

The Middle Clarence Valley Revisited

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In an earlier *Wellington Botanical Society Bulletin*, McQueen (1954) described the vegetation of the lower slopes in the middle Clarence Valley as "low tussock grassland more or less depleted", and "In the limestone area, tussock is continuous along the valley except for occasional patches of scree, colonised by blue borage (*Echium vulgare*)". Twenty-five years later, increased grazing and associated farming activity has greatly reduced the extent of tussock grassland and created a sward of shorter or more ephemeral grasses and herbs. Here I briefly describe this vegetation and comment on the tall-tussock grasslands and other, largely herbaceous, communities. A list of the adventive plants has been deposited in the Library of Botany Division, DSIR (Private Bag, Christchurch) and is available from there or from me. Lists of the native plants have been compiled by A. P. Druce.

Geoff Park and I visited the valley of the middle Clarence for several days during 1976, 1977. The main areas examined were valleys and spurs adjacent to the road in the valley floor. In addition, we walked over the Chalk Range and Mead Hill (Fig. 1) up on to the top of the Haycock Range, and from Bluff Station to Lake MacRae via Spaniard Flat and St Bernard Spur, and back to Bluff Station via Quail Flat (Figs. 2, 3).

McQueen (1954) described the complex geology and climate of this area; for the vegetation he said, "the general pattern of vegetation is the result of two main influences (apart from altitude): the decreasing rainfall up the valley; and the influence of calcareous rocks in extending tussock grassland into a forest climate". Superimposed are the effects of European fires, excessive grazing by sheep and rabbits, and currently an intensification of use by cattle, together with oversowing and top dressing in the lower reaches of the valley — similar to the pattern on Molesworth Station further to the south (Moore 1976).

Tall-tussock grasslands

Tall-tussock grasslands dominated by *Chionochloa flavescens* — the eastern South Island form — occur down to 800 m on the Haycock Range and the St Bernard Spur, leading ridges to tall-tussock grasslands on the Seaward and Inland Kaikoura ranges respectively.

Tall tussocks are most dense on south-facing slopes, together with *Aciphylla aurea*, *A. squarrosa*, *Anisotome aromatica*, *Celmisia monroi*, *C. gracilentia*, *Gingidium montanum*, *Hebe pinguiifolia*, *H. decumbens*, king devil (*Hieracium praealtum*), wall lettuce (*Mycelis muralis*), blue tussock (*Poa colensoi*), silver tussock (*P. caespitosa*) and *Ranunculus insignis*. On drier north-



Fig. 1. Mead hill from the north. Kanuka shrublands have been cleared, giving way to grasslands of browntop and sweet vernal.

facing slopes, *Cyathodes colensoi*, *Festuca novae-zelandiae*, *Muehlenbeckia ephedroides*, *Pimelea sericeo-villosa*, and *Raoulia subsericea* increase in importance. On shady faces especially, between c. 1200-1400 m, and on rock outcrops and bluffs throughout, tall tussocks grow with the shrubs. *Cassinia vauvilliersii*, *Cyathodes colensoi*, *Discaria toumatou*, *Hymenanthera alpina*, *Olearia nummularifolia* var. *cymbifolia*, *Pachystegia insignis*, and *Senecio monroi*. On drier sites in the Haycock Range *Corokia cotoneaster* and *Sophora prostrata* grow with tall tussocks, and mountain flax (*Phormium cookianum*) is the co-dominant on shady faces.

Grassland and herbaceous communities on acid parent materials

Silver tussock and hard tussock (*Festuca novae-zelandiae*) were extensive in the 1950s (McQueen 1954) but today are relatively restricted in extent. The best stand of hard tussock I encountered is on St Bernard Spur between 800-1000 m where it forms an estimated 50% cover, interspersed with sweet vernal (*Anthoxanthum odoratum*), *Craspedia lanata*, *Cyathodes colensoi*, catsear (*Hypochoeris radicata*), *Pimelea sericeo-villosa* and *Raoulia subsericea*. A small patch of *Swainsona novae-zelandiae* in flower was seen here too. A less extensive stand of hard tussock with more adventive herbs and grasses covers the slopes at the northern end of Lake MacRae. Dense stands of silver tussock grow near Bluff Station, but the most extensive are still on limestone soils on the Chalk Range and near Whernside. Shady faces of the Haycock Range below 1200 m that have been retired from grazing are developing a cover of tall fescue (*Festuca arundinacea*).

Other widespread grassland species are *Bromus mollis*, mouse-ear chickweed (*Cerastium holosteoides*), catsear, mouse-ear hawkweed (*Hieracium pilosella*), king devil, *Linum catharticum*, *Poa pratensis*, suckling clover (*Trifolium dubium*) and white clover (*Trifolium repens*). Dry grasslands on north-facing slopes have greater proportions of silver hair grass (*Aira caryophylla*), hawksbeard (*Crepis capillaris*), viper's bugloss, sheep's sorrel (*Rumex acetosella*) and haresfoot trefoil (*Trifolium arvense*).

Oversowing and top dressing have encouraged red clover (*Trifolium pratense*), white clover, and timothy (*Phleum pratense*) initially, while cocksfoot (*Dactylis glomerata*) and perennial ryegrass (*Lolium perenne*) appear to be coming to the fore as time passes. The most extensive areas of "unimproved grassland" cover the rolling to steep lands between Muzzle Stream and Bluff Station. These are dominated by two forms of blue wheat grass (*Agropyron scabrum*), the danthonias (*Rytidosperma clavatum*, *R. racemosum*, *R. pilosum*, *R. merum*), suckling clover, hawksbeard, and viper's bugloss, the last species increasing in importance towards colluvial sites.

Elsewhere on acid parent materials the grasslands are dis-

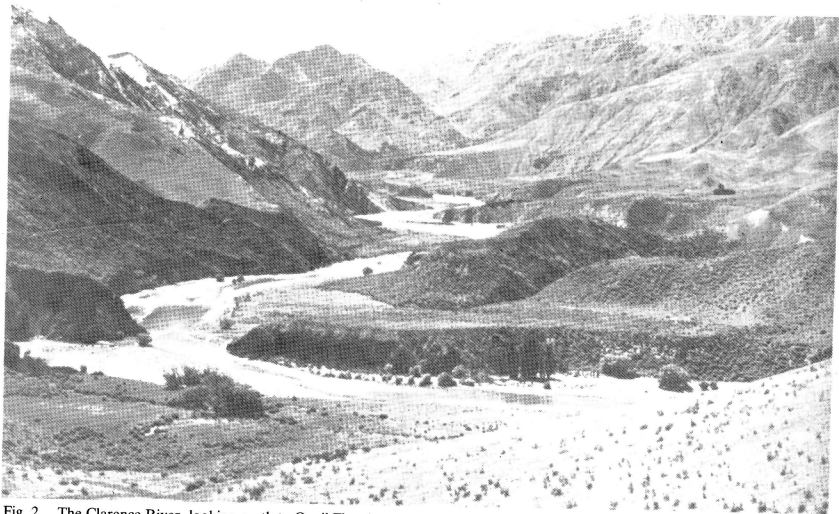


Fig. 2. The Clarence River, looking north to Quail Flat. Sweet brier now covers extensive areas of degraded grasslands.

persed among shrublands, scrub, and severely depleted lands. Many would have developed relatively recently from bare ground or from weedy successional communities. The dominant grasses are cocksfoot and sweet vernal, with some browntop (*Agrostis tenuis*) and Yorkshire fog (*Holcus lanatus*). Cocksfoot is particularly abundant in moist fertile sites. Sweet vernal is a major grass over the poorer soils throughout whereas browntop forms an extensive cover mainly in areas with more than c. 800 mm precipitation. Following scrub burning and in the absence of oversowing, browntop and sweet vernal, together with oxeye daisy (*Chrysanthemum leucanthemum*) are the dominant species.

Grassland and herbaceous communities on calcic parent materials

Compared with the grasslands on acid parent materials, those on calcic parent materials are restricted in area. They are more readily described in relation to contiguous gradients of topography, moisture, and soil fertility.

Stable lower slopes that have not been topdressed recently are dominated by sweet vernal, cocksfoot, and suckling clover, with viper's bugloss, *Bromus sterilis* and *Vulpia myuros* increasing in importance on drier sites. Parsley piert (*Aphanes arvensis*), *Bromus mollis*, oxeye daisy, *Poa pratensis*, tall oat grass (*Arrhenatherum elatius*), and yarrow (*Achillea millefolium*) occur throughout. Oversown and topdressed areas support a lush growth of red clover, white clover and cocksfoot, with sweet vernal, ryegrass, vetches (*Vicia hirsuta* and *V. sativa*) and cleavers (*Galium aparine*) as scattered associates.

At approximately 660-670 m slopes steepen to produce coarse textured soils, especially where talus material has been derived from upslope. Cocksfoot and tall oat grass form a dense cover even where there has been little oversowing, while wall lettuce and dandelion (*Taraxacum officinale*) are common, sometimes with the native *Anisotome aromatica* and silver tussock.

On drier ridges and crests, especially towards the top of the limestone mountains, viper's bugloss, suckling clover and black medic (*Medicago lupulina*) are the widespread and important species, together with *Rytidosperma setifolium* and silver tussock in the less harsh sites. Where grazing pressure is low, *Bromus mollis*, *B. sterilis* and *Poa pratensis* are important. Increased grazing produces a tight sward of mainly herbaceous species: sandwort (*Arenaria serpyllifolia*), hawksbeard, mouse-ear chickweed, *Geranium sessiliflorum* and *Myosotis discolor*. Suckling clover may be replaced by clustered clover (*T. glomeratum*).

Severely depleted vegetation

Extensive areas of the Middle Clarence Valley are sparsely vegetated, especially in the area known as the Desert on the west bank, and on the front faces of spurs and ridges south of Jam Stream on the east bank.



Fig. 3. North of Fig. 2, the Clarence opens to a broad river bed with very sparse vegetation.

Apart from shrubs and remnant scab weeds (*Raoulia australis* and *R. hookeri*), the most important herbaceous species of the Desert are haresfoot trefoil, *Rytidosperma racemosum*, *R. clavatum*, sheep's sorrel, and black medic. In slightly more favourable sites there are patches of browntop, cocksfoot, goose grass and sweet vernal. Viper's bugloss is largely restricted to disturbed sites. Silver tussock and Californian thistle (*Cirsium arvense*) may be important. Plume grass (*Dichelachne crinita*), *Lachnagrostis richardii*, *Poa maniototo*, *P. lindsayi*, woolly mullein (*Verbascum thapsus*) and moth mullein (*V. virgatum*) are scattered about.

A similar assemblage of herbaceous species accompanies the shrublands on the lower slopes of the Haycock Range and the eastern bank, but in addition (and this applies to similar areas throughout where rabbits are still abundant) scarlet pimpernel (*Anagallis arvensis*) and Californian stinkweed (*Navarretia squarrosa*) are locally important. *Cyathodes fraseri*, hawksbeard, scab weeds and *Scleranthus uniflorus* are scattered over the extensive bare ground areas of the ridges. Woolly mullein covers extensive hard grazed areas of sunny slopes near Quail Flat.

Riverbed and miscellaneous communities

Riverbeds on the western bank of the Clarence have coarse bouldery or stony substrates and there are limited areas of stabilised terraces.

Black medic is the most important legume colonising these newly formed surfaces, giving way to haresfoot trefoil as precipitation decreases up the valley and on the drier and less fertile sites. Similarly, *Bromus sterilis* gives the riverbeds a purple hue up to about the Dart River, whereas *B. tectorum* is more important in side streams further up the Clarence. Viper's bugloss is abundant in riverbeds throughout, while woolly mullein is important locally, as for example, in the Dart. Silver hair grass, sandwort, *Rytidosperma clavatum*, *R. racemosum* and *Vulpia myuros* can all be important locally, while *Dichelachne crinita*, *Epilobium hectori*, *E. rostratum*, *Erigeron canadensis*, *Hieracium* spp., St John's wort (*Hypericum perforatum*) and scab weeds are scattered throughout. One patch of purple fuzzweed (*Vittadinia triloba*) was found on a low terrace of the Dee Stream, probably the most inland colony in Marlborough and one that will be interesting to watch. Tall fescue and timothy may form dense stands adjacent to ponded side streams, especially where these are not grazed. Timothy is especially abundant in the Elliot Stream valley where the growth of brier has denied access to traditional grazing lands.

In contrast to the tributaries here are some large areas of relatively stable flat land in the Clarence riverbed. On the west bank near Quail Flat an extensive area of sandy soil houses a large rabbit colony and the vegetation resembles that which once

covered much of Marlborough: scab weed and little else but scattered *Epilobium hectori*. Where grazing pressure declines, viper's bugloss, Canadian fleabane (*Erigeron canadensis*) and haresfoot trefoil increase in importance, sometimes with silver hair grass and *Bromus tectorum*. Black medic may be important, particularly in damper substrates.

Wetland vegetation is uncommon in the Middle Clarence Valley, the largest area seen being at the head of Elliot Stream near Lake MacRae. Dominant species are *Carex geminata*, cocksfoot, *Juncus articulatus*, *J. effusus*, *Myosotis caespitosa*, *Ranunculus repens*, *Schoenus pauciflorus*, timothy and Yorkshire fog. Small bodies of standing water along both banks of the Clarence have *Azolla rubra*, *Myriophyllum elatinoides* and *Potamogeton cheesemanii*.

In conclusion, the flora and vegetation have changed noticeably since the 1950s, with little evidence that an overall stability has been reached yet.

REFERENCES

- MC QUEEN, D. R. 1954: Vegetation of the Middle Clarence Valley. *Bulletin of the Wellington Botanical Society* 27: 1-3.
MOORE, L. B. 1976: The Changing Vegetation of Molesworth Station, New Zealand, 1944 to 1971. *New Zealand Department of Scientific and Industrial Research Bulletin* 277.

Book Review

Botany of the Manawatu District, New Zealand, by A. E. Esler. DSIR Information Series No. 127, Government Printer, Wellington, 1978. Price \$12.50.

Many readers who knew that Alan Esler had been working for 12 years on the botany of the Manawatu District would have been pleased to find this publication in various bookshops after numerous delays.

Although the book is only 15 x 21½ cm and thus nearly pocket size, it contains a wealth of information which will fascinate and assist not only botanists but also "environmentalists".

The first half of the book is mainly a description of the past and present vegetation. After the 'Introduction', Esler restricts the book to the Manawatu and Kairanga Counties, and the city of Palmerston North, in 'The Manawatu and its Environment'. In the 'History of the District', readers will note that the Manawatu was covered with high-density podocarp forests, comparable to stands in Whirinaki State Forest, until the 1870's when sawmills were established. By 1900 very little remained: what was beyond the reach of sawmills, was destroyed in flames. Most of the land had been converted to pasture to support the thriving dairying and fat lamb industry for which the Manawatu is well known. The two