It Campbell Creek: botanical and conservation assessment

P.N. Johnson
Landcare Research
Private Bag 1930
Dunedin
15 December 1999

Introduction

This assessment of conservation values in the head of Mt Campbell Creek, Knobby Range, Central Otago was requested by Rob Wardle, Department of Conservation, Alexandra, in the context of tenure review of The Knobbies and Cairnhill pastoral leases. On 10 December 1999 an inspection was carried out with Rob Wardle and Peter Diver (consultant to Knight Frank Ltd) of an area under consideration for designation as a Conservation Area.

Mt Campbell Creek runs north from near Gordon Peak (1004 m) on the north-east flank of the Knobby Range and the western edge of the Manorburn plateau. The area of conservation interest (about 275 ha) comprises the catchment head of Mt Campbell Creek, a parcel of land some 2.5 km long and 1.5 km wide: a broad valley-head basin with gentle side slopes and tributary streams, spanning an altitude of 840 to 960 m, and bounded on east and west sides by easy ridges, dotted with schist tors.

Vegetation types and their extent

Table 1 provides a summary of vegetation and habitat types recorded from Greenland RAP (Johnson 1994) and Manorburn Conservation Area (Johnson 1995) plus an estimate of the representation of similar or equivalent types in the head of Mt Campbell Creek.

Two points of caution that should be noted in this comparison are as follows. Firstly my estimate of relative percent cover of vegetation types at Mt Campbell Creek was made from on-the-ground observations, not from any careful measurement of recent air photos. Depending on where you stand and which direction you look within the valley head, the landscape can appear to have quite different proportions of plant cover. Looking eastwards one sees a great deal of short *Hieracium* vegetation, whereas a view looking towards the north or west suggests an almost complete blanket of red tussock. Secondly, not all the vegetation types at Greenland or Manorburn are exactly represented again in Mt Campbell Creek. This is especially the case with the 'dryland' tussock types. Thus for item 7 (Raoulia/ short tussock, of crests and upper slopes at Greenland) I have termed 7c (Chionochloa rigida/ hard/ blue/ red tussock) for Mt Campbell Creek. And within item 8, (the most common yet variable tussock mixture type at Greenland and Manorburn) I have recognised two communities for Mt Campbell Creek, namely 8b (hawkweed/ hard/ blue tussock) and 8c (*Aciphylla aurea* = speargrass).

The Table 1 comparison illustrates that Mt Campbell Creek head has a generally similar array of vegetation types to the other two areas, and an indication that dense wetland red tussock is relatively well represented here.

Vegetation pattern in Mt Campbell Creek

Vegetation types and habitats are briefly as follows, again with reference to the Table 1 numbering system, and in approximate order as they occur from ridge crests down to valley bottoms:

1. Tors, with the usual mixture of ledge, crevice, shaded overhangs, and lichen vegetation.

2. Turf near tors: limited areas skirting tors, with short vegetation e.g. with *Scleranthus*, mosses, and lichens; or sheep-camp sites with soft brome, suckling clover, sorrel, etc.

3. Heath pavement: much less common than in the Greenland RAP; only small areas with *Pentachondra pumila*, and other small heaths dominant.

4. Sunny scarp turf: also uncommon here; just small areas of sunny aspect banks having turf of mat herbs such as *Gaultheria*, *Herpolirion*, and *Stackhousia*.

5. Bluffs: this habitat not present in Mt Campbell creek head.

6. Scrub: There is no scrub vegetation to speak of, just scattered individuals of a few shrub species, e.g. coral broom, olearias, porcupine shrub.

7b. *Chionochloa rigida*/ hard/ blue/ red tussock: The main cover of convex and planar upper hill slopes in the head and on the sides of Mt Campbell Creek. An example of composition is: *Chionochloa rigida* 30% cover, hard tussock (*Festuca novae-zelandiae*) 15%, blue tussock (*Poa colensoi*) 10%, browntop (*Agrostis capillaris*) 15%, mouse-eared hawkweed (*Hieracium pilosella*) 15%, sweet vernal (*Anthoxanthum odoratum*) 5%, plus native herbs. Red tussock (*Chionochloa rubra*) is also present to varying degrees, and many tall tussocks appear to be *rubra* X *rigida* hybrids.

8b. Hawkweed/ hard/ blue tussock grassland: this forms large patches 100 m or more in extent, upon broad spurs and gentle mid-slope faces within the headwater basin, probably on the least moist soils. An example of composition is: mouse-eared hawkweed 50 - 70% cover, hard tussock 15%, blue tussock 10%, and low native plants such as *Coprosma petriei*, *Raoulia subsericea*, and *Leucopogon fraseri*.

8c. *Aciphylla aurea* (speargrass): moderately dense patches 20-50 m across, often with Maori onion (*Bulbinella angustifolia*), very scattered tall tussocks, and 30-40% hawkweed; this type occurs immediately downslope of the 8b (hawkweed) community, and just upslope of 9 (dense wetland red tussock), seeming to pick out the soils of intermediate moisture level.

9. Dense wetland red tussock grassland: common as 20-30 m wide bands occupying the flanks of stream depressions, and more extensive across parts of the basin floor. Red tussock 70-80 % cover, with much tussock litter beneath, or a ground cover of bidibid (*Acaena caesiiglauca*) or the mosses *Hypnum* or *Polytrichum*. Red tussocks also occur within much of the next three wetland communities.

10. Sphagnum bog: *Sphagnum cristatum* occupies a few fingers of tributary streams, as deep hummocks interlaced with red tussock and *Carex sinclairii*.

11. Sedge wetlands: the beds of most streams have peaty substrates with green swards variously dominated by different mixtures of sedges, especially *Carex coriacea*, *C. echinata*, *C.*

iandra, C. gaudichaudiana, and *C. sinclairii*.

12. Moss wetland: some valley beds are dominated by wetland mosses, especially *Breutelia pendula*.

13. Stream pools of the main watercourse contain native potamogeton, milfoil, and callitriche, and naturalised jointed rush and floating sweetgrass.

Vegetation and habitat condition

Bared ground is not a feature of this area: vegetation cover is virtually completely intact. All of the vegetation types contain a diversity of native plants, probably a good representation of the natural flora. The red tussock vegetation is relatively tall and dense, mainly with an appreciable litter layer beneath. Tussock vegetation on drier substrates of hill flanks and crests is less dense and tall than it must originally have been but still contains a predominance of native species. The most modified vegetation type is the hawkweed/ hard/ blue tussock grassland (8b above), where mouse-eared hawkweed reaches 50-70% cover, yet has not (or not yet) fully replaced the native grassland species. Two other *Hieracium* species were noted, *H. caespitosum* and *H. lepidulum*, neither of them common. No woody weed species were seen in the head of Mt Campbell Creek, nor in the immediate area. Four feral pigs were seen; localised pigrooting was noted alongside valley floor wetlands.

Flora

A list of observed plants is attached; this should be regarded as a preliminary and by no means exhaustive list for the area.

Conservation values

Assessment of natural area criteria (as used by the Protected Natural Areas Programme) and listed in the draft Knobbies DoC report are as follows:

* Representativeness:	High
* Diversity:	Moderate
* Rarity:	High (ecosystem vs Species)
* Naturalness:	Moderate to High
* Long Term Ecological Viability:	Moderate
* Size and Shape:	Low (moderate to high if adjoining land is protected)
* Buffering, Surrounding Landscape and Boundaries:	Low (moderate to high if adjoining land is protected).

I support the assessment of these criteria, though I am inclined to rate the area at somewhere above the "low" rating ascribed to the last two asterisk items.

Viability of Mt Campbell Creek head as a Conservation Area

As a Conservation Area for tussock grassland systems the head of Mt Campbell Creek is relatively small when compared with, for example, the Manorburn Conservation Area. But this does not necessarily mean that it is not a viable-sized unit in its own right. Risk from infestation by woody weeds is low, especially as none are present in the head of Mt Campbell Creek now, nor as a seed source anywhere in the immediate adjacent vicinity. One would hope that future pastoral land use in the vicinity would maintain this situation. The biggest immediate question probably centres on the future trend of hawkweeds. *Hieracium pilosella* is well established now. Whether it is likely to increase its cover within existing hawkweed-dominant communities, or expand into other vegetation types are scenarios I cannot predict, though I would expect these possibilities would be least likely if the area was retired from grazing. *H. pilosella* and other hawkweeds are undoubtedly with us for good, which means that their presence within existing or proposed conservation areas cannot be viewed in a black-and-white manner as negating conservation values overall. Having said that, there is always the hope that biological control agents or other control strategies and methods for hawkweeds might in the future reduce their presence. In which case any tussockland area given protection now will retain options for rehabilitation of native vegetation types.

The potential impact of fire on a Mt Campbell Creek Conservation Area is ever-present, though the likelihood may diminish in future given a trend towards more conservative burning practices in pastoral country generally. The size of the proposed Conservation Area does not allow for a great deal of marginal buffer zone against possible impacts arising from adjacent land, but the Area is compact in shape, and its enclosing catchment-boundary ridges make for a tidy landscape unit, somewhat separate from adjoining catchments, and accordingly buffered from fire as well as possible effects such as topdressing in surrounding pastoral land.

Representativeness of proposed Conservation Area

In the context of the Manorburn Ecological District, the vegetation pattern and diversity in the head of Mt Campbell Creek is, in broad terms, representative of the higher elevation character of the District. From a vegetation and flora viewpoint the proposed Conservation Area does not appear to contain anything unique or rare. By comparison with the vegetation and habitats already protected in the Manorburn Conservation Area it basically represents something more of the same, which is not altogether a bad thing considering (a) that it is some 13 km distant from Manorburn CA and represents a more westerly portion of the Ecological District, and (b) that conservation advantages could be argued for a further, discrete conservation site ('more than one egg-in-the basket').

There is also a more local scale within which to consider the values and significance of this proposed Conservation Area, namely the context of the Knobby Range itself. In the absence of the upper Mt Campbell Creek Conservation Area, what other actual or potential sites for conservation protection are there anywhere near the range crest? On other, higher, Central Otago Ranges, land has been retired from pastoral use for several reasons, including for soil and water conservation purposes, and for protection of more alpine habitats, biota, and landscapes. The Knobby Range does not rise to a subalpine or alpine zone, and the range crests are at a level where pastoral farming remains an alternative or competing land use with biological conservation. But might there not be an argument also for ensuring that some portion, like the Mt Campbell Creek head, should be protected against further pastoral development, as a representation of the 'original' character of the range crest landscape and plant cover.

Finally, the innate character of the head of Mt Campbell Creek is such that when one is there on the ground, there is no feeling of being merely within some pocket handkerchief of tussock country. Instead the uplifted viewpoint within a setting of broad headwater basin, with a skyscape and landscape that stretches to far-distant ranges, gives a scenic appeal to the place, to which the diversity of tussock and wetland add biological authenticity. In a nutshell: a place with high biological conservation, and charm to boot.

References

Johnson, P.N. 1994: Little Valley - Greenland RAP: vegetation assessment. Landcare Research Contract Report LC9394/103. 22 pp.

Johnson, P.N. 1995: Manorburn Conservation Area: vegetation assessment. Landcare Research Contract Report LC9495/144. 21 pp.

Table 1. Comparison of vegetation types, and their approximate % cover in Greenland RAP (G'land), Manorburn Conservation Area (M'burn), and head of Mt Campbell Creek (Mt C.)

	G'land	M'burn	Mt C.
1. Tors	<1		2
2. Turf near tors	2		1
3. Heath pavement	4	1	<1
4. Sunny scarp turf	4	6	2
5. Bluffs	1		
6. Scrub	1		
7. Raoulia/ short tussock	10		
7a. C. rigida/ blue tussock		14	
7b. C. rigida/hard/ blue/red tussock			25
8. Red/hard/blue tussock	58		
8a. Red/ rigida/ blue tussock		57	
8b. Hawkweed/ hard/ blue tussock			25
8c. Aciphylla aurea			5
9. Dense wetland red tussock	18	11	35
10. Sphagnum bog	1	c.3	<1
11. Sedge wetland	<1	c.4	3
12. Moss wetlands	1	c.4	2

Plant species recorded from head of Mt Campbell Creek, Knobby Range
P.N. Johnson, Landcare Research, December 1999.

Abbreviations:

* = naturalised (not native)

Abundance:
a = abundant
f = frequent
o = occasional
r = rare

Principal habitats:
G = tussock grasslands
W = wetlands
H = short heath/ hawkweed vegetation
T = tors
R = ridges, tracks, skirts of tors

Monocots

*	*Agrostis capillaris*	f	G	creeping bent
*	*Aira caryophyllea*	o	R	silvery hairgrass
*	*Anthoxanthum odoratum*	a	GW	sweet vernal
	Astelia nervosa	r	T	
*	*Bromus hordeaceus*	f	R	soft brome
	Bulbinella angustifolia	f	WG	Maori onion
	Caladenia lyallii	r	G	
	Carex breviculmis	o	G	
	Carex coriacea	f	W	rautahi
	Carex diandra	o	W	
	Carex echinata	f	W	
	Carex gaudichaudiana	f	W	
	Chionochloa rigida	a	G	narrow-leaved snow tussock
	Chionochloa rubra ssp. *cuprea*	a	GW	red tussock
	Festuca novae-zelandiae	f	GH	hard tussock
*	*Glyceria declinata*	r	W	floating sweet grass
	Herpolirion novae-zelandiae	f	H	grass lily
	Juncus articulatus	f	W	jointed rush
*	*Juncus bufonius*	o	R	toad rush
	Lachnagrostis lyallii	r	W	
	Luzula banksiana var. *rhadina*	o	T	
	Luzula leptophylla	o	W	
	Luzula rufa	o	G	woodrush
	Microtis unifolia	o	GH	onion orchid
	Oreobolus pectinatus	o	W	comb sedge
	Poa breviglumis	r	T	
	Poa colensoi	f	GH	blue tussock
	Poa maniototo	r	T	
*	*Poa pratensis*	o	W	meadow grass
	Potamogeton cheesemanii	o	W	pondweed
	Prasophyllum colensoi	r	G	leek orchid
	Pterostylis cycnocephala	o	GR	greenhood orchid

Dicots

	Acaena caesiiglauca	f	G	bidibid	
	Aciphylla aurea r	G	speargrass		
	Anisotome aromatica	f	G		
*	*Aphanes arvensis*	o	R	parsley piert	
	Brachyglottis bellidioides		o	T	
	Brachyscome humilis	o	GH		
	Callitriche petriei	f	W		
	Cardamine debilis	o	W		
	Carmichaelia crassicaule		r	GT	coral broom
	Celmisia gracilenta	f	G		
	Celmisia lyallii r	T			
	Celmisia sessiliflora	r	G		
*	*Cerastium fontanum*	o	R	mouse-ear chickweed	
	Colobanthus apetalus			r	W
	Colobanthus strictus			o	G
	Coprosma perpusilla			o	H
	Coprosma petriei			f	HG
	Crassula tetramera			o	T
	Discaria toumatou			r	G matagouri
	Epilobium alsinoides			o	G
	Epilobium brunnescens			o	W
*	*Erodium cicutarium*			o	R storksbill
	Gaultheria depressa var. *novae-zelandiae*			r	G snowberry
	Gaultheria macrostigma			o	G
	Gaultheria parvula			f	H
	Geranium microphyllum			o	G
	Geum leiospermum			o	GW
	Gingidia decipiens			f	WG
	Gnaphalium laterale			o	W
	Gonocarpus micranthus			o	W
	Helichrysum bellidioides			o	G
*	*Hieracium caespitosum*			o	HG field hawkweed
*	*Hieracium lepidulum*			o	G tussock hawkweed
*	*Hieraceum pilosella*			a	HG mouse-ear hawkweed
	Hydrocotyle novae-zeelandiae var. *montana*			o	G
	Hydrocotyle sulcata			f	W
*	*Hypericum perforatum*			r	G St John's wort
*	*Hypochoeris radicata*			o	G catsear
	Kelleria dieffenbachii			o	G
	Leptinella mediana			o	W cotula
	Leucopogon fraseri			a	GT patotara
	Melicytus alpinus			r	T porcupine bush
	Microseris scapigera			o	W
	Montia fontana			f	W blinks
	Muehlenbeckia axillaris			o	T
*	*Myosotis discolor*			o	R grassland forget-me-not
*	*Myosotis laxa* subsp. *caespitosa*			o	W water forget-me-not

Dicots continued ..

	Myriophyllum propinquum	f	W	milfoil
	Neopaxia sessiliflora	r	W	
	Oreomyrrhis colensoi	f	G	
	Olearia bullata	r	G	
	Olearia lineata	r	G	
	Pentachondra pumila	f	H	
	Pimelea oreophila	f	G	
	Plantago uniflora	o	W	
	Ranunculus cheesemanii	o	W	
	Ranunculus glabrifolius	f	W	
	Ranunculus maculatus	r	W	
	Ranunculus multiscapus	f	G	
	Raoulia subsericea	f	HG	
*	*Rumex acetosella*	o	R	sheep's sorrel
	Rumex flexuosus	o	W	native dock
	Schizeilema cockaynei	f	W	
	Scleranthus uniflorus	o	GR	
	Stackhousia minima	o	S	
*	*Stellaria alsine*	o	W	bog stitchwort
	Stellaria gracilenta	o	T	
*	*Taraxacum officinale*	o	GR	dandelion
*	*Trifolium dubium*	f	R	suckling clover
*	*Trifolium repens*	o	G	white clover
*	*Veronica verna*	r	R	spring speedwell
	Viola cunninghamii	r	G	
	Wahlenbergia albomarginata	r	G	native harebell

Ferns and lycopods

Asplenium flabellifolium	o	T	
Asplenium terrestre	r	T	
Blechnum penna-marina	o	GT	little hard fern
Lycopodium australianum	r	G	clubmoss
Lycopodium fastigiatum	f	GH	clubmoss
Ophioglossum coriaceum	o	G	
Polystichum richardii	o	T	shield fern
Polystichum vestitum	r	T	prickly shield fern

Mosses and liverworts

Breutelia pendula	a	W	
Dicranoloma billardieri	o	W	
Dicranum scoparium	a	W	
Drepanocladus sp.	o	W	
Hypnum cupressiforme	f	GW	
Marchantia berteroana	o	W	
Polytrichum commune	f	W	
Racomitrium lanuginosum	o	HG	
Sphagnum cristatum	o	W	

Lichens

Caloplaca cf. *cribrosa*	r	T
Chrysothrix candelaris	r	T
Cladia aggregata	a	HG
Cladonia chlorophaea gp.	o	HG
Lecanora epibryon ssp. *broccha*	a	HG
Lecanora pruinosa	r	T
Neuropogon acromelanus	r	T
Peltigera dolichorhiza	r	G
Psoroma hirsutulum	o	GH
Rhizocarpon geographicum	f	T
Siphula decumbens agg.	r	RH
Teloschistes fasciculatus	r	T
Thamnolia vermicularis	r	T
Umbilicaria cylindrica	r	T
Umbilicaria polyphylla	r	T
Usnea torulosa	r	T
Usnea sp.	o	GH