

Crown Pastoral Land Tenure Review

Lease name : LAKE HAWEA

Lease number : PO 286

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.

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

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

July 05

APPENDIX 4

LINDIS ECOLOGICAL DISTRICT PNAP REPORT – RAP A7

LINDIS - RAP A7

GRANDVIEW CREEK



GRID REFERENCE : INFO MAP 260 G40 212 150

AREA : 310 hectares

ALTITUDE : 550m - 1310m



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LINDIS RAP A7 : GRANDVIEW CREEK

Bioclimatic Zones Montane to low alpine

Ecological units	Vegetation types	Landforms
	Not sol	on colluvial slope
	Not sol	on riparian slope
	Kun eri	on colluvial slope
	Dis tou-Cop pro	on alluvial surface
	Dis tou-Cop pro	on colluvial slope
	Dis tou-Cop pro	on riparian slope
	Mixed shrubland	on riparian slope
	Mixed outcrop vegetation	
	Fes nov	on colluvial slope
	Chi rig-Fes mat-Poa col	on colluvial slope
	Chi rig-Fes mat-Poa col	on ripply colluvial slope
	Chi mac-Fes mat-Poa col	on colluvial slope
	Chi mac-Fes mat-Poa col	on ripply colluvial slope
	Fes mat-Poa col	on colluvial slope

Landform

Catchments of two steep southwest flowing tributaries of Grandview Creek, and the lowermost section of the opposite face. Grandview Creek and its tributaries are very deeply incised into the eastern wall of the Hawea - Upper Clutha valley. The southwest aspect of the area is dominated by very steep derivative slopes, with bands of bluffs up to 100 m high interspersed with colluvial slopes. The more extensive colluvial slopes are locally slumped, particularly at higher altitudes, and an unusual rockflow deposit fills the gully at the southeastern corner of the area.

The Haast Schist here dips moderately northeast and the landform consequently has strong asymmetry - the opposite northeast aspect of Grandview Creek is an entirely slumped ripply colluvial slope with reactivated slumping near the base of the slope in the priority area.

The steep slopes are susceptible to sheetwash and incipient gully erosion. Yellow-brown (Dunstan) steepland soils are predominant.

Vegetation

Five small stands of mountain beech forest (<1.5 ha) occur mainly on shady aspects adjacent to the main stream or tributaries. There is little understory except near the stream where broadleaf, *Olearia avicenniaefolia* and *Coprosma propinqua* are significant.

Elsewhere alongside Grandview Creek is a diverse scrub dominated by matagouri and *Aristotelia fruticosa* with *Coprosma propinqua*, *Coriaria sarmentosa* and koromiko. *Olearia avicenniaefolia*, bracken and broadleaf are locally abundant.

Matagouri-dominated shrubland of lesser diversity commonly surrounds the diverse shrubland and extends up colluvial slopes particularly in the upper portion of the main stream and tributaries.

Kanuka shrubland occupies unstable ground above the diverse shrubland on the sunny aspect southwest of the main stream. Scattered kanuka is present on other sunny slopes nearby. Outcrops on shady aspects have much *Helichrysum selago*, *Brachyglottis baastii* and *Stellertia gracilentia*.

intermedian

Fescue tussockland of generally low naturalness (abundant clover and sweet vernal) extends above the shrublands on sunny faces. On shady aspects alpine fescue - blue tussockland is predominant with much *Hieracium lepidulum* and clover. Scattered narrow-leaved snow tussock above 900 - 1000 m grades into narrow-leaved snow tussockland above 1050 - 1200 m.

Snow tussockland contains *Dracophyllum pronum* on most shady faces; elsewhere *Hieracium lepidulum* is abundant with scattered golden spaniard and *Celmisia densiflora*. *Carmichaelia monroi* and *Pentachondra pumila* are found on the ridge crest.

Flora

Species uncommon in the District are: silver beech (a few mature and juvenile specimens), *Myrsine divaricata*, *Blechnum chambersii* and *Libertia ixioides*, present in the largest beech stand; cabbage tree, *Scandia geniculata*, mountain flax, *Schizaelema trifoliatum* and *Hydrocotyle moschata* in shrublands; and *Hebe subalpina*, *Pimelea oreophila*, *Hebe decora* and *Anisotome brevistylis* on outcrops.

Discussion

The dramatic landform of this area is a consequence of the oversteepening of the eastern wall of the Hawea - Upper Clutha Valley by the Hawea glacier in the Albert Town (and earlier) glacial advances and the relatively short time since then for rapid downcutting and dissection (cf. Lindis A13). The RAP includes good representation of the Grandview land system, but could be improved by extension through the Lindis B4 to include the full upper catchment of Grandview Creek with its striking contrast between the fully slump and relatively stable valley sides.

The main significance of the RAP is for the combination of diverse woody vegetation and the steepland altitudinal sequence of vegetation and soils. It represents the important transition zone in the northwestern part of the District across the regional boundary between the Lindis and Wanaka Districts. These are the southernmost of the isolated beech stands characteristic of the mountain side east of Hawea. Several other species or communities more characteristic of the wetter Wanaka Ecological District to the northwest are here at or close to their southeastern limit, hence the unusual diversity in the shrublands associated with the beech remnants. The downstream boundary of the RAP is placed to include the diverse woody vegetation while excluding the areas most strongly modified by recent fires and intensive oversowing.

The value of the altitudinal sequence is limited by the strong modification of the tussocklands - the absence of low altitude snow tussockland directly associated with the woody vegetation, oversowing and topdressing and the abundance of *Hieracium*. The main ridge crest is not quite high enough for shady slopes to support a significant area of slim snow tussockland, which is present on all aspects at only slightly higher altitude in Lindis B4.

CRITERIA SUMMARY : RAP A7 - GRANDVIEW CREEK

Representativeness	H	Typical vegetation communities of NW Lindis District.
Diversity	H	Particularly good diversity in woody vegetation.
Naturalness	M	High for woody vegetation except in ground tier, low or moderate in tussocklands.
Special Features	H	High diversity of woody vegetation including the uncommon species.
Viability	H	Regeneration of woody communities appears adequate. Some tussockland species may be at risk.
Buffering	M	Good buffering of most diverse woody vegetation on steep riparian sites, except from downstream.
Threat	H	Fire, further exotic dominance and erosion of tussockland communities.
Landform	H	Though preponderance of steeper derivative slopes, characteristic of Grandview land system.

APPENDIX 5

LINDIS ECOLOGICAL DISTRICT PNAP REPORT – RAP B3

LINDIS - RAP B3

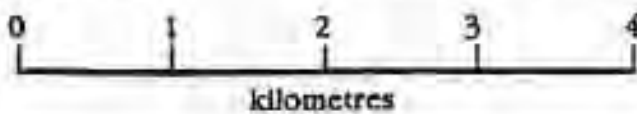
MID BREAST CREEK



GRID REFERENCE : INFO MAP 260 G40 281 185

AREA : 330 hectares

ALTITUDE : 640m - 1370m



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LINDIS RAP B3 : MID BREAST CREEK

Bioclimatic Zones Montane to low alpine

Ecological Units	Vegetation types	Landforms
	Not sol	on riparian slope
	Dis tou-Cop pro	on colluvial slope
	Fes nov	on colluvial slope
	Chi rig-Fes mat-Poa col	on colluvial slope
	Chi rig-Fes mat-Poa col	on ripply colluvial slope
	Chi mac-Fes mat-Poa col	on colluvial slope
	Chi mac-Fes mat-Poa col	on ripply colluvial slope

Landform Encompasses a moderately incised tributary and the adjacent broad spur crest on the northern flank of the middle reaches of Breast Creek. Haast Schist dips moderately northeast, so that sections of derivative slope are common on southwest aspects, whereas the predominant southeast aspects are generally shumped ripply surfaces. The broad, nearly flat main ridge crest is a vestige of an old warped plateau surface. Soils are hygrous yellow-brown (Dunstan) earths.

Vegetation Slim snow tussockland of moderate density caps the main ridge crest and extends down to 950 m on the spur to the south. False splanard is abundant and may be dominant in patches. Narrow-leaved snow tussockland occurs below, but reaches moderate density only in patches. Narrow-leaved snow tussock is generally scattered within dominant alpine fescue tussockland on the lower altitude shady faces. Depleted fescue tussockland occurs on the opposite sunny face south of Breast Creek.

A narrow riparian strip of mountain beech forest extends 800 m (horizontally) up the Breast Creek tributary, and four patches of a few hectares of beech forest occur on the shady slopes above the main stream. The understorey is sparse and of limited diversity, except in the frequent canopy gaps. Matagouri shrubland grows beside Breast Creek, and extends up the adjacent sunny faces particularly in fluvies.

Flora *Hebe decora* noted on a boulderfield near beech forest, otherwise typical.

Discussion This area features an altitudinal sequence representative of the northwestern Lindis District (Breast land system), from mountain beech forest remnants to slim snow tussockland. The intervening narrow-leaved snow tussockland, however, is generally sparse or replaced by alpine fescue tussockland. Slim snow tussockland here extend down to the lowest altitude known in the Lindis, Pisa and Dunstan Districts.

Beech forest remnants are the largest surveyed. Five small forest birds were observed: rifleman, grey warbler, tomtit, fantail and silvereye.

The lower reaches of Breast Creek, immediately downstream of Lindis B3, were unavailable for survey. This area includes far larger stands of mountain beech forest, covering a wider variety of terrain and greater altitudinal range and in direct association with snow tussocklands apparently more intact than in Lindis B3.

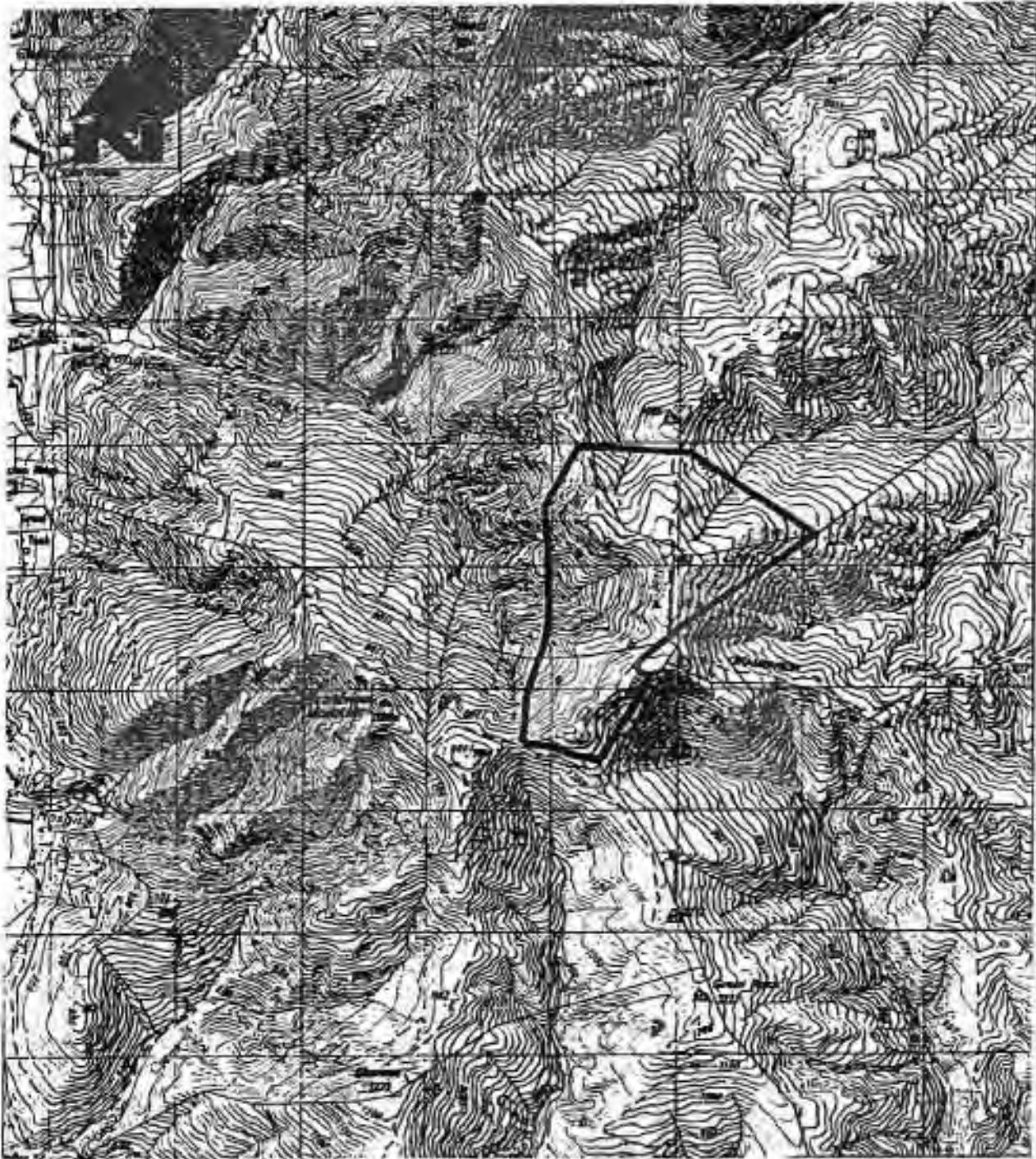
CRITERIA SUMMARY : LINDIS RAP B3 - MID BREAST CREEK

Representativeness	H	Typical vegetation sequence of NW Lindis District (though better examples nearby).
Diversity	M	Beech forest, tussocklands, limited shrubland.
Naturalness	M	Tussocklands at mid-lower altitudes depleted with frequent exotics.
Special Features	M	Beech forest (typical of NW Lindis), low altitude slim snow tussockland.
Viability	H	Beech stand is expanding, tussocklands stable in modified state.
Buffering	M	Forest partially protected by steep shady sites, surrounding areas similar.
Threat	M	Aerial oversowing and topdressing, increase in exotic species, fire.
Landform	H	Plateau fragment, ripply slopes and incised stream characteristic of Breast land system.

APPENDIX 6

LINDIS ECOLOGICAL DISTRICT PNAP REPORT – RAP B4

LINDIS - RAP B4 **GRANDVIEW TOPS**



GRID REFERENCE	: INFO MAP 260 G40 228 128
AREA	: 310 hectares
ALTITUDE	: 1010m - 1460m

0 1 2 3 4
kilometres

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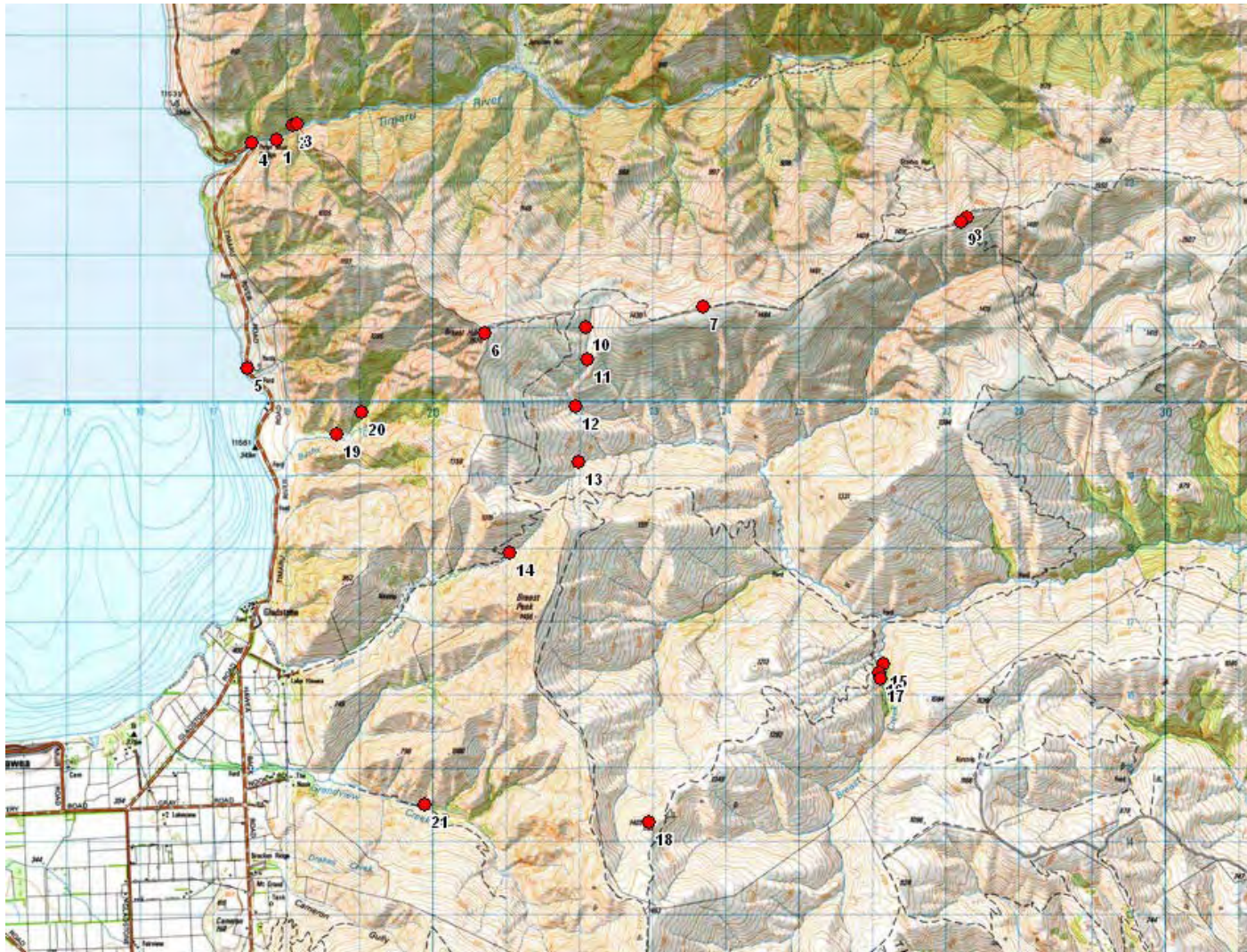
LINDIS RAP B : GRANDVIEW TOPS

Bioclimatic Zones	Subalpine to low alpine	
Ecological Units	Vegetation types Mixed outcrop vegetation Chi mac-Fes mat-Poa col	Landforms on colluvial slope
Landform	A crestal area encompassing the heads of Grandview Creek in the west and Breast and Camp Creeks in the east. The broad ridge crest, with tor outcrops is a vestige of an old warped plateau surface. Schist dips abruptly ESE. The western edge of the ridge crest is abruptly defined by steep derivative slopes, whereas to the east the ridge merges into faces and shallow valley heads. Shady faces tend to be slumped ripply slopes.	
Vegetation	Slim snow tussockland caps the broad ridge crest and extends on sunny slopes to 1420 m and on shady slopes to about 1300 m. It has a high species diversity including a small amount of cushionfield species with <i>Dracophyllum muscoides</i> , <i>Abrotanella inconspicua</i> , <i>Phyllacme colensoi</i> and <i>Cbionobebe densiflora</i> along the ridge crest. narrow-leaved snow tussockland also in good or moderate condition surrounds the slim snow tussockland. <i>Hieractium lepidulum</i> is locally prominent. Rock outcrops, including buttresses on the Grandview face and summit tors, are a notable feature of the area and carry a distinctive vegetation including <i>Olearia cymbifolia</i> , <i>Hebe buchananii</i> , <i>Coprosma cheesemantii</i> , <i>Helicbrysum selago</i> , <i>Actiphylla montana</i> , <i>Poa breviglumis</i> , <i>Koeleria cheesemantii</i> , <i>Hymenophyllum sanguinolentum</i> and <i>edclweiss</i> .	
Flora	A rich alpine flora, including species such as <i>Actiphylla montana</i> uncommon elsewhere in Lindis District.	
Discussion	This area includes a diverse alpine vegetation in generally good condition, enhanced by the strong landform contrast across the boundary between the Grandview and Breast land systems. The slim snow tussockland is the best in the western Lindis district. There are larger areas to the east, but those in the Pass and Chain land systems are on different substrates, and slim snow tussockland around Little Breast Hill was not available for survey. Narrow-leaved snow tussockland is in abrupt contact with slim snow tussockland on a variety of aspects and landforms. The main limitation of this RAP - that it is an alpine zone fragment of limited altitudinal range - could be remedied if it were linked to Lindis A7 nearby in the middle reaches of Grandview Creek. This would expand considerably the altitudinal sequence and representativeness of the Grandview Creek RAP.	

CRITERIA SUMMARY : LINDIS RAP B4 - GRANDVIEW TOPS

Representativeness	H	Major communities typical of the NW Lindis District.
Diversity	M	Tussocklands dominate, limited altitudinal range though good species diversity.
Naturalness	H	Alpine communities in good condition, exotic species only a minor component.
Special Features	M	Several uncommon species on outcrop refuges.
Viability	H	Stable alpine catchments.
Buffering	H	Poor catchment boundaries, but buffered by altitude, steep terrain and extent of surrounding similar vegetation.
Threat	L	Fire, increase in exotics.
Landform	M	Representative of crestral slopes of Breast and Grandview land systems, but not of the lower slopes.

PLAN – INVERTEBRATE COLLECTION SITES



INVERTEBRATE COLLECTION SITE DETAILS

Invertebrate collecting sites with locality, habitat description, altitude, collecting date and methods.

Site	Latitude and longitude	Locality and habitat description	Altitude	Collecting date	Collecting method
1	44°32'14.46"S, 169°19'23.52"E	Timaru River, beech forest floor	309 m	9 December 2002	Log and rock turning
2	44°32'08.31"S, 169°19'33.89"E	Timaru River, matagouri	362 m	9 December 2002	Log and rock turning, beating
3	44°32'07.24"S, 169°19'36.33"E	Timaru River, riverbed and shrubs	358 m	9 December 2002	Hand collecting, beating
4	44°32'14.66"S, 169°19'07.63"E	Timaru River, kanuka	346 m	9 December 2002	Beating
5	44°33'54.78"S, 169°18'58.65"E	Lake Hawea, lake shore	344 m	9 December 2002	Rock turning
6	44°33'43.81"S, 169°21'26.50"E	Breast Hill, rocks in alpine meadow	1577 m	10 December 2002	Rock turning
7	44°33'36.50"S, 169°23'41.80"E	ridge above Timaru River, rocks in tussock	1426 m	10 December 2002	Rock turning
8	44°33'01.89"S, 169°26'27.71"E	ridge above Timaru River, rocks in tussock	1450 m	10 December 2002	Rock turning
9	44°33'03.67"S, 169°26'23.81"E	ridge above Timaru River, rocks in tussock	1440 m	10 December 2002	Rock turning
10	44°33'43.10"S, 169°22'29.37"E	swampy creek near Breast Hill	1304 m	10 December 2002	Hand collecting, sweeping
11	44°33'57.22"S, 169°22'28.81"E	Gully near Breast Hill, under rocks	1285 m	10 December 2002	Hand collecting, rock turning
12	44°34'18.10"S, 169°22'20.29"E	tussock above Breast Creek tributary	1138 m	10 December 2002	Sweeping
13	44°34'42.72"S, 169°22'21.03"E	<i>Olearia odorata</i> in gully	1129 m	10 December 2002	Beating
14	44°35'21.56"S, 169°21'35.64"E	near Johns Creek, rocks and scree	954 m	10 December 2002	Hand collecting, rock turning
15	44°36'17.66"S, 169°25'23.93"E	Breast Creek, beech forest, forest floor	760 m	11 December 2002	Hand collecting, log and rock turning
16	44°36'21.39"S, 169°25'21.26"E	Breast Creek, matagouri litter	820 m	11 December 2002	Litter searching
17	44°36'23.91"S, 169°25'22.05"E	Breast Creek, beech forest	800 m	11 December 2002	Beating
18	44°37'22.97"S, 169°22'54.68"E	under stones, near tors	1400 m	11 December 2002	Hand collecting, rock turning
19	44°34'25.76"S, 169°19'52.49"E	Bushy Creek, mixed scrub	520 m	12 December 2002	Log and rock turning, beating
20	44°34'16.31"S, 169°20'07.96"E	Bushy Creek, beech forest	530 m	12 December 2002	Log and rock turning, beating, litter searching
21	44°37'10.73"S, 169°20'36.74"E	Grandview Creek, mixed scrub	525 m	12 December 2002	Log and rock turning, beating
22		Breast Creek. Collected by J. Barkla	700 m	11 December 2002	Log and rock turning
23		Tributary above Timaru River, kanuka shrubland. Collected by J. Barkla	1000 m	9 December 2002	Hand collecting
24	44°36'S, 169°25'E	near Breast Creek, <i>Muelenbeckia</i> . Collected by T. Jewell	850 m	11 December 2002	Beating
25		under rocks in paddock beside Timaru River Road	350 m	9 December 2002	Log and rock turning

INVERTEBRATE SPECIES LIST

Order	Family	species	Site	Comment
Insects				
Blattodea	Blattidae	<i>Celatoblatta anisoptera</i> Johns	7	Found in rocky ground in Central Otago and the Mackenzie Basin (Johns 1966)
Coleoptera	Byrrhidae	<i>unidentified species</i>	21	
	Carabidae	<i>Actenonyx bembidioides</i> White	3, 5	Widespread, found in gravel riverbeds
	Carabidae	<i>Anchomenus</i> sp.	1, 20	
	Carabidae	<i>Bembidion anchonoderum</i> Bates	3	Widespread and common
	Carabidae	<i>Demetrida moesta</i> Sharp	6, 14, 18	Widespread in Otago
	Carabidae	<i>Holcaspis implica</i> Butcher	6, 7, 16, 20, 21	Widespread from Central Otago to Mid Canterbury
	Carabidae	<i>Holcaspis ovatella</i> (Chaudoir)	14	Found in southern South Island. Indicative of good snow tussock habitat (R.M. Emberson pers. comm.)
	Carabidae	<i>Holcaspis sternalis</i> Broun	18	Widespread in southern South Island
	Carabidae	<i>Megadromus</i> n. sp. 1	7, 8, 18, 20	Widespread but not common in North Otago, found in lowland forest (P.M. Johns pers. comm.).
	Carabidae	<i>Megadromus</i> n.sp. 2	6	This species has not been seen before (P.M. Johns pers. comm.).
	Carabidae	<i>Mecodema lucidum</i> Laporte de Castelnau	6, 8, 11, 15, 18, 22	Widespread in Central Otago
	Carabidae	<i>Molopsida</i> sp.	18	
	Carabidae	<i>Notogonum feredayi</i> (Bates)	10	Widespread in South Island in damp places
	Carabidae	<i>Oregus aereus</i> White	21	Widespread eastern species
	Carabidae	<i>Scopodes versicolor</i> Bates	10, 11	Widespread in South Island
	Cerambycidae	<i>Eburida quadriguttata</i> (Sharp)	17	Widespread
	Cerambycidae	<i>Zorion</i> sp.	24	Widespread
	Chrysomelidae	<i>Adoxia</i> sp.	17	
	Coccinellidae	<i>Adalia bipunctata</i> (L.)	13, 24	Widespread
	Coccinellidae	<i>Coccinella leonina</i> F.	11	Widespread
Coccinellidae	<i>Coccinella undecimpunctata</i> L.	24	Widespread	
Coccinellidae	unidentified species 1	4		
Coccinellidae	unidentified species 2	4		
Coccinellidae	unidentified species 3	21		
Curculionidae	<i>Anagotus lewisi</i> group (Broun)	11	Widespread in southern NZ. Larvae feed on tussock tiller bases.	
Curculionidae	<i>Inophloeus</i> ?n.sp.	11	Probably has a local distribution. Related to <i>Inophloeus inuus</i> , which was	

				originally described from Queenstown (B.I.P. Barratt pers. comm.).
	Curculionidae	<i>Otiorhynchus ovatus</i> L.	21	Introduced strawberry weevil
	Curculionidae	<i>Otiorhynchus sulcatus</i> (F.)	21	Introduced black vine weevil
	Curculionidae	<i>Peristoreus</i> sp.	20	Usually distributed more widely. Often host specific, known as flower weevils (B.I.P. Barratt pers. comm.).
	Elateridae	<i>Ctenicera</i> ' sp.	10	
	Elateridae	<i>Prisahynus frontalis</i> (Sharp)	21	Western South Island
	Lucanidae	<i>Mitophyllus foveolatus</i> (Broun)	20	Uncommonly found in South Island upland beech forests
	Melyridae	<i>Dasytes</i> ' sp.	24	
	Nitidulidae	<i>Soronia histrix</i> Sharp	2	Widespread, found on sooty mould covered beech trees
	Tenebrionidae	<i>Artystona rugiceps</i> Bates	11	Widespread
	Tenebrionidae	<i>Mimopeus ?impressifrons</i> (Bates)	19	Found in Central Otago and the Mackenzie country
	Tenebrionidae	<i>Zeadelium ?aeratum</i> (Broun)	14	Found in southern Otago and Southland
	Tenebrionidae	<i>Zeadelium ?femorale</i> (Broun) or ?n.sp.	21	<i>Zeadeliman femorale</i> has been recorded from Central Otago and Southland by Watt (J.W.M. Marris pers. comm.)
	Tenebrionidae	<i>Zeadelium ?intermedium</i> (Sharp)	16	Widespread in the northern 2/3 of South Island. This may be the southern-most record of this species.
	Scarabaeidae	<i>Pyronota festiva</i> (F.)	4	Common manuka beetle
Diptera	Asilidae	unidentified species	15	
	Oestridae	<i>Oestrus ovis</i> L.	near 21	Introduced sheep nasal bot fly
	Tipulidae	unidentified species	10	
Hemiptera	Acanthosomatidae	<i>Oncacoutias vittatus</i> (F.)	17	Widespread
	Aradidae	<i>Anearus brouni</i> White	20	Widespread, found under dead bark
	Cicadidae	<i>Amphipsalta strepitans</i> (Kirkaldy)	23	The chirping cicada. Only local in Otago, but with a wider distribution. Known only from less than 230 sites in Otago in rocky montane areas. Indicates good quality rocky/ shrubland habitat.
	Miridae	unidentified species	3	
	Pentatomidae	<i>Cermatulus nasalis hudsoni</i> Woodward	14	Widespread in South Island
	Pentatomidae	<i>Dictyotus caenosus</i> (Westwood)	10, 11, 21	Widespread
Hymenoptera	Ichneumonidae	unidentified species	18	
	Pompilidae	<i>Sphictstethus nitidus</i> (F.)	15	Common throughout NZ, especially in open habitats (Harris1987)
Lepidoptera	Crambidae	<i>Orocrambus philpotti</i> Gaskin	12	Tall tussock grassland species that is indicative of good quality snowgrass. Widespread in central South Is high-country. Alpine. Larvae never reared but probably feed on

	Lycaenidae	<i>Lycaena salustius</i> (F.)	3, 15, 25	<i>Chionochloa</i> sp. stems (B.H. Patrick pers. comm.). Common throughout NZ.
	Geometridae	<i>Austrocidaria parora</i> (Meyrick)	20	Indicative of diverse shrubland. Local species of <i>Coprosma</i> feeding geometrid. Can be locally common where rich shrubland present. Lowland to low alpine.
	Geometridae	<i>Austrocidaria similata</i> (Walker)	19	Widespread and common <i>Coprosma</i> feeding geometrid. Mostly lowland to montane.
	Geometridae	<i>Helastia plumbea</i> (Philpott)	21	Local species. Larvae on moss on rock faces in montane zone. Records from across Otago from Queenstown to hills near Dunedin but it is more common in western mountains (B.H. Patrick pers. comm.).
	Geometridae	<i>Paranotoreas zopyra</i> (Meyrick)	10	Day active orange underwing moth. Larvae on <i>Epilobium</i> . Likes naturally disturbed areas and can be locally common in montane to low alpine areas of NZ uplands (B.H. Patrick pers. comm.).
	Glyphipterigidae	<i>Glyphipterix cionophora</i> (Meyrick)	17	Day active moth that can be locally common around <i>Poa</i> spp., the larval host in which the larvae are stem borers. Widespread in montane areas.
	Hepialidae	<i>Wiseana mimica</i> (Philpott)	6, 10, 21	Early emerging and upland porina moth. Larvae in flushes and damp grassland. Widespread and locally common species. South Is only.
	Noctuidae	<i>Rictonis comma</i> (Walker)	21	Widespread and common noctuid from lowlands to low alpine zone. Larvae on herbs and grasses.
	Oecophoridae	<i>Tingena siderodeta</i> (Meyrick)	15	Widespread and locally common litter-feeding species. Adult active by day. Forest specialist that can also be found in suburban gardens.
Odonata	Corduliidae	<i>Procordulia grayi</i> (Selys)	18	Widespread
Orthoptera	Acrididae	<i>Sigaas australis</i> (Hutton)	(6-9), 10	Common at higher altitudes over most of the Southern Alps (Bigelow 1967)
	Anostomatidae	<i>Hemiandrus maculifrons</i> (Walker)	6, 7	Subalpine southern South Island
Arachnids				
Araneae	Amphinectidae	<i>Maniho centralis</i> Forster & Wilton	20	Previously known only from a few specimens around Alexandra. This genus typically inhabits forest and may have been widespread in Central Otago prior to deforestation.
	Araeneidae	<i>Cryptaranea</i> n.sp.	17	Close to <i>Cryptaranea subalpina</i> , which has a restricted distribution. The

				genus <i>Cryptaranea</i> has been revised recently (Court & Forster 1988) and it is very unusual to find a new species in the Araneinae.
	Desidae	<i>Badumna longinqua</i> (L. Koch)		Introduced, widespread species
	Desidae	<i>Gasparia</i> n.sp.	7	Close to <i>Gasparia nelsonensis</i> . Most <i>Gasparia</i> species are found in forest although two other species are found in open alpine and lowland habitats.
	Gnaphosidae	<i>Hemicloea rogenhoferi</i> L. Koch	18	Widespread species, introduced from Australia
	Gnaphosidae	<i>Matua valida</i> Forster	6, 15	Found in Canterbury and Otago but with a very limited distribution (Forster 1979)
	Gnaphosidae	<i>Notiodrassus distinctus</i> Bryant	1, 19	Widespread in forest in the southern regions of the South Island
	Gnaphosidae	<i>Taieria obtusa</i> Forster	11	Found in Central Otago river beds
	Linyphiidae	<i>Haplinis major</i> (Blest)	21	Widespread in the eastern South Island, inhabits creek beds (Blest & Vink 2002)
	Lycosidae	<i>Anoteropsis adumbrata</i> (Urquhart)	16	Widespread, found in higher altitude grassland
	Lycosidae	<i>Anoteropsis lacustris</i> Vink	5	Widespread, found in riverbeds and lakeshores
	Pisauridae	<i>Dolomedes aquaticus</i> Goyen	5	Widespread, found in riverbeds and lakeshores
	Stiphidiidae	<i>Cambridgea antipodiana</i> (White)	11, 14	Widespread in Otago
	Tetragnathidae	undescribed species	17	
	Theridiidae	<i>Steatoda capensis</i> Hann	25	Introduced, widespread species
	Theridiidae	<i>Steatoda lepida</i> (O. P.-Cambridge)	5	Widespread, found in riverbeds and lakeshores
	Theridiidae	undescribed species	4, 17	New Zealand has a large theridiid fauna, most of which are undescribed
	Thomisidae	<i>Diaea</i> sp.	4, 17, 21	Widespread, arboreal spider
	Zoropsidae	<i>Uliodon</i> sp.	15	Most species are forest floor inhabiting
Opiliones	Triaenonychidae	<i>Nuncia</i> sp.	20, 21	Some species can have restricted distributions
Pseudoscorpiones	Chelifidae	<i>Protochelifer novaezealandiae</i> Beier	2, 9	Widespread

APPENDIX 10

INVERTEBRATE SPECIMEN HOLDING LOCATION.

Lepidoptera: Brain Patrick, Otago Museum

Spiders and other insects: Entomology Research Museum, Lincoln University

Duplicate specimens of *Anagotus lewisi* group and *Inophloeus* n.sp.: Barbara Barratt,
AgResearch, Invermay

Duplicate specimens of *Megdromus* n.spp.: Peter Johns, Canterbury Museum

APPENDIX 11

ELECTRIC FISHING SITES

Location	G.P.S Reading	Species Recorded
Grandview Creek	2219633 / 56145538	No fish
Grandview Creek	2218312 / 5614920	No fish
Grandview Creek	2217422 / 5614957	No fish
Bushy Creek	2217753 / 5619102	No water
Un-named tributary of Johns Creek	2220271 / 5617715	No fish
Un-named tributary of Lake Hawea	2217283 / 5621678	No fish
John's Creek	220477 / 5617733	No fish
Breast Creek	2221070 / 5618864	No fish
Breast Creek	2221744 / 5620552	No fish
Breast Creek	2221915 / 5621297	No fish
Breast Creek	2222231 / 5621354	No fish
Breast Creek	2220486 / 5622745	No fish
Breast Creek	2248030 / 5615214	No fish
Breast Creek	2223198 / 5616986	No fish
Breast Creek	2224467 / 5619080	Brown trout (abundant), koaro
Tributary of Breast Creek	2222367 / 5619276	Galaxiid spD
Breast Creek	2228245 / 5621644	No fish
Tributary of Timaru River	2220486 / 5622744	No fish

Note: Fish were recorded at only 2 of the 18 sites fished.

PLANT LIST

**Checklist of vascular plant species compiled from visit 9-13 December 2002 & 15
January 2003**

J.W. Barkla, Department of Conservation, Dunedin

* denotes adventive species

Trees and shrubs

Aristotelia fruticosa	G. crassa	Myrsine divaricata
*Buddleja davidii	G. depressa	M. nummularia
Carmichaelia crassicaule	G. parvula	Nothofagus menziesii
C. petriei	Griselinia littoralis	N. solandri var.
C. vexillata	Hebe buechananii	cliffortioides
Coprosma atropurpurea	H. cupressoides	Olearia avicenniaefolia
C. cheesemanii	H. epacridea	O. cymbifolia
C. ciliata	H. pinguifolia	O. fimbriata
C. perpusilla	Hebejeebie densifolia	O. lineata
C. propinqua	H. subalpina	O. odorata
C. "taylori"	H. salicifolia	Ozothamnus vauvilliersi
Cordyline australis	Helichrysum intermedium	Pentachondra pumila
Coriaria sarmentosa	H. lanceolatum	Peraxilla tetrapetala
Corokia cotoneaster	Kunzea ericoides	Pimelea oreophila
Discaria toumatou	Leptospermum scoparium	P. traversii
Dracophyllum	Leucopogon fraseri	*Pinus radiata
longifolium	L. suaveolens	Pittosporum tenuifolium
D. muscoides	*Lupinus arboreus	*Ribes uva-crispa
D. pronum	*Macrocarpus	*Rosa rubiginosa
D. uniflorum	cupressoides	*Salix fragilis
Fuchsia excorticata	Melicytus alpinus	*Sambucus nigra
Gaultheria antipoda	Muehlenbeckia axillaris	Sophora microphylla

Herbs

Abrotanella caespitosa	Anaphalioides	Bulbinella angustifolia
A. inconspicua	bellidioides	Cardamine sp
*Acaena agnipila	Anisotome aromatica	Celmisia angustifolia
A. caesiiglauca	A. brevistylus	C. densiflora
A. inermis	A. haastii	C. gracilentia
A. profundeincisa	*Aphanes arvensis	C. lyallii
A. saccaticupula	Arthropodium candidum	C. "rhizomatous"
Aciphylla aurea	Brachyglottis haastii	*Cerastium fontanum
A. montana	B. southlandicus	*Cirsium arvense
	Brachyscome sinclarii	*C. vulgare

Colobanthus acicularis	*Hypochoeris radicata	Ranunculus gracilipes
C. strictus	Kelleria dieffenbachii	Raoulia australis
*Conium maculatum	K. paludosa	R. grandiflora
Coriaria plumosa	Leptinella pectinata	R. subsericea
Craspedia lanata	subsp. villosus	R. tenericaulis
Crassula sieberiana	L. pusilla	*Rumex acetosella
*Dianthus armeria	Leucogenes grandiceps	Senecio glaucophyllus
Dolichiglottis lyallii	Libertia ixioides	ssp. discoides
*Echium vulgare	*Linum catharticum	Schizeilema
Epilobium brunnescens	*Marrubium vulgare	hydrocotyloides
E. pubens	Microtis unifolia	S. trifoliolatum
Euchiton mackayi	*Mimulus moschatus	Scleranthus uniflorus
Galium sp. aff	*Mycelis muralis	Senecio quadridentatus
perpusillum	Myosotis australis	Stellaria gracilentia
Gentiana amabilis	M. goyenii	Thelymitra longifolium
Geranium microphyllum	M. elderi	*Trifolium arvense
G. sessiliflorum	Neopaxia sessiliflora	*Trifolium pratense
Geum leiospermum	Ourisia caespitosa	*T. repens
Gingidia montana	Pachycladon cheesemanii	*Verbascum thapsus
*Hieracium auranticum	P. enysii	V. virgatum
*H. lepidulum	Parahebe decora	Viola cunninghamii
*H. pilosella	Phormium cookianum	Vitaddinia australis
*H. praeltum	Phyllachne colensoi	*V. gracilis
Hydrocotyle hydrophila	Plantago triandra	Wahlenbergia
H. microphylla	Pratia angulata	albomarginata
H. moschata	Psycrophila obtusa	
*Hypericum perforatum	Pterostylus sp.	
Grasses		
*Agrostis capillaris	Cortaderia richardii	Poa breviglumis
*Anthoxanthum	*Critesion glaucum	P. cita
odoratum	Festuca mathewsii	P. colensoi
*Bromus tectorum	Festuca novae-zelandiae	*P. pratensis
Chionochloa macra	*Holcus lanatus	
C. rigida	Koeleria cheesemanii	
Lianes		
Clematis marata	Parsonsia heterophylla	Scandia geniculata
Muehlenbeckia complexa	Rubus schmidelioides	*Solanum dulcumara
Rushes and sedges		
Carex berggrenii	C. petriei	L. rufa
C. coriacea	Luzula crinita	Oreobolus pectinatus
C. gaudichaudiana	L. pumila	Schoenus pauciflorus
Ferns and fern allies		
Asplenium	Blechnum chambersii	Herperzia australiana
appendiculatum	B. penna-marina	Hymenophyllum
A. flabellifolium	Cheilanthes sieberi	sanguinolentum
A. flaccidum	Grammatis patagonica	Hypolepis millifolium

Lycopodium fastigiatum
Polystichum richardii

P. vestitum
Pteridium esculentum

APPENDIX 13

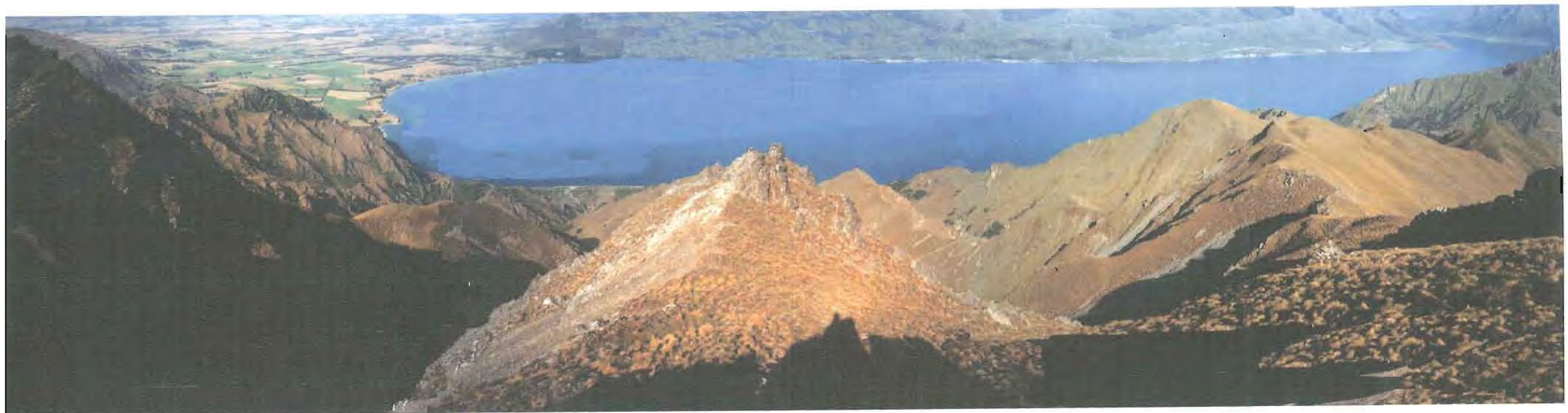
PHOTOS



Bushy Creek from Timaru River Road



Hawea Faces from northern end of Timaru River Road



Looking from Breast Hill down the Lake Hawea faces to the lake



Timaru faces from across valley



Timaru River from the ridge above



Main Breast Creek Basin (looking east) from Breast Hill



Rear of lake Hawea Station (looking east) from middle of property