coral broom	Fabaceae
Carmichaelia crassicaule X Carmichaelia vexillata	Rare	Only second recorded occurrence	Unknown		Fabaceae
Carmichaelia petriei	Occasional		Not threatened		Fabaceae
Carmichaelia vexillata	Local	short tussocklands @ 1100 m	Serious Decline		Fabaceae
Chionohebe densiflora	Local		Not Threatened		Plantaginaceae (ex.
Clematis marata	Local	montane shrublands	Not threatened		Ranunculaceae
Coprosma atropurpurea	Local	alpine seeps	Not threatened		Rubiaceae
Coprosma cheesemanii	Local	around rock talus	Not threatened		Rubiaceae
Coprosma dumosa (ex *Coprosma* "taylorae" (*C. parviflora* var. *dumosa*, *C.* sp. (t), *C.* sp. 27) in part)	Local	montane rock tors	Not threatened		Rubiaceae
Coprosma propinqua subsp. "propinqua"	Common		Not threatened		Rubiaceae
Coriaria sarmentosa	Rare		Not threatened	tutu	Coriariaceae
Corokia cotoneaster agg.	Local		Not threatened	corokia	Cornaceae
Discaria toumatou	Abundant		Not threatened	matagouri	Rhamnaceae
Dracophyllum muscoides	Local	fellfield	Not threatened	prostrate inaka	Epacridaceae
Dracophyllum pronum	Rare		Not threatened		Epacridaceae
Dracophyllum uniflorum var. *uniflorum*	Rare		Not threatened	turpentine scrub	Epacridaceae
Gaultheria depressa var. *depressa*	Common		Not threatened	snowberry	Ericaceae
Gaultheria parvula	Local		Not threatened		Ericaceae
Hebe rakaiensis	Rare	Associated with snow totara patch	Not threatened		Plantaginaceae (ex. Scrophulariaceae)
Hebe salicifolia	Local		Not threatened	koromiko	Plantaginaceae (ex. Scrophulariaceae)
Leucopogon fraseri complex (mountain ecotype)	Abundant		Not threatened		Ericaceae
Melicytus aff. *alpinus* (erect)	Occasional		Not threatened	porcupine shrub	Violaceae
Muehlenbeckia axillaris	Local		Not threatened		Polygonaceae
Muehlenbeckia complexa agg.	Common		Not threatened	small-leaved pohuehue	Polygonaceae
Myrsine nummularia	Rare		Not threatened		Myrsinaceae
Olearia bullata	Rare	Few plants in main stem Bannock Burn	Not threatened		Asteraceae

Dicotyledonous trees, shrubs and vines	Abundance at site	Notes	Threat ranking	Common name	Family
Olearia cymbifolia	Rare	A couple of large shrubs around rock outcrop in main stem Bannock Burn	Not threatened		Asteraceae
Olearia lineata	Rare	A few trees on valley floor below Duffers Gully	Sparse		Asteraceae
Olearia odorata	Occasional		Not threatened		Asteraceae
Ozothamnus leptophyllus (*Cassinia vauvilliersii*)	Rare		Not threatened	tauhinu	Asteraceae
Pentachondra pumila	Local		Not threatened		Epacridaceae
Pimelea aridula s.s.	Rare	Arid slopes in Round Hill block	Locally Notable		Thymeleaceae
Pimelea oreophila agg.	Occasional		Not threatened	alpine daphne	Thymeleaceae
Prunus cerasifera	Rare	Around stone building	Exotic	cherry plum	Rosaceae
Ribes uva-crispa	Local		Exotic	gooseberry	Grossulariaceae
Rubus schmidelioides var. *schmidelioides*	Occasional	montane shrublands	Not threatened	bush lawyer	Rosaceae
Salix fragilis	Local	riparian forest in lower Bannock Burn	Exotic	crack willow	Salicaceae
Sambucus nigra	Occasional	montane shrublands	Exotic	elder	Caprifoliaceae

Dicotyledonous herbs (including composits)	Abundance at site	Notes	Threat ranking	Common name	Dicotyledonous herbs (including composits) Family
Abrotanella caespitosa	local	upland seeps	Not threatened		Asteraceae
Abrotanella inconspicua	local	fellfield	Not threatened		Asteraceae
Acaena anserinifolia	Rare		Not threatened	bidibid	Rosaceae
Acaena buchananii	local	At several sites some of which are very degraded	Gradual Decline	Buchanan's bidibid	Rosaceae
Acaena caesiiglauca var.	Occasional		Not threatened	bidibid	Rosaceae
Acaena saccaticupula	Occasional		Not threatened	bidibid	Rosaceae
Aciphylla aurea	Abundant		Not threatened	spaniard	Umbelliferae
Aciphylla scott-thomsonii	Rare	Main stem Bannock Burn	Not threatened	spaniard	Umbelliferae
Anaphalioides bellidioides (ex. *Helichrysum bellidioides* in part)	Common		Not threatened		Asteraceae
Anisotome aromatica var.	local		Not threatened		Umbelliferae
Anisotome brevistylis	local	Bluffs in main stem Bannock Burn	Not threatened		Umbelliferae
Anisotome cauticola	local	Bluffs in main stem Bannock Burn	Not threatened		Umbelliferae
Anisotome flexuosus	Rare		Not Threatened		Umbelliferae
Anisotome imbricata var. *imbricata*	local		Not threatened		Umbelliferae
Argyrotegium mackayi (ex *Gnaphalium mackayi*)	local	alpine seeps	Not threatened		Asteraceae
Brachyscome sinclairii var. *sinclairii*	local		Not threatened		Asteraceae
Cardamine debilis agg.	local		Not threatened		Brassicaceae
Celmisia brevifolia	local		Not threatened		Asteraceae
Celmisia gracilenta agg.	Occasional		Not threatened		Asteraceae
Celmisia laricifolia	Occasional		Not threatened		Asteraceae
Celmisia lyallii	local		Not threatened	false spaniard	Asteraceae
Celmisia sessiliflorum	local		Not threatened		Asteraceae
Cerastium fontanum subsp. *vulgare*	Common		Exotic	mouse-ear chickweed	Caryophyllaceae
Cirsium vulgare	Common		Exotic	Scotch thistle	Asteraceae
Colobanthus apetalus var. *apetalus*	local		Not Threatened		Caryophyllaceae
Colobanthus strictus	local		Not threatened		Caryophyllaceae
Conium maculatum	local		Exotic	hemlock	Apiaceae
Craspedia incana	Rare		Not threatened		Asteraceae
Crassula colligata comp. (ex *C. tetramera*)	Rare	rock outcrops	Not threatened		Crassulaceae
Digitalis purpurea	Occasional		Exotic	foxglove	Scrophulariaceae
Dolichoglottis lyallii	local		Not threatened	groundsel	Asteraceae
Echium vulgare	local		Exotic	viper's bugloss	Boraginaceae
Epilobium komarovianum	local		Not Threatened		Onagraceae
Epilobium macropus	local	channels in alpine seeps	Not Threatened		Onagraceae

Dicotyledonous herbs (including composits)	Abundance at site	Notes	Threat ranking	Common name	Family
Epilobium pubens	Rare	dry rock sites	Not threatened		Onagraceae
Erodium cicutarium	local		Exotic	storksbill	Geraniaceae
Euchiton paludosus	Rare	streamside herbfield	Sparse		Asteraceae
Euchiton ruahinacus (ex. *Gnaphalium ruahinacum*)	local		Not threatened		Asteraceae
Euchiton traversii	Occasional		Not threatened		Asteraceae
Galium perpusillum	local		Not threatened		Rubiaceae
Gentianella bellidifolia	Occasional	fellfield	Not threatened		Gentianaceae
Geranium microphyllum	local		Not threatened		Geraniaceae
Geranium sessiliflorum subsp. *novaezelandiae* var. *novaezelandiae*	local		Not threatened		Geraniaceae
Geum leiospermum	local		Not threatened		Rosaceae
Hectorella caespitosa	local		Not threatened		Portulacaceae
Helichrysum filicaule	local		Not threatened		Asteraceae
Hieracium lepidulum	Occasional		Exotic	tussock hawkweed	Asteraceae
Hieracium pilosella subsp. *pilosella*	Abundant		Exotic	mouse-eared hawkweed	Asteraceae
Hydrocotyle "montana"	local		Not Threatened		Apiaceae
Hypochoeris radicata	Occasional		Exotic	catsear	Asteraceae
Kelleria paludosa	local		Not threatened		Thymeleaceae
Kelleria villosa var. *villosa*	local		Not threatened		Thymeleaceae
Lagenifera barkeri	local		Not threatened		Asteraceae
Leptinella goyenii	local		Not threatened		Asteraceae
Leptinella pectinata subsp. *villosa*	local		Not threatened		Asteraceae
Leptinella pectinata subsp. *willcoxii*	local		Not threatened		Asteraceae
Leptinella pusilla (*Cotula perpusilla*)	local		Not threatened		Asteraceae
Mazus radicans	Rare	Montane seep	Locally Notable	swamp musk	
Mimulus moschatus	Rare		Exotic	musk	Scrophulariaceae
Montia fontana subsp. *fontana*	local		Exotic	blinks	Portulacaceae
Myosotis lyallii var. *lyallii*	local	fellfield	Not Threatened		Boraginaceae
Neopaxia sessiliflora s.s.	local		Not threatened		Portulacaceae
Nertera balfouriana	local	Montane seep	Not threatened		Rubiaceae
Oreomyrrhis ramosa s.l.	Occasional		Not threatened		Umbelliferae
Ourisia caespitosa	Occasional		Not threatened		Scrophulariaceae
Ourisia glandulosa	Occasional		Not threatened		Scrophulariaceae
Oxalis exilis	local		Not threatened	native yellow-flowered oxalis	Oxalidaceae
Pachycladon cheesemanii	Rare	Eight plants in flower under rock overhang @ E2204266 N5548377	Gradual Decline		Brassicaceae
Pachycladon novae-zelandiae	local		Not Threatened		Brassicaceae
Phyllachne colensoi	Occasional		Not threatened		Stylidiaceae
Plantago lanigera	local		Not threatened	hairy swamp plantain	Plantaginaceae

Dicotyledonous herbs (including composits)	Abundance at site	Notes	Threat ranking	Common name	Family
Plantago raoulii	Rare		Not threatened		Plantaginaceae
Plantago triandra subsp. *triandra*	local		Not threatened		Plantaginaceae
Pratia angulata	Rare	Montane seep	Not threatened		Campanulaceae
Pseudognaphalium "inland" (ex. *P. luteo-album* in part)	Rare		Not threatened		Asteraceae
Psychrophila obtusa (*Caltha obtusifolia*)	Occasional		Not Threatened	White caltha	Ranunculaceae
Ranunculus enysii	local		Not threatened		Ranunculaceae
Ranunculus gracilipes	local		Not threatened		Ranunculaceae
Ranunculus maculatus	Rare	low alpine seeps	Sparse		Ranunculaceae
Ranunculus multiscapus (ex. *R. lappaceus*)	Occasional		Not threatened		Ranunculaceae
Ranunculus royi	Rare		Not threatened		Ranunculaceae
Raoulia apice-nigra	Rare		Not threatened	scabweed	Asteraceae
Raoulia australis s.s.	Occasional		Not threatened	scabweed	Asteraceae
Raoulia glabra	Rare		Not threatened		Asteraceae
Raoulia grandiflora	local		Not threatened		Asteraceae
Raoulia hectorii var. hectorii	local		Not threatened	scabweed	Asteraceae
Raoulia parkii	local		Not Threatened	Celadon mat daisy	Asteraceae
Raoulia subsericea	Abundant		Not threatened		Asteraceae
Rumex acefosella	Common		Exotic	sheep's sorrel	Polygonaceae
Rumex flexuosus	Rare		Locally Notable	native dock	Polygonaceae
Sagina procumbens	local		Exotic	procumbent pearlwort	Caryophyllaceae
Schizeilema cockaynei	Rare		Not threatened		Umbelliferae
Scleranthus brockiei	local		Not threatened		Caryophyllaceae
Scleranthus uniflorus	Occasional		Not threatened		Caryophyllaceae
Senecio quadridentatus	local	dry rock face amongst open shrubland	Not threatened	cotton fireweed	Asteraceae
Stellaria gracilenta	local		Not threatened		Caryophyllaceae
Trifolium repens	Occasional		Exotic	white clover	Fabaceae
Verbascum thapsus	Occasional		Exotic	woolly mullein	Scrophulariaceae
Vicia sativa	local		Exotic	vetch	Fabaceae
Viola cunninghamii	local		Not threatened		Violaceae
Vittadinia australis agg.	local	dry rock face and amongst open dry short tussockland	Data Deficient	white fuzzweed	Asteraceae
Wahlenbergia albomarginata subsp. *albomarginata*	Occasional		Not threatened	harebell	Campanulaceae

Grasses	Abundance at site	Notes	Threat ranking	Common name	Grasses Family
Agrostis capillaris	common		Exotic	browntop	Agrostidinae
Agrostis muscosa	local		Not threatened	pincushion grass	Agrostidinae
Anthoxanthum odoratum	common		Exotic	sweet vernal	Phalaridinae
Bromus diandrus	occasional		Not threatened	ripgut brome	Bromeae
Chionochloa macra	local		Not threatened	slim snow tussock	Danthoniinae
Chionochloa rigida subsp. *rigida*	common	Best represented in main stem of Bannock Burn	Not threatened	narrow-leaved snow-tussock	Danthoniinae
Cortaderia richardii	local		Not threatened	South Island toetoe	Cortaderiinae
Critesion murinum subsp. *murinum*	local		Exotic	barley grass	Hordeeae
Elymus solandri	local		Not threatened		Hordeeae
Festuca matthewsii subsp. *latifundii*	common		Not threatened		Poeae
Festuca matthewsii subsp. *pisamontis*	local	at highest altitudes	Range Restricted		Poeae
Festuca novae-zelandiae	abundant		Not threatened	hard tussock	Poeae
Festuca rubra subsp. *commutata*	occasional	montane grasslands	Exotic	Chewings fescue	Poeae
Holcus lanatus	local		Exotic	Yorkshire fog	Aveninae
Poa cita agg.	occasional		Not threatened	silver tussock	Poeae
Poa colensoi s.l.	common		Not threatened	blue tussock	Poeae
Poa lindsayi	local		Not threatened		Poeae
Poa maniatoto	local		Not threatened	desert poa	Poeae
Rytidosperma pumilum	local		Not threatened		Danthoniinae
Dactylis glomerata	occasional		Exotic	cocksfoot	Poeae

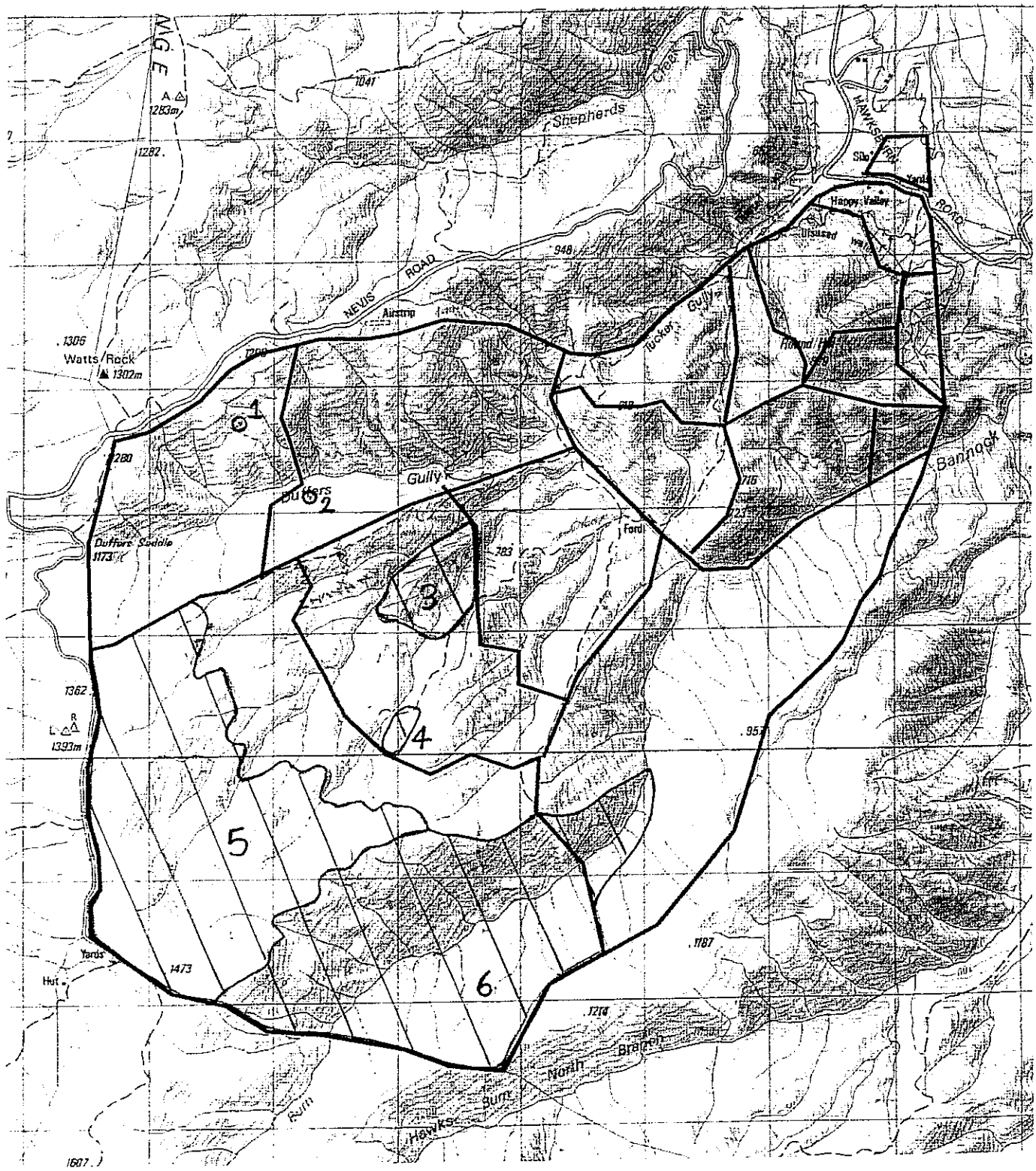
Rushes and Sedges	Abundance at site	Notes	Threat ranking	Common name	Rushes and Sedges Family
Carex breviculmis	local		Not threatened		Cyperaceae
Carex buchananii	local	riparian in Duffers Gully	Not threatened		Cyperaceae
Carex comans	local		Not Threatened		Cyperaceae
Carex coriacea	occasional		Not threatened		Cyperaceae
Carex guadichaudiana	local		Not threatened		Cyperaceae
Carex inopinata	rare	Under rock overhang @ E2203302 N5552178	Endangered		Cyperaceae
Carex virgata	rare		Not threatened		Cyperaceae
Carex wakatipu agg.	local		Not threatened		Cyperaceae
Luzula pumila	local		Not threatened	woodrush	Juncaceae
Luzula rufa var. *rufa*	local		Not threatened	woodrush	Juncaceae
Oreobolus pectinatus	occasional		Not threatened	comb sedge	Cyperaceae
Schoenus pauciflorus "short"	occasional		Not threatened	bog-rush	Cyperaceae

					Monocotyledons (other)
Monocotyledons (other)	Abundance at site	Notes	Threat ranking	Common name	Family
Bulbinella angustifolia	Abundant		Not threatened	maori onion	Liliaceae
Microtis unifolia s.s.	occasional		Not threatened	onion orchid	Orchidaceae

Ferns and Allies	Abundance at site	Notes	Threat ranking	Common name	Ferns and Allies Family
Asplenium flabellifolium agg.	local		Not threatened	necklace fern	Aspleniaceae
Asplenium richardii	local		Not threatened		Aspleniaceae
Blechnum penna-marina	occasional		Not threatened		Blechnaceae
Cheilanthes sieberi subsp. *sieberi* (ex. *C humilis*)	rare	Dry rocky slopes	Not threatened	rock fern	Pteridaceae
Cystopteris fasmanica	local		Not threatened	bladder fern	Dryopteridaceae
Grammitis poepiggiana	local	montane and alpine tors	Not threatened		Grammitidaceae
Huperzia australiana (ex. *Lycopodium australianum*)	rare		Not Threatened		Lycopodiaceae
Hypolepis millefolium	local		Not threatened	thousand-leaved fern	Dennstaedtiaceae
Lycopodium fastigiatum	occasional		Not threatened	mountain clubmoss	Lycopodiaceae
Ophioglossum coriaceum agg.	rare		Not threatened	adder's tongue	Ophioglossaceae
Pellaea calidirupium	rare		Not threatened		Pteridaceae
Polystichum cytostegia	local		Not threatened	alpine shield fern	Dryopteridaceae
Polystichum vestitum	occasional		Not threatened	prickly shield fern	Dryopteridaceae

APPENDIX 6

Map 1 – Area of Significant Inherent Botanical Values



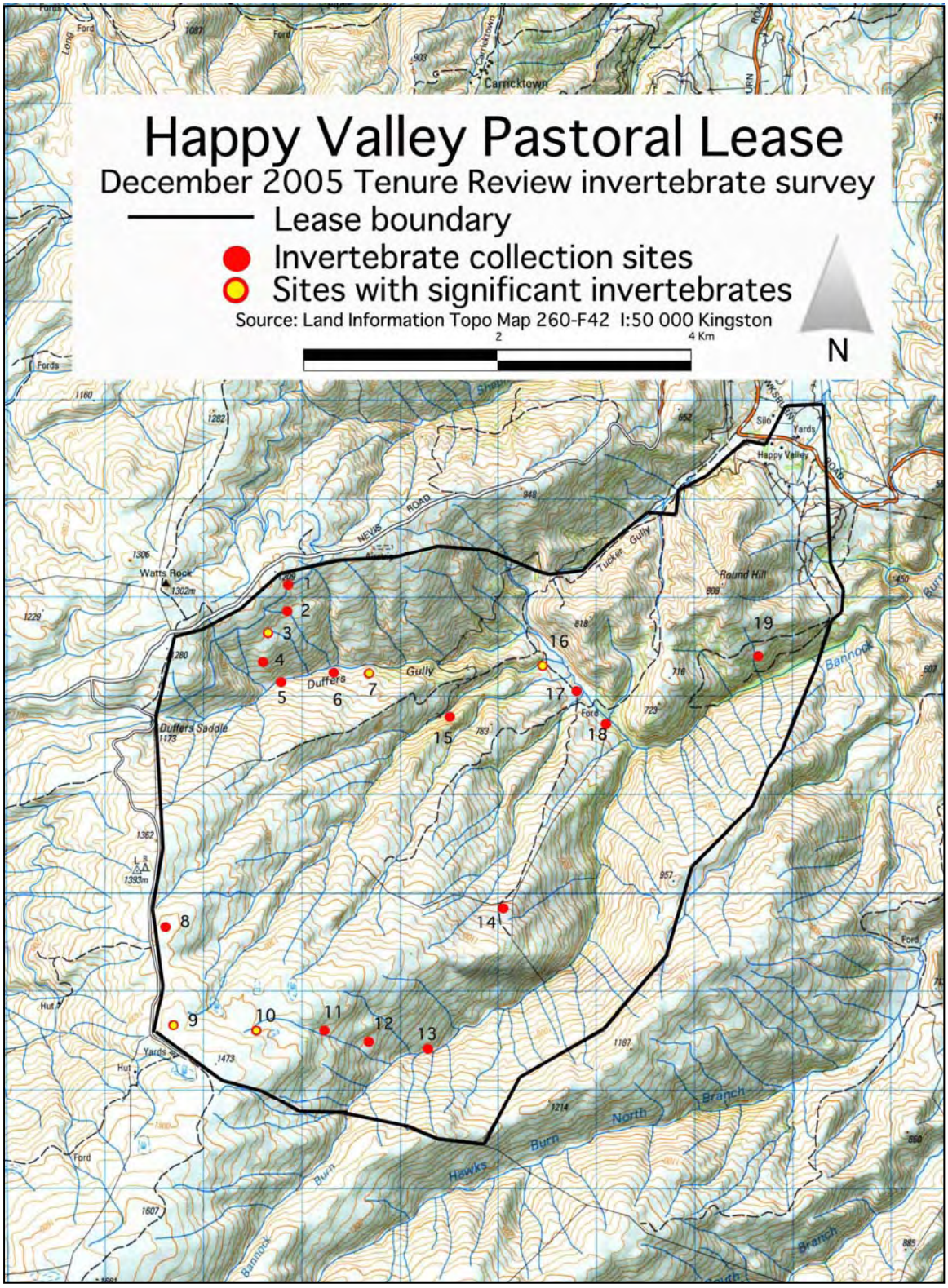
MAP 1

Happy Valley

Area of significant inherent botanical values

APPENDIX 7

Map 2 – Location of Significant Invertebrate Species



Map 2: Location of significant invertebrate species and collection sites of all taxa found on Happy Valley PL

APPENDIX 8

List of Invertebrate Species found on PL

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Class	Order	Family	Genus and Species	Collection Site	Taxonomic and conservation status
Arachnida	Araneae	Agelenidae	*Neorepukia* sp.	11	Limited information. Endemic genus of hunting spiders. Conservation status unknown however two species (*N. setosa* Bryant and *N. hama* Forster & Wilton) are threatened (data-deficient)
Arachnida	Araneae	Agelenidae	Indet sp.	16	Small Agelenid spiders, beaten from *Coprosma propinqua.*
Arachnida	Araneae	Agelenidae	*Neoramia alta* Forster	3,4,11	Endemic Otago spider. Holotype ex. Remarkables Range.
Arachnida	Araneae	Araneidae	*Eriophora pustulosa* Walck.	6	Introduced orbweb spider. Beaten from *Coprosma propinqua*.
Arachnida	Araneae	Clubionidae	*Clubiona* sp.	5	Probably native. Immature specimen.
Arachnida	Araneae	Miturgidae	*Miturga* sp.	2,12	Nocturnal prowling spiders. Probably endemic. Closely related to Australian Clubionid spiders.
Arachnida	Araneae	Pisuridae	*Dolomedes aquaticus* Goyen	7	Large water spider. Threatened: Data-deficient. Found under stones in lower Bannockburn Creek.
Arachnida	Araneae	Salticidae	Indet.sp.	12	Unknown species of jumping spider. Probably native. An under-studied group. Ex. *Aciphylla aurea.*
Arachnida	Araneae	Thomisidae	*Diaea ambara* Urquhart	6	Native crab spider. Common on flowering plants. Beaten from *Coprosma propinqua*

Class	Order	Family	Genus and Species	Collection Site	Taxonomic and conservation status
Arachnida	Araneae	Toxopidae=Cycloctenidae	*Cycloctenus sp.?* *C. westlandicus*	2	Fast moving native hunting spiders. Cycloctenids are common in sub-alpine habitats throughout NZ.
Chilopda	Polydesmoidea (Millipedes)	Julidae	*Ophyiulus pilosus* Newport	17	Common introduced millipede.
Diplopoda	Polydesmoidea	Sphaerotrichopidae	*Icosidesmus olivaceus* Carl	5,12,13	Common endemic scree, shrubland and forest millipede. Known from Mackenzie basin to north Otago.
	Polydesmoidea	Sphaerotheridae	*Procycliosoma* sp.	3	Endemic pill millipede. Fungus feeders. Ex. Micro-habitat beneath *Podocarpus nivalis*
Insecta	Blattodea	Blattidae	*Celatoblatta anisoptera* Johns	2,3	Endemic cockroach, found from Mackenzie basin to south Otago
	Blattodea	Blattidae	*Celatoblatta quinquemaculata* Johns	2,4,10,12,15	Common and widespread Otago endemic cockroach
	Coleoptera	Byrrhidae	*Liochoria* sp.	10	Native moss beetle. Under stones, sub-alpine zone. Poorly described group.
	Coleoptera	Carabidae	*Mecodema chiltoni* Broun	7	Threatened endemic species. Classified “Sparse”. Western Otago and Southland.. Large (40mm) beetle.
	Coleoptera	Carabidae	*Mecodema lucidum* Castelnau	5	Endemic. Of general conservation interest.
	Coleoptera	Carabidae	*Megadromus* sp. ?*M. sandageri* complex	9,10	A large (25mm) carabid. *M. sandageri* is known from Southland to Otago and is part of a species complex.
	Coleoptera	Carabidae	*Metaglymma* sp. cf. *M. aberrans*	3	Member of a species complex. Not known as threatened.

Class	Order	Family	Genus and Species	Collection Site	Taxonomic and conservation status
Insecta	Coleoptera	Carabidae	*Neoferonia procerula* Broun	11	Carabid of conservation interest (Johns 2005). South Island endemic genus. Widespread in Otago.
	Coleoptera	Carabidae	*Taenarthrus capito* Jeannel	11,5	Not threatened. Otago endemic. Damp (stream bank) sub alpine habitats.
	Coleoptera	Cerambycidae	*Zorion* sp.	7	Native longhorn flower feeders, often colourful. Not threatened.
	Coleoptera	Chrysomelidae	Eumolpinae: ?*Eucolaspis* sp.	12	Native Eumolpinines have been collected from manuka. This specimen ex. *Carmichaelia petriei*
	Coleoptera	Curculionidae:Brachycerinae: Entimini	*Inophloeus sulcifer* Broun	1,5,12	Endemic speargrass weevil. Common in eastern sub-alpine habitats.
	Coleoptera	Curculionidae:Eugonini	Species A	2,10,6	Beaten from *Coprosma propinqua* and *Aciphylla aurea*
	Coleoptera	Elatridae:Pyrophorinae	Species A	11	Small click beetle. Pollen and nectar feeders. (nocturnal). Over 130 species in NZ of which four are threatened.
	Coleoptera	Melyridae	*Dasytes* sp.	5,6	Native flower beetles. Beaten from *Coprosma propinqua*, Duffers Gully.
	Coleoptera	Scarabaeidae	*Costelytra zealandica* White	15	Common native grass grub beetle.
	Coleoptera	Scarabaeidae	*Odontria* sp.	15	Endemic chafer beetle.
	Coleoptera	Scarabaeidae	*Pyronota festiva* F.	1,7,15,16	Manuka beetle. Widespread and common.

Class	Order	Family	Genus and Species	Collection Site	Taxonomic and conservation status
Insecta	Coleoptera	Tenebrionidae	*Artystona vicina* Sharp	9,7	Darkling beetle. Otago endemic.
	Coleoptera	Tenebrionidae	*Mimopeus opaculus cf. M. opaculus otagensis* Hudson	6	Endemic Otago darkling beetle.
	Diptera	Bibionidae	*Dilophus* sp.	13	Native blossom fly. Common throughout NZ. Flower feeders/pollinators. Eight species endemic to NZ.
	Diptera	Muscidae	Species A	9	Ex. Yellow pan trap
	Diptera	Muscidae	Species B	9	Ex Yellow pan trap
	Diptera	Sciridae	Indet.sp.	9	Root gnat fly. Ex. Yellow pan trap, summit ridge, Old Woman Range.
	Diptera	Stratiomyidae	*Odontomyia chloris* Walker	1,6,13	Native soldier fly. Adults feed on nectar and pollen. Not known as threatened
	Diptera	Syrphidae	*Melanostoma fasciatum* Macquart	12	Native hover fly. Sweep netting tussock,
	Diptera	Tachinidae	*Huttonbressaria* sp.	7	Native.Tachinids visit flowers and parasitise spiders, caterpillars, beetles, bugs and grasshoppers.
	Ephemeroptera	Leptophlebiidae	*Deleatidium* sp.?*D. lillii*	17,18	Collected from stream. Common Mayfly larvae. Native.

Class	Order	Family	Genus and Species	Collection Site	Taxonomic and conservation status
Insecta	Hymenoptera	Formicidae	*Monomorium antarcticum* Smith	All sites	Endemic Southern ant. Not threatened.
	Hemiptera:Heteroptera	Lygaeidae	*Nysius huttoni* White	6,13	Native wheat bugs. Sap suckers.
	Hemiptera:Heteroptera	Lygaeidae	*Rhypodes anceps* White	6,10	Ex. Roulia cushions in wet flush. Endemic.
	Homoptera	Tibinicidae	*Maoricicada campbelli* Myers	All	Common South Island mountain cicada
	Lepidoptera	Crambidae	*Orocrambus* so.	All high elevations (>1000m)	Tussock moths. Native.
	Lepidoptera	Geometridae	*Dasyuris callicrena* Meyrick	13	The Rusty *Hebe* looper moth. A day flying native.
	Lepidoptera	Geometridae	*Dasyuris transaurea* Howes	11,15	Golden spotted looper. Day flying mountain moth. Native.
	Lepidoptera	Geometridae	*Dichromodes gypsotis* Meyrick	11	Endemic lichen moth. Collection records include Wakatipu mountains.
	Lepidoptera	Geometridae	*Orthoclydon* sp. cf. *O. chlorias* Meyrick	12	Likely to be the Snowberry yellow moth. Prefers beech forest although caterpillars feed on Gaultheria berries (present on Happy Valley).
	Lepidoptera	Lycaenidae	*Lycaena salustius* F.	All sites, below 800m	Native New Zealand Copper butterflies.
	Lepidoptera	Lycaenidae	*Zizina labrus oxleyi*	6,14,15,16,17,18,19	Common New Zealand blue butterfly. Caterpillars feed on *Carmichaelia*
	Lepidoptera	Noctuidae	*Graphania rubescens* Butler	1,13	Caterpillars probably feed on grasses and lowgrowing plants.

Class	Order	Family	Genus and Species	Collection Site	Taxonomic and conservation status
Insecta	Lepidoptera	Pyralidae	*Eudonia* sp.? *E. xysmatias* Meyrick	All lower elevations (>1200m)	Native grass moth. Not threatened.
	Megaloptera	Corydalidae	*Archichauliodes diversus* Walker	17,18	Endemic Dobson fly. Larvae, ex. Lower Bannock Burn
	Neuroptera	Hemerobiidae	*Micromus* sp.	13	Native lacewing. Beaten from *Coprosma propinqua*. Not known as threatened.
	Odonata	Petaluridae	*Uropetala chiltoni* Tillyard	15	Giant mountain dragonfly.
	Orthoptera	Anostostomatidae	*Zealandosandrus maculifrons* Walker	1,3,8,9	Not threatened. Robust weta that can grow up to 35mm. Occurs throughout much of the South Island, not commonly seen. Strong tunnelling ability. Meads 1997.
	Orthoptera	Acrididae	*Alpinacris tumidicauda* Bigelow	8	Endemic species. Known only from Otago and Southland.
	Orthoptera	Acrididae	*Sigaus australis* Hutton	Common throughout	Common South Island alpine grasshopper. Known from Arthur's Pass to Queenstown. Not threatened.
	Orthoptera	Acrididae	*Sigaus minutus* Bigelow	16	Endemic Otago/ Mackenzie grasshopper. Threat category 5: Gradual decline.
	Plecoptera	Gripopterygidae:Zelandoperlinae	*Zelandoperla* sp.	17,18	Native stonefly larvae. Difficult to identify as larvae.

List of invertebrate taxa on Happy Valley PL, December 2005.
*Conservation status derived from Hitchmough 2002 and McGuinness 2001.

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APPENDIX 9

List of Lizard Sightings on PL

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

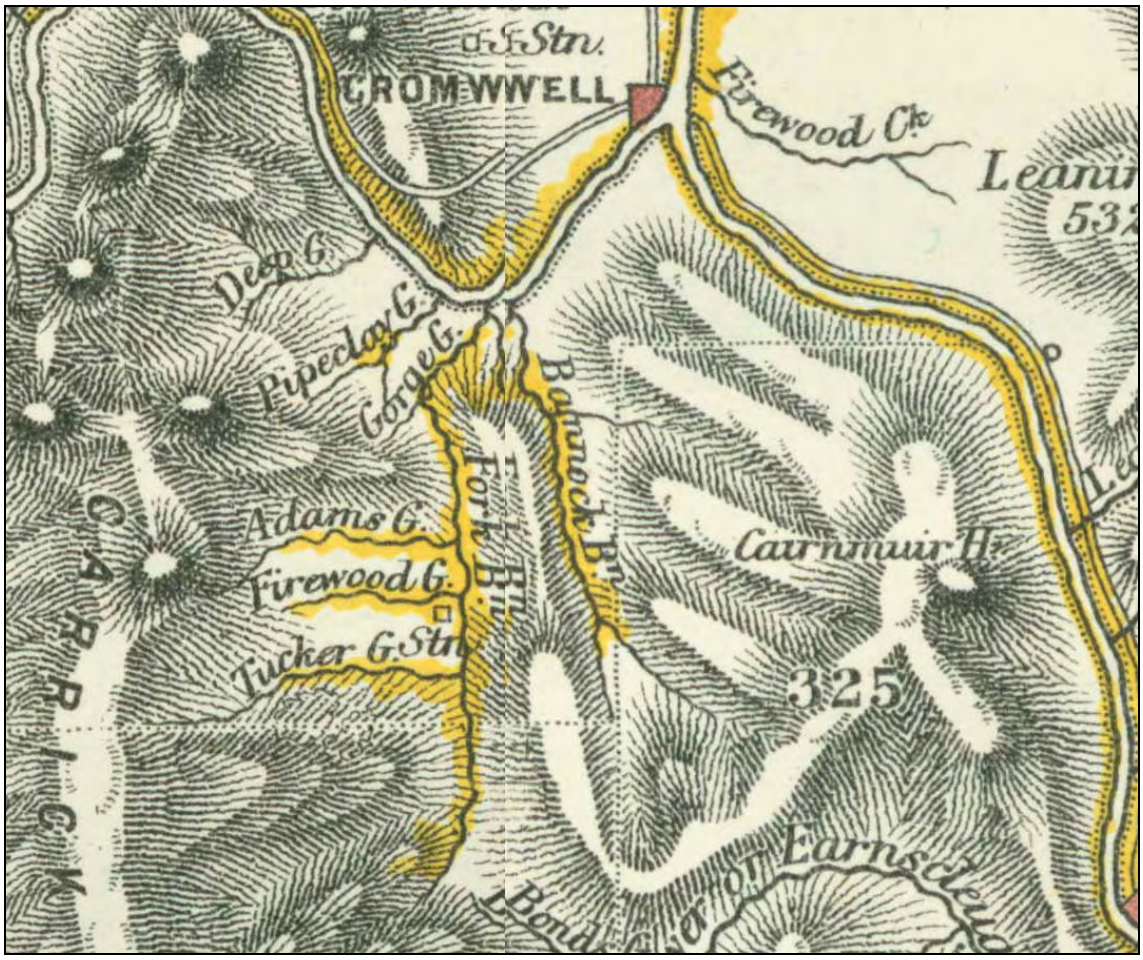
APPENDIX 10

Locations of Aquatic Fauna on Happy Valley PL

Location	**Easting**	**Northing**	**Species Observation**
Tucker Gully, Shepherds Creek	2205913	5553319	No fish
Tucker Gully, Shepherds Creek	2206353	5553728	No fish
Bannock Burn	2205301	5548947	No fish
Bannock Burn	2205993	5551932	*Salmo trutta*
Unnamed tributary, Bannock Burn	2205477	5551236	*Galaxias* species D
Unnamed tributary, Bannock Burn	2205665	5552173	*Salmo trutta*
Unnamed tributary, Bannock Burn	2205813	5551954	*Salmo trutta*
Unnamed tributary, Bannock Burn	2204476	5551933	*Galaxias* species D
Unnamed tributary, Bannock Burn	2205596	5551968	*Salmo trutta*
Unnamed tributary, Bannock Burn	2205627	5551564	*Salmo trutta*
Unnamed tributary, Bannock Burn	2205495	5552385	*Salmo trutta*
Duffers Gully	2205310	5552661	*Salmo trutta*
Duffers Gully	2204359	5552371	*Galaxias* species D
Unnamed tributary, Duffers Gully	2205301	5552959	No fish

APPENDIX 11

Gold mining recorded in Tucker Fully (bottom left of map) recorded by Thomsen and Spreat in 1867



APPENDIX 12

Happy Valley PL showing property boundaries and archaeological sites recorded prior to (red dots) and during (green dots) the Tenure Review field survey