

**Emerald Creek, Nenthorn:**

**Botanical Report on Wetlands**

P.N. Johnson

Landcare Research New Zealand  
Private Bag 1930  
Dunedin  
New Zealand

Landcare Research Contract Report LC 9394/17

PREPARED FOR:  
Department of Conservation  
Otago Conservancy  
P.O. Box 5244  
Dunedin

DATE: August 1993

ISSN 1171-9834

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Reference to material in this report should be cited thus:

Johnson, P.N., 1993.

Emerald Creek, Nenthorn : Botanical report on wetlands.

*Conservation Advisory Science Notes No. 49*, Department of Conservation,  
Wellington. 11p.

Commissioned by: Otago Conservancy.

Location: NZMS

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## 1. Summary

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- An area of 2.0 x 0.5 km on Trig J ridge, west of Emerald Creek, contains examples of swamp, bog, turf depressions, pools, and red tussock wetlands, within a setting of narrow-leaved snow tussock and schist tors.
- The area offers an opportunity to protect the turf depression habitat of *Gratiola nana*, a rare herb known from only 23 South Island sites, and from only four other Otago sites.
- The area warrants protection on the basis of its botanical diversity, relatively intact condition, and representativeness within the Macraes Ecological District, in addition to its known value as lizard habitat.

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## 2. Introduction

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The Emerald Creek area, on Clover Downs Station in eastern Otago, is of particular interest to the Department of Conservation as the habitat of seven lizard species.

The area lies within the Macraes Ecological District, and comprises broad rolling schist hills with intervening incised streams. The vegetation is mainly grassland of narrow-leaved snow tussock grassland (*Chionochloa rigida*), but with red tussock (*C. rubra*) on damp ground. Outcrops of schist are common as tors on hill crests and spurs, and as bluffs bordering stream gorges. Numerous native shrub species occur as scattered scrub patches. Ongoing farm development, including ploughing, is turning much of the tussockland to pasture.

Wetlands occur on a broad ridge crest west of Emerald Creek, the Trig J ridge, centred on map reference 143/057244, at around 560 m altitude.

An opinion was sought by DoC as to the botanical values of these wetlands.

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## 3. Objective

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To describe flora and vegetation of ridge-crest wetlands west of Emerald Creek, and advise on their botanical values.



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## 4. Methods

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The site was visited on 20 May 1993, in the company of Otago Conservancy DoC staff Graeme Loh, Brian Patrick, and Neill Simpson. Qualitative descriptions were made of representative examples of wetland types at five sites (A to E in Fig. 1), and an attempt was made to record all wetland plant species. The weather was fine but frosty, so that many ponds had a thin ice cover. Observations under summer conditions would undoubtedly result in additional plants being recorded.

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## 5. Results

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Wetlands are scattered along about a 2.0 km length and 0.5 km width of hill crest, within broad, slight hollows of stream heads (Fig. 1). Wetland plants are recorded in the Appendix. The main habitat/ vegetation types (four wetland and three dryland) in this study area are as follows.

### 5.1 Red tussock grassland

*Chionochloa rubra* grassland occupies gently sloping stream head basins generally 20-100 m across, on moist mineral soil. The main associated plants are browntop (*Agrostis capillaris*), tall *Juncus* species, occasional sedge tussock (*Schoenus pauciflorus*), and *Oreobolus strictus*. Much of the ground cover is of the mosses *Hypnum cupressiforme* and *Polytrichum* sp. and the lichens *Stereocaulon ramulosum* and *Cladia aggregata*.

### 5.2 Turf depressions

These are seasonally inundated hollows without surface outlets, oval or circular, 10-30 m across, and approx. 0.5 m deep to the level of surrounding red tussock grassland (Fig. 3). The three examples studied (A, D, and E in Fig. 1) were moist but not flooded at the time of study.

Turf plants form an almost complete and uniform cover in each depression. Plant composition is variable between sites, but the common dominants are the sedge *Carex gaudichaudiana* and the grass *Agrostis stolonifera*. Other species which contribute 10% or more of the cover are *Hypsela rivalis*, *Gratiola nana*, *Isolepis aucklandica*, *Juncus bufonius*, *Lachnagrostis* sp., and the mosses *Polytrichum* and *Drepanocladus*.

Site E has an upper zone of turf in which *Dichondra brevifolia*, *Gonocarpus micranthus*, and *Galium* sp. aff. *perpusillum* become dominant.



### 5.3 Pools

The pool at site B (Fig. 2), some 30 cm deep at the time of study, may not be permanent, but the largest one (site C), which is somewhat deeper, appears to be permanent. In both pools the common aquatics are *Myriophyllum propinquum*, *Glyceria dedinata*, *Alopecurus geniculatus*, *Juncus articulatus*, and *Ranunculus glabrifolius*.

### 5.4 Juncus - Carex swamp

Surrounding the largest pool (site C) is a fringe of niggerhead tussocks (*Carex secta*) then a zone of swamp 30-100 m wide, upon shallow peat. Plant composition varies a lot from one part to another, with patches dominated by one or more of the tall rushes *Juncus gregiflorus* and *J. conglomeratus*, the sedge *Carex diandra*, and red tussock.

### 5.5 Sphagnum bog

Within the swamp at site C are patches of sphagnum bog 10-15 m across. *Sphagnum cristatum* grows as orange-brown cushions, interlaced with the sedge *Carex gaudichaudiana*, while green wefts of *Sphagnum falcatulum* fill the intervening watery hollows.

### 5.6 Narrow-leaved snow tussock grassland

*Chionochloa rigida* tussocks of relatively short stature along with occasional hard tussock (*Festuca novae-zelandiae*) are the main cover on hill crests, on drier soils than those occupied by red tussock. Browntop and mouse-ear hawkweed are common.

### 5.7 Dryland turf

Sunny slopes of northerly aspect flanking valley heads and close to tors have only scattered *C. rigida* tussocks remaining among a low, dry turf vegetation. Mouse-ear hawkweed (*Hieracium pilosella*) is the predominant cover, but native plants such as *Leptinella serrulata*, *Leucopogon fraseri*, and *Raoulia subsericea* are locally abundant.

### 5.8 Tors

On a small but repeated scale these provide a lot of different habitats - including sunny ledges, shaded clefts, and small caves - for many localised communities of native grasses, herbs, and ferns. Shrubs are sparse yet diverse in for crevices, and include in this area *Carmichaelia virgata*, *Corallospartium crassicaule*, *Coprosma* sp. aff. *parviflora*, *Corokia cotoneaster*, *Cyathodes juniperina*, *Dracophyllum uniflorum*, *Gaultheria antipoda*, *Melicope simplex*, *Melicytus alpinus*, *Muehlenbeckia complexa*, and *Myrsine divaricata*.



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## 6. Discussion

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### 6.1 The rare herb *Gratiola nana*

*Gratiola nana* (Fig. 4) is a creeping herb of damp turf in the foxglove family (Scrophulariaceae). It has a very localized distribution in both North and South Islands, and is classed as Rare (i.e. plant taxa which are not Endangered or Vulnerable, but are at risk).

Its occurrence in the turf depression at site A at Emerald Creek (Fig. 1; 143/054241) is significant. The species is known from just 23 localities in the South Island, as follows: Nelson (8), Westland (8), Canterbury (2: Cass and Geraldine), Southland (1: Mavora Lakes), and Otago (4).

All four Otago records are within the Macraes Ecological District, all in seasonally wet depressions. In addition to the Emerald Creek locality, they are:

- Paddys Rock (7 km to the south; 143/05-17-; D. Bruce, 1985).
- Hummock Runs Road (12 km to the south-west; 143/980155; D. Bruce, 1986).
- Sutton Salt Lake (30 km to the south-west; edge of salt lake, M.J.A. Simpson & A.F. Mark, 1970; CHR 181129, map reference given as S.154/820080, probably generalised).

The Sutton collection site lies within what is now Sutton Salt Lake Reserve. *G. nana* would appear to be uncommon there; it was not recorded on any of the shore transects of E. Murray (1972, Vegetation Zonation at the Salt Lake near Sutton, Central Otago. Honours project, Botany Department, Otago University).

The Emerald Creek site offers a further opportunity to protect the habitat of *Gratiola nana* in what appears to be one of its few centres of distribution.

### 6.2 Botanical values of the wetlands

This site is valuable for its diversity of wetland types in a relatively small area. Thus there are examples of swamp, bog, moist red tussock grassland, wetland turf, and both permanent and periodic pools. These wetland types reflect the nuances of water movement and accumulation on the broad ridge crest, and result also in numerous interfaces between the habitats. Adding to the value of the wetlands is the variety of the interspersed drier grasslands and numerous tors which form their setting. The wetland flora is not particularly large here, but there is a good representation of native plants, and greatest floristic diversity among the turf depressions, with 18 native vascular species.



### 6.3 Condition of the vegetation

The wetland types are composed primarily of native plants (35 species), while the eight naturalised species are not of great concern in the context of overwhelming the natives. Trampling by cattle has had an obvious and marked impact on the soft substrates of swamp and pool margins. Nutrient enrichment of the wetlands has probably accompanied the incursion of livestock. The turf depressions of firmer ground show less trampling damage.

In the drier communities, browntop and mouse-ear hawkweed are well established.

Tussocks are relatively dense in the wetlands. Tussocks of the drier communities show reduction in density and stature as a result of their pastoral and burning history. Narrow-leaved snow tussocks growing on tors are markedly taller plants than those of the surrounds, presumably because they have escaped the most recent fires.

Given cessation of grazing and burning of this area, tussock cover would probably increase, and there might be some increase in native shrubs, both in for crevices and into the tussockland.

### 6.4 Representativeness of vegetation

The Macraes Ecological District has not been covered by PNA survey. Its vegetation has not yet been very well documented, and nor has much of it been protected in reserves. It appears, however, that the Emerald Creek - Trig J ridge area is fairly typical in both landform and vegetation cover of the schist hillock ridges which comprise much of the District.

Judging by the topographic maps, small wetlands are peppered across many of the broad-topped ridges in the District. Some are mapped as ponds of comparable size to those on the Trig J ridge. Some are mapped as swamp, but may not necessarily be very swampy. As an example, the hilltop "swamp" near Trig Z (143/090070), to the east of Peat Moss Hills, proved on recent inspection to be tussock grassland (*Chionochloa rigida*, *C. rubra*, and hybrids) of slightly denser growth than that surrounding, and on merely moist mineral soils.



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## 7. Conclusions

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This area of wetlands warrants protection and appropriate conservation action on the basis of its botanical diversity and representativeness, and relatively unmodified condition. This is in addition to its obvious landscape values, and to its known importance for lizards.

Although lizard habitat protection is the driving force in DoC seeking conservation management for this area, and lizard habitats might be defined in the narrowest sense as being mainly the rock tors, the intactness of surrounding vegetation may be of long-term importance. The precise links between the wetland plants, the particular insects which eat them, and the lizards which eat the insects are not yet known. By protecting this diversity of surrounding vegetation we shall be in a better position to develop further understanding and to maintain future management options.





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## 8. Appendix: Plant species recorded from hill crest wetlands at Emerald Creek

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### Abbreviations:

\* = naturalised (not native)

#### Abundance:

a = abundant

f = frequent

o = occasional

r = rare

#### Habitats:

T = turf depressions

S = swamp, bog, red tussock

A = aquatic in pools

### Monocots

<i>Agrostis capillaris</i>	f	S	creeping bent
<i>A. stolonifera</i>	f	T	browntop
<i>Alopecurus geniculatus</i>	o	A	kneed foxtail
<i>Bulbinella angustifolia</i>	o	S	Maori onion
<i>Carex coriacea</i>	o	S	rautahi
<i>C. ?diandra</i>	f	S	
<i>C. gaudichaudiana</i>	a	T	
<i>C. secta</i>	f	S	niggerhead
<i>Chionochloa rigida</i>	o	S	narrow-leaved snow tussock
<i>C. rubra</i>	a	S	red tussock
<i>Eleocharis acuta</i>	o	A	spike sedge
<i>Glyceria declinata</i>	f	A	floating sweet grass
<i>Herpolirion novae-zelandiae</i>	r	T	grass lily
<i>Isolepis aucklandica</i>	f	T	
<i>Juncus articulatus</i>	f	A	jointed rush
<i>J. bufonius</i>	f	T	toad rush
<i>J. conglomeratus</i>	a	S	
<i>J. distegus</i>	o	S	
* <i>J. effusus</i>	o	S	soft rush
<i>J. filiformis</i>	r	S	
<i>J. gregiflorus</i>	a	S	
<i>J. pusillus</i>	o	T	
<i>Lachnagrostis</i> sp.	f	T	
<i>Oreobolus strictus</i>	o	S	
<i>Schoenus pauciflorus</i>	f	S	sedge tussock



**Dicots**

	<i>Callitriche petriei</i>	o	A	
*	<i>C. stagnalis</i>	o	A	starwort
	<i>Crassula ?multicaulis</i>	r	T	
*	<i>Crepis capillaris</i>	o	T	hawksbeard
	<i>Dichondra bmvifolia</i>	r	T	
	<i>Galium</i> sp. aff. <i>perpusillum</i>	o	T	
	<i>Gnaphalium laterale</i>	r	T	
	<i>G. traversii</i>	o	T	
	<i>Gonocarpus micranthus</i>	r	T	
	<i>Gratiola nana</i>	o	T	
	<i>Hydrocotyle novae-zelandiae</i>			
	var. <i>montana</i>	r	T	
	<i>Hypericum japonicum</i>	o	T	
	<i>Hypsela rivalis</i>	f	T	
	<i>Limosella lineata</i>	o	T	
	<i>Myriophyllum propinquum</i>	o	A	milfoil
	<i>Plantago triandra</i>	r	T	starweed
	<i>Ranunculus cheesemanii</i>	o	A	
	<i>R. glabrifolius</i>	f	A	

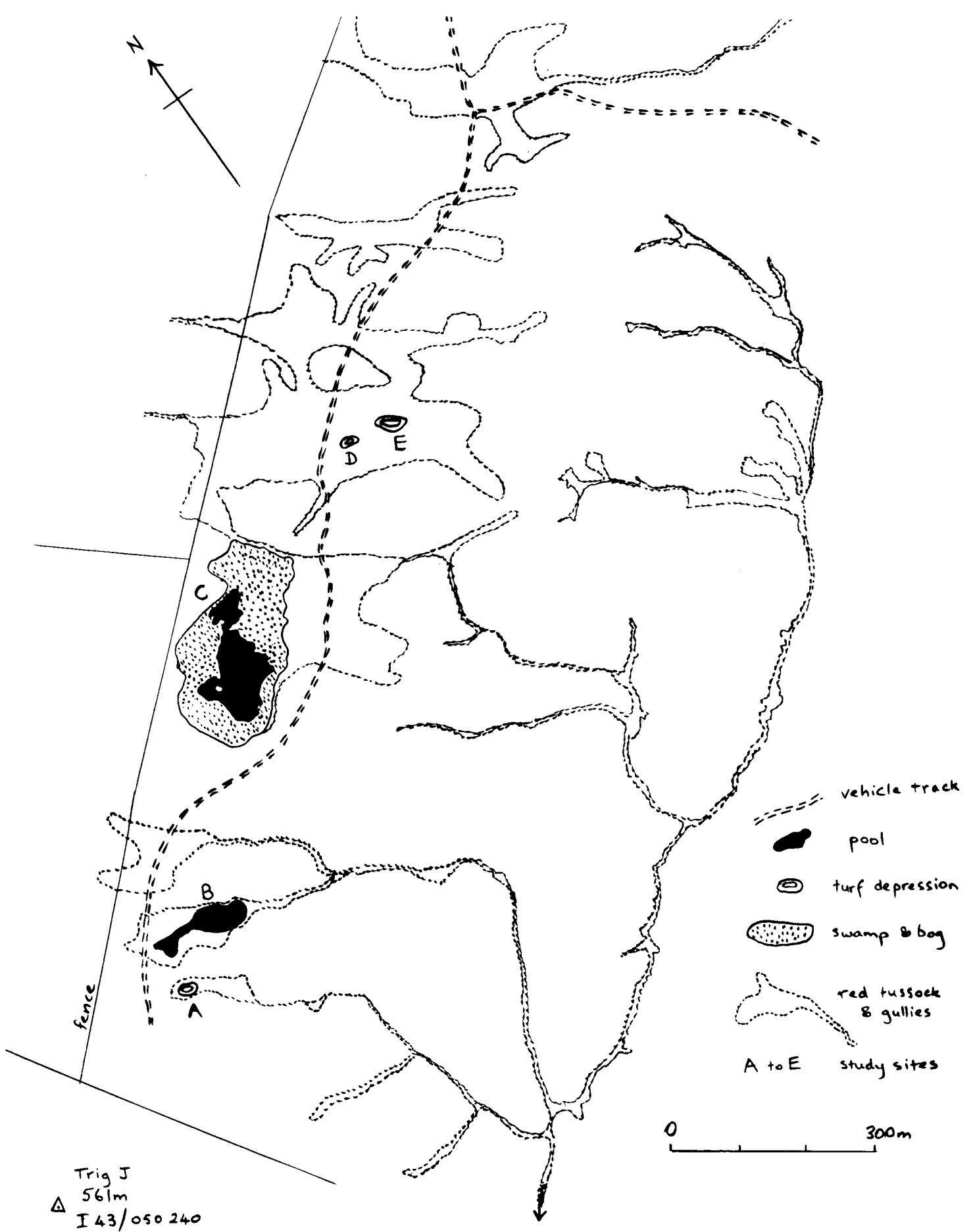
**Fern**

	<i>Ophioglossum coriaceum</i>	r	T	adder's tongue
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**Mosses**

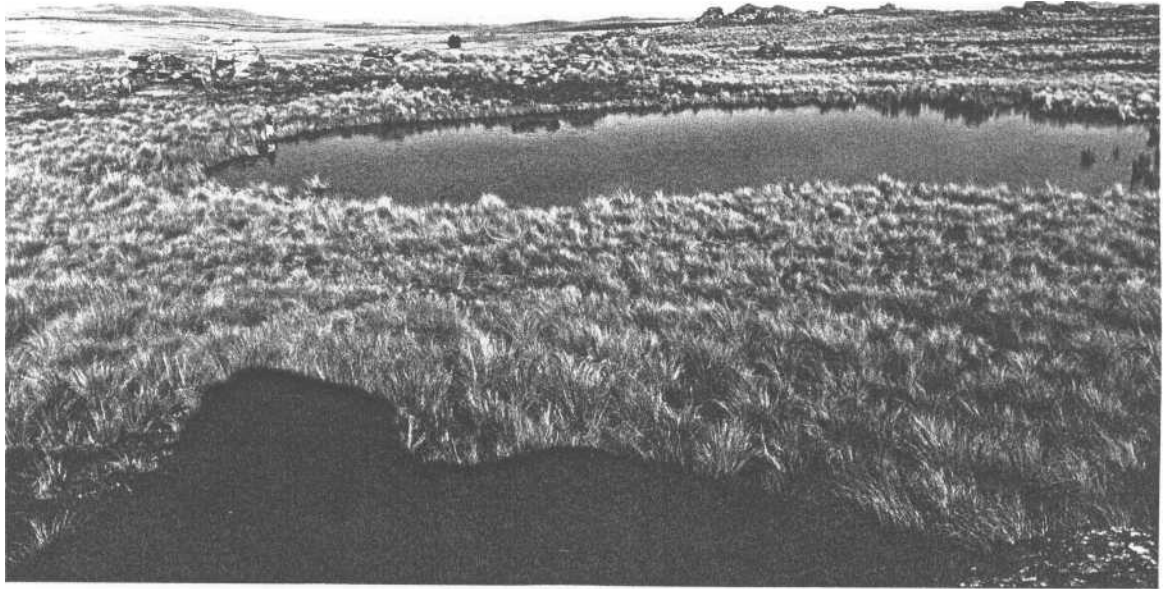
	<i>Drenanocladus</i> sp.	f	T	
	<i>Hypnum cupressiforme</i>	f	S	
	<i>Polytrichum</i> sp.	f	T	
	<i>Sphagnum cristatum</i>	f	S	
	<i>S. falcatulum</i>	f	S	





**Fig. 1**

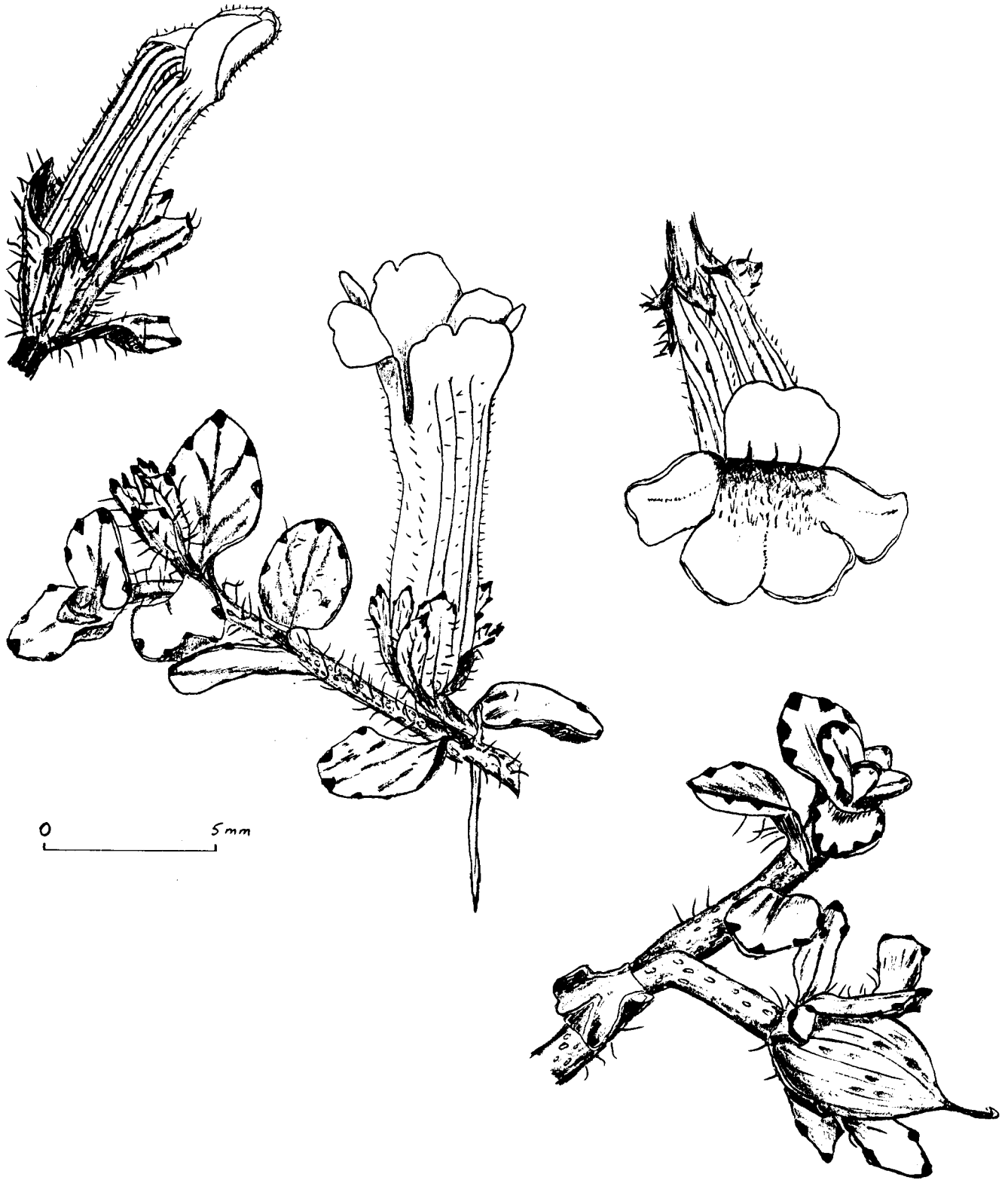
Wetlands on Trig J ridge, west of Emerald Creek, near Nenthorn. Sketch map based on Nespair air photo number 9, 5.2.1988; approx scale 1:7000.



**Fig. 2** Wetland pool among red tussock grassland and tors on Trig J ridge, Emerald Creek, near Nenthorn.



**Fig. 3** Seasonally wet depression with turf vegetation, among red tussock grassland.



**Fig. 4**

*Gratiola nana*, found in turf depressions near Nenthorn. It is a creeping herb of damp places, has white flowers with a yellow throat, and belongs to the foxglove family. *G. nana* is classed in the threat category "rare" in New Zealand.