

RECORDS OF THE FOREST AND SCRUB FLORA OF EASTERN-SOUTHERN ARROWSMITH RANGE VALLEYS

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The Arrowsmith Range is a high massif (rising to 2795 m) in central Canterbury, between the headwaters of the Rakaia, South Ashburton and Rangitata Rivers (Fig. 1). Rivers and large streams draining from it include, on the north the Reischek, part of the upper Rakaia, and the Jagged and Lower Washbourne Streams; on the east the Lake Stream, and Cameron River; on the south-east the South Ashburton River and Paddle Hill Stream; on the south the Potts River; and on the west the Lawrence River. Between each pair of the Cameron/Ashburton and Ashburton/Potts rivers are long ridges, with summits becoming progressively lower towards the east and south. These terminate in scarp-like fronts facing the Lake Heron Basin and the Lake Clearwater Valley, respectively.

Over the years several articles have included information about the flora of parts of the Arrowsmith Range (Speight *et al.*, 1911, Burrows, 1977; Burrows & Russell, 1990; Burrows *et al.*, 1993). The more westerly valleys (Lawrence, Reischek, Upper Rakaia) though disturbed by European burning, are relatively well-wooded. In the Lawrence occur patches of mountain beech (*Nothofagus solandri* var. *cliffortioides*) and mountain totara (*Podocarpus hallii*) - celery pine (*Phyllocladus alpinus*). The Reischek-upper Rakaia has areas of mountain totara-celery pine and rare cedar (*Libocedrus bidwillii*) (cf. Burrows, 1977; Burrows & Russell, 1990). In the Lake Stream both mountain beech and silver beech (*N. menziesii*) occur in several side valleys (Burrows & Russell, 1990). One of these, Bush Stream has, in its deep-cut lower part, extensive and vigorously regenerating stands of mountain and silver beech. Some small stands of mountain totara-celery pine occur in the open basin in its upper valley (Burrows, 1996).

The Potts River valley, narrow and deeply incised, contains small patches of mountain totara and mountain beech. Neither it (visited in 1993), nor Bush Stream (visited in 1991) appear to have been botanized hitherto. The remaining three, eastern valleys, Cameron, South Ashburton and Paddle Hill Stream have been well-studied (Burrows *et al.*, 1993), but some remote corners of them revealed otherwise unrecorded localities for woody plants during visits in the summer of 1996.

The main purpose of this article is to list the forest and scrub flora for Bush Creek in the Lake Stream and the Potts River, on the south side of the range.

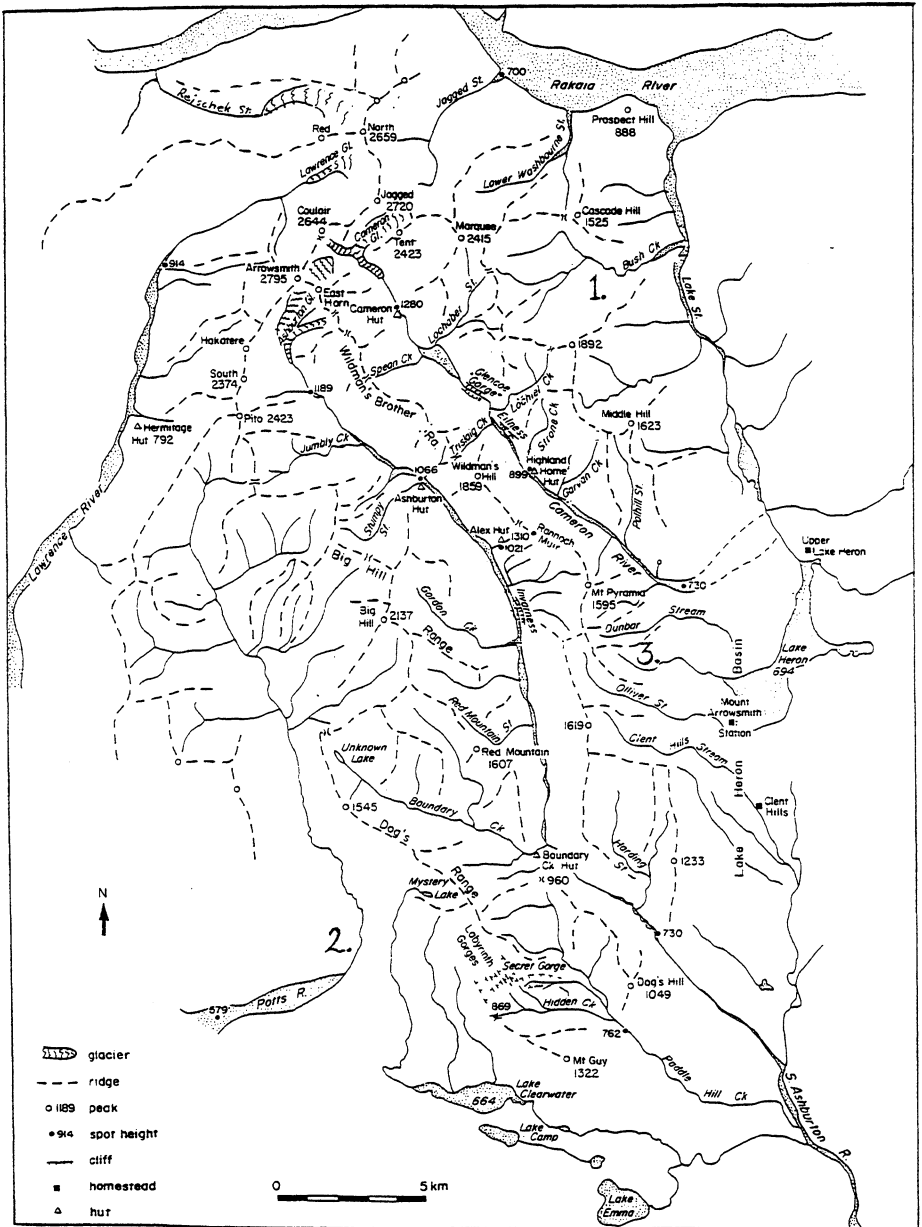


Fig. 1 The Arrowsmith Range. 1. Bush Creek; 2. Potts River; 3. Mountain front facing the Lake Heron Basin.

The list (Table 1) contains all of the woody species, ferns and herbs usually associated with forest and scrub that were seen in these two catchments. The few new records of woody plants from Cameron and South Ashburton Valleys are also listed, as well as forest and scrub species of the slopes and small valleys that face the Lake Heron Basin between the Cameron and South Ashburton Rivers.

Table 1 Forest and Scrub Flora of Some Arrowsmith Range Watersheds*

* see end of table for new records for Cameron and South Ashburton Rivers

	Bush Creek, Lake Stream	Potts River	Lake Heron Basin Slopes
Trees			
<i>Cordyline australis</i>	-	+ (one tree)	-
<i>Griselinia littoralis</i>	+	+	-
<i>Hoheria lyallii</i>	+	+	+
<i>Nothofagus menziesii</i>	+	-	-
<i>N. solandri</i> var. <i>cliffortioides</i>	+	+	-
<i>Pittosporum tenuifolium</i>	+	-	-
<i>Podocarpus hallii</i>	+	+	-
<i>Pseudopanax crassifolius</i>	+	-	-
<i>Sophora microphylla</i>	+	+	-
Shrubs			
<i>Aristotelia fruticosa</i>	+	+	+
<i>Carmichaelia grandiflora</i>	+	+	-
<i>C. cf. robusta</i>	+	+	+
<i>Cassinia fulvida</i>	-	+	+
<i>C. vauvilliersii</i>	+	-	-
<i>Coprosma ciliata</i>	+	-	+
<i>C. intertexta</i>	-	+	+
<i>C. linariifolia</i>	-	+	-
<i>C. microcarpa</i>	+	-	-
<i>C. sp. cf. parviflora</i>	+	-	-
<i>C. propinqua</i>	+	+	+
<i>C. rhamnoides</i>	+	-	-
<i>C. rugosa</i>	+	-	-
<i>Corokia cotoneaster</i>	+	+	+
<i>Cyathodes juniperina</i>	+	-	-
<i>Discaria toumatou</i>	+	+	+
<i>Dracophyllum longifolium</i>	+	-	+
<i>D. uniflorum</i>	+	+	+
<i>Gaultheria antipoda</i>	+	-	-
<i>G. crassa</i>	+	+	+
<i>Hebe odora</i>	+	-	+
<i>H. salicifolia</i>	+	+	-

<i>H. subalpina</i>	+	+	-
<i>H. sp. cf. traversii</i>	+	-	+
<i>H. sp. cf. glaucophylla</i>	-	-	+
<i>Hymenanthera alpina</i>	+	+	+
<i>Kunzea ericoides</i>	-	+	-
<i>Leptospermum scoparium</i>	-	+	-
<i>Myrsine divaricata</i>	-	+	-
<i>Olearia arborescens</i>	+	-	-
<i>O. avicenniifolia</i>	+	+	-
<i>O. nummularifolia</i>	+	-	-
<i>O. virgata</i>	-	-	+
<i>Phyllocladus alpinus</i>	+	-	-
<i>Pittosporum divaricatum</i>	+	-	-
<i>Podocarpus nivalis</i>	+	+	-
<i>Pseudopanax colensoi</i>	+	-	-

Parasite

<i>Korthalsella clavata</i>	-	+	-
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Vines

<i>Clematis marata</i>	-	+	+
<i>Muehlenbeckia australis</i>	-	+	+
<i>M. complexa</i>	+	+	+
<i>M. complexa x ephedroides</i>	-	+	-
<i>Parsonsia capsularis</i>	-	+	+
<i>Rubus schmidelioides</i>	-	+	-
<i>R. squarrosus</i>	+	+	+

Herbs

<i>Aciphylla scott-thompsonii</i>	+	-	+
<i>Astelia nervosa</i>	+	+	+
<i>Chionochloa conspicua</i>	+	-	-
<i>Phormium cookianum</i>	+	-	+
<i>Uncinia uncinata</i>	+	-	-

Ferns

<i>Asplenium flabellifolium</i>	+	+	+
<i>A. richardii</i>	+	+	-
<i>A. trichomanoides</i>	+	+	-
<i>Blechnum chambersii</i>	-	+	-
<i>B. procerum</i>	+	+	+
<i>Hymenophyllum multifidum</i>	+	+	-
<i>Hypolepis millefolium</i>	+	-	+
<i>Polystichum richardii</i>	+	-	-
<i>P. vestitum</i>	+	+	+
<i>Pteridium esculentum</i>	-	+	+

* New records from the upper South Ashburton gorge include *Cordyline australis* (c. 5 trees), *Sophora microphylla* (c. 3 trees), *Phormium cookianum*. *Korthalsella clavata* is present in upper South Ashburton Valley and Paddle Hill Stream - previously recorded as *K. salicornioides*, in error. *Myrsine divaricata* (one plant) was seen in one location in the lower Cameron Valley.

By contrast with the other valleys of the Arrowsmith Range the Cameron, South Ashburton and Paddle Hill watersheds are singularly lacking in trees. *Hoheria lyallii* is the only relatively common species (cf. Burrows *et al.*, 1993). It is scattered in favoured places among a vast sea of tall tussock, mainly *Chionochloa rigida*, cotton plant (*Celmisia spectabilis* var. *magnifica*, and some scrub, especially *Discaria toumatou*. Until this summer no tree species other than *Hoheria* were known from the South Ashburton, but a visit to its gorge turned up a locality for several kowhais (*Sophora microphylla*) and cabbage trees (*Cordyline australis*), as well as extensive stands of the shrub kanuka (*Kunzea ericoides*). Kowhai is the only other tree than *Hoheria* known from the Cameron. Paddle Hill Stream has some nooks and crannies with a few more tree species, chiefly in a complex dry gorge system, The Labyrinth and Secret Gorges. Present are one small patch of mountain beech, a few dozen mountain totara, a few kohuhu (*Pittosporum tenuifolium*) and broadleaf (*Griselinia littoralis*). Kanuka is plentiful in this area.

Some shrubs and vines, usually more abundant in the Lawrence and Reischek-upper Rakaia Valleys, are sparsely represented in the drier Cameron, South Ashburton and Paddle Hill Stream catchments. A very few plants of *Coprosma linaariifolia*, *Gaultheria antipoda*, *Halocarpus bidwillii* (one plant), manuka (*Leptospermum scoparium*), and *Myrsine divaricata* occur in Paddle Hill stream. A few *Carmichaelia grandiflora*, *Coprosma rugosa*, manuka, *Olearia arborescens*, *Pseudopanax colensoi*, *Myrsine divaricata* (one plant), and rather more *Muehlenbeckia australis* occur in the Cameron. In all these valleys celery pine is restricted to a few small patches and scattered individuals.

The main causes of differences in the present vegetation of the Arrowsmith Range Valleys seem to be that: 1. The western valleys, where most forest and sub-alpine scrub survive, are relatively wet (precipitation 180 - 250 cm per annum) while the more easterly valleys (Cameron, South Ashburton, Paddle Hill Stream) are drier (precipitation 100 - 130 cm); 2. The Potts River and the forested Lake Stream tributaries are both low (650 - 900 m) and narrow. They escape the drying, evaporative effects of the frequent north-west winds, while the higher (750 - 1200 m) and more open Cameron, South Ashburton and Paddle Hill Stream valleys are exposed to the full force of the wind; 3. Fire in prehistoric times has had less devastating impacts on the woody vegetation in the western, Potts and Lake Stream tributaries than has occurred in the open eastern valleys.

Dated pollen analyses show that the almost treeless Cameron, South Ashburton and Paddle Hill Stream valleys were once well wooded. They experienced major fires in the last few thousand years (especially in the last 900 years). Their mountain totara-celery pine woodlands were removed in an astonishingly comprehensive manner (Burrows & Russell, 1990; Burrows *et al.*, 1993; Burrows, 1996) and they are now dominated by snow tussock grassland. The trees that survive in them, including *Hoheria lyallii*, occur in sites such as rocky gorges, and boulder scree, that would have afforded some protection from fires to the progenitors of the present tree populations.

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