

THE VEGETATION AND FLORA OF THE WAITAKI RIVERBED BELOW

THE WAITAKI DAM

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Introduction.

With the possibility of the lower Waitaki River being developed for hydro-electricity, I spent several days in the early summer of 1975 investigating the vegetation. This proved to be more diverse and interesting than might be imagined from a passing car, so here I report on these "gorse covered wastelands".

The riverbed environment.

The climate of the lower Waitaki valley ranges from semi-arid inland, to very dry near the coast, with hot summers and cold winters.

For a short distance below the Waitaki dam the river flows between high rocky banks with only small areas of shingle near water level. Just above Kurow, however, the river broadens out along anastomosing channels between numerous islands. In size and age they range from small surfaces formed during the most recent freshes, to extensive, semi-permanent islands. On islands and adjacent low terraces, the physical nature of the substrate and depth to "permanent" water vary enormously and independently, to produce a wide range of sites for plant colonisation, e.g. dry boulders and gravels, or at the other extreme, wet silts and sands with every intermediate combination.

Most surfaces in the main river channel immediately adjacent to running water are very unstable, but where quiet backwaters flow, the banks are frequently sufficiently stable to allow the establishment of semi-aquatic and aquatic plants.

Native vegetation.

Very little remains of the native vegetation. The riverbed has been burnt and grazed intensively for many years and following the reduction of rabbits in the early 1950's, gorse (Ulex europaeus), broom (Cytisus scoparius), crack willows (Salix fragilis), and tree lupins (Lupinus arboreus) became widely established, shading out most of the remaining native remnants. Of the taller native vegetation resembling the original communities, only very small areas of flax (Phormium tenax), raupo (Typha orientalis), toetoe (Cortaderia richardii) and niggerheads (Carex secta), still remain, scattered amongst the quiet backwaters along both banks. The largest area of such vegetation in the riverbed proper grows on the right bank near the mouth, together with jointed rush (Leptocarpus similis). There is quite a large area of pure flax, however, on a terrace some distance from the river, at the end of Gibsons Rd (right bank).

Of the native shrubs, apart from matagouri (Discaria toumatou), only Coprosma propinqua is at all common - particularly on the left bank upstream from Black Point. C. acerosa grows on the rocky banks below the Waitaki dam and occasional C. crassifolia and C. rugosa were seen on the banks near Hakataramea. Other native shrubs on the rocky banks are Hebe stricta, H. pimeleoides, Helichrysum selago, Olearia virgata, Cassinia fulvida, Coriaria sarmentosa, Pimelea sp., and the native brooms (Carmichaelia curta and C. ramosa).

The rocky banks below the dam also support many native species not found elsewhere in the riverbed, although they are probably quite common on adjacent hill country; Asplenium flaccidum, Cheilanthes sieberi, Colobanthus acicularis, Corybas macranthus, Schoenus pauciflorus, Ranunculus lappaceus, and Oreomyrrhis rigida.

The native grasses Lachnagrostis filiformis, Poa colensoi, Festuca novae-zelandiae, and Rytidosperma gracilis, are also more common in the area immediately below

the dam than elsewhere.

Several other native species so far appear to be very local e.g. Cotula maniototo near the mouth of the Hakataramea river; a native bidi bidi Acaena buchananii var picta in open riverbed in the middle reaches; Hypericum japonicum and poroporo (Solanum laciniatum) near the mouth; Ranunculus glabrifolius in a shallow water course near Black Point; and Parahebe canescens growing ephemerally along the water's edge near Black Point. Other native species e.g. Raoulia tenuicaulis, R. australis, Epilobium spp., Juncus spp., and Carex spp. are widespread.

The vegetation patterns.

Gorse and broom occupy vast areas of stable riverbed and lower terraces, upstream of State Highway I bridge. Tree lupins occupy similar sites downstream. Gorse appears to dominate wherever grazing has eliminated the broom seedlings. Gorse, and more especially broom seedlings, are virtually ubiquitous on young surfaces in the central riverbed - including the spaces between tern and gull nests on even the most recent islands. Few species grow beneath these shrubs where they are dense, but where the canopy is open or the shrubs dispersed, the ground layer is composed of mainly sweet vernal (Anthoxanthum odoratum), brome grass (Bromus spp.), chewings fescue (Festuca rubra), and vulpia hair grass (Vulpia bromoides and V. myuros). In heavily grazed and very dry conditions, Trifolium spp and Aira caryophyllea become important and in extreme sites, the gorse bushes may be surrounded only by stone crop (Sedum acre) and scabweed (Raoulia australis). Many stands of gorse and broom have recently been burnt to facilitate access for stock and to fishing holes. Species that frequently dominate the ground layer here are woolly mullein (Verbascum thapsus), dandelion (Taraxacum officinale), sheep's sorrel (Rumex acetosella), catsear (Hypochoeris radicata), hawkbit (Leontodon taraxacoides), and occasionally hemlock (Conium

maculatum), or rushes and sedges in damp places, together with the inevitable broom and gorse seedlings.

Willow trees and shrubs grow extensively along both banks and are scattered over much of the riverbed itself. Large trees have frequently developed through established patches of gorse, broom, and lupin, shading them out in the process. In addition, sprouting logs, branches, and small pieces of stem are ubiquitous on recent surfaces in the central riverbed. Similar assemblages of ground species are found beneath willow forests, where there is sufficient light, to those mentioned for leguminous shrubs. Wetland species are important in the ground layer where willows grow in damp situations, or adjacent to running or still water.

The youngest sites in dry situations are colonised most commonly by Raoulia tenuicaulis, Epilobium microphyllum, Plantago lanceolata, sheep's sorrel, Californian poppy (Eschscholtzia californica), Muehlenbeckia axillaris, Leontodon taraxacoides, and oxeye daisy (Chrysanthemum leucanthemum), although not necessarily in that order of importance. Sweet clover (Melilotus alba) covers many young surfaces beyond the reach of stock or rabbits, giving a green hue to islands towards the centre of the river. St Johns wort (Hypericum perforatum) and fireweed (Senecio quadridentata) are important on some islands in the upper reaches, while Senecio sylvaticus tends to be more important towards the mouth. The herbaceous vegetation of the lowermost dry terraces or stabilised islands consists largely of those species mentioned under the leguminous shrubs.

Youthful stony sites with the water table near the surface are dominated by water speedwell (Veronica anagallis-aquatica), monkey musk (Mimulus guttatus), cresses (Cardamine spp.), winter cresses (Barbarea spp.), water forget-me-not (Myosotis caespitosa), cudweeds (Gnaphalium spp.), selfheal (Prunella vulgaris), tarweed (Parentucellia viscosa), and Carex buchananii.

Damp sandy sites are often occupied by Carex coriacea,

C. sinclairii, jointed rush (Juncus articulatus), J. conglomeratus, J. effusus and J. tenuis, together with many of the above species.

Margins of slow flowing back-waters and ponds have buttercups (Ranunculus repens and R. acris), monkey musk, water cress (Nasturtium officinale), and water speedwell. Frequently inundated areas have Eleocharis acuta, Montia fontana, Potamogeton cheesemanii, Glyceria fluitans, and Myriophyllum elatinoides, the latter three being the most important plants of permanent standing water.

Woody Plants.

Carmichaelia curta	occasional on cliffs
C. ramosa	occ. plants, terraces on N. bank
Cassinia fulvida	occ. plants terraces on N. bank
Coprosma acerosa	frequent on cliffs near dam
C. crassifolia	occasional near stone wall
C. propinqua	occasional throughout
C. rugosa	occasional near Kurow bridge
Coriaria sarmentosa	occasional throughout
Cytisus scoparius	abundant throughout
Hebe pimeleoides	occasional on banks near dam
H. stricta var.	occasional throughout
Helichrysum selago	occasional on cliffs near dam
Hymenanchera alpina	occasional on cliffs near dam
Lupinus arboreus	abundant, coast to S.H.1. bridge
Muehlenbeckia australis	occasional throughout
Olearia virgata var.	occasional shrubs near dam
Pinus radiata	occasional plants in river bed
Populus alba	occasional near side streams
Rosa rubiginosa	frequent in dry sites throughout
Rubus schmidelioides	occasional throughout
Sambucus nigra	occasional throughout
Salix babylonica	occasional throughout
S. fragilis	abundant throughout
Solanum laciniatum	occasional near mouth
S.dulcamara	occasional near mouth

<i>Sorbus aucuparia</i>	one plant seen on island
<i>Ulex europaeus</i>	abundant throughout
<i>Vittadinia australis</i>	occasional on cliffs near dam

Rushes, sedges and other monocotyledons.

<i>Carex albula</i>	frequent on terraces near the dam
<i>C. buchananii</i>	frequent near the water
<i>C. coriacea</i>	often abundant
<i>C. decurtata</i>	occasional on swampy margins
<i>C. flagellifera</i>	occasional throughout
<i>C. flaviformis</i>	occasional throughout
<i>C. sinclairii</i>	frequent in wet places throughout
<i>Corybas macranthus</i>	in wet seepage near dam
<i>Eleocharis acuta</i>	frequent adjacent to back waters
<i>Juncus articulatus</i>	frequent in wet places throughout
<i>J. conglomeratus</i>	frequent in wet places throughout
<i>J. effusus</i>	frequent in wet places throughout
<i>J. sarophorus</i>	occasional clumps throughout
<i>J. tenuis</i>	frequent in wet places throughout
<i>Leptocarpus similis</i>	frequent near the mouth
<i>Luzula banksiana</i>	occasional in upper reaches
<i>Luzula rufa</i> var. <i>albicomans</i>	occasional on dry situations.
<i>Phormium tenax</i>	occasional on terraces
<i>Prasophyllum colensoi</i>	occasional in grasslands
<i>Schoenus pauciflorus</i>	in seepages near the dam
<i>Scirpus basilaris</i>	frequent throughout
<i>S. nodosus</i>	frequent near the mouth
<i>S. setaceus</i>	frequent in wet places throughout
<i>Typha orientalis</i>	occasional big colonies

Grasses.

<i>Agrostis gigantea</i>	frequent in wet places throughout
<i>A. stolonifera</i>	freq., wet places, particularly towards the mouth
<i>A. tenuis</i>	freq. on drier margins and islands
<i>Anthoxanthum odoratum</i>	freq. on drier margins and islands

<i>Bromus diandrus</i>	abundant, especially near mouth
<i>B. mollis</i>	abundant on dry sites, particularly towards the mouth
<i>B. tectorum</i>	abundant, grasslands and open places
<i>B. unioloides</i>	more frequent in lower reaches
<i>Cortaderia richardii</i>	occasional near backwaters
<i>Cyanosurus cristatus</i>	occasional near the mouth
<i>Festuca arundinacea</i>	frequent in wet places throughout
<i>F. novae-zelandiae</i>	occasional on islands
<i>F. rubra</i>	frequent in rough "pasture"
<i>F. tenuifolia</i>	occasional above Kurow
<i>Glyceria fluitans</i>	abundant in side creeks
<i>Holcus lanatus</i>	frequent in damp places
<i>Hordeum murinum</i>	frequent on dry sites
<i>Lachnagrostis filiformis</i>	occasional on drier sites
<i>Rytidosperma gracile</i>	occ. on dry cliffs near the dam
<i>Phleum pratense</i>	occasional along stream margins
<i>Poa annua</i>	locally frequent
<i>P. caespitosa</i>	occasional patches throughout
<i>P. colensoi</i>	occasional on rocks near dam
<i>P. lindsayii</i>	occasional in shingle riverbeds
<i>P. pratense</i>	occasional throughout
<i>Stipa variabilis</i>	frequent on riverbed above Kurow
<i>Vulpia bromoides</i>	abundant throughout in dry sites
<i>V. myuros</i>	abundant throughout in dry sites
Herbs.	
<i>Acaena anserinifolia</i>	occasional in damp places
<i>A. buchananii</i>	occasional in open grasslands
<i>A. buchananii</i> var. <i>picta</i>	occasional in open grasslands
<i>A. caesiiglauca</i>	occasional near dam
<i>A. inermis</i>	frequent throughout
<i>A. novae-zelandiae</i>	occasional throughout
<i>Acaena</i> sp.	occasional in grassland
<i>Achillea millefolium</i>	occasional throughout
<i>Allyssum alyssoides</i>	occ. near Hakataramea river

<i>Anagallis arvensis</i>	occasional throughout
<i>Anthriscus caucalis</i>	occasional near mouth
<i>Arenaria serpyllifolia</i>	freq. throughout in dry places
<i>Artemisia absinthium</i>	occasional near Kurow-Duntroon
<i>Barbarea verna</i>	abundant in open riverbed
<i>Bellis perennis</i>	occasional in moist grasslands
<i>Brassica</i> sp.	seedlings on island
<i>Capsella bursa-pastoris</i>	frequent on some terraces
<i>Calystegia tugriorum</i>	occ. on shrubs above Kurow
<i>Cardamine hirsuta</i>	occasional in damp places
<i>Celmisia gracilentia</i>	occasional on cliffs near dam
<i>Centaureum erythraea</i>	occasional throughout
<i>Centranthus ruber</i>	occasional on open islands
<i>Cerastium arvense</i>	locally frequent
<i>C. glomeratum</i>	locally frequent
<i>C. holosteiodes</i>	frequent throughout
<i>Chrysanthemum leucanthemum</i>	abundant throughout
<i>Colobanthus acicularis</i>	occasional plants near dam
<i>Conium maculatum</i>	frequent throughout
<i>Cotula maniototo</i>	occ. near Hakataramea river
<i>Craspedia uniflora</i>	occasional near dam
<i>Crepis taraxacifolia</i>	occ. especially near mouth
<i>Dianthus deltoides</i>	occ. near Hakataramea mouth
<i>Echium vulgare</i>	frequent throughout
<i>Epilobium ciliatum</i>	abundant throughout in open places
<i>E. billardierianum</i> subsp. <i>cinereum</i>	frequent, open places throughout
<i>E. brunnescens</i>	occasional in open riverbed
<i>E. insulare</i>	frequent in wet places throughout
<i>E. komarovianum</i>	frequent in wet places throughout
<i>E. microphyllum</i>	abundant throughout on open areas
<i>E. rostratum</i>	occasional in gravel riverbed
<i>Erigeron canadensis</i>	freq. in open places throughout
<i>E. floribundus</i>	occ. in dry grasslands throughout
<i>Erodium cicutarium</i>	frequent in dry places throughout
<i>Erophila verna</i>	frequent in dry places throughout

<i>Euphorbia peplus</i>	occasional throughout
<i>Eschscholtzia californica</i>	abundant in dry open riverbed
<i>Filago minima</i>	frequent in dry open riverbed
<i>Galium aparine</i>	occ. in open places throughout
<i>G. parisiense</i>	occasional near river mouth
<i>Geranium molle</i>	frequent in damp grasslands
<i>G. sessiliflorum</i>	occasional in dry grasslands
<i>Glossostigma elatinoides</i>	frequent near water margins
<i>Gnaphalium collinum</i>	occasional throughout
<i>G. involucratum</i>	freq. swampy margins throughout
<i>G. sp. aff. traversii</i>	occ. in open areas throughout
<i>Gypsophila tubulosa</i>	frequent in dry grasslands
<i>Hieracium pilosella</i>	occasional near dam
<i>H. praealtum</i>	occasional near dam
<i>Haloragis erecta</i>	occasional throughout on islands
<i>Hydrocotyle microphylla</i>	frequent in wet places throughout
<i>H. novae-zelandiae</i>	frequent in wet places throughout
<i>H. tripartita</i>	frequent in wet places throughout
<i>Hypericum japonicum</i>	occasional near river mouth
<i>H. perforatum</i>	frequent on islands
<i>Hypochaeris glabra</i>	occasional in open places
<i>H. radicata</i>	frequent in open areas throughout
<i>Leontodon taraxacoides</i>	frequent in open areas throughout
<i>Limosella lineata</i>	occ. near mough of Hakataramea
<i>Linaria purpurea</i>	occasional plants on islands
<i>Linum catharticum</i>	occ. in open areas above Kurow
<i>L. marginale</i>	occ. in open areas throughout
<i>Lotus pedunculatus</i>	occasional in lower reaches
<i>Marrubium vulgare</i>	occasional throughout
<i>Medicago sativa</i>	occasional on dry sites
<i>Melilotus alba</i>	abundant on islands throughout
<i>Mentha spicata</i>	occ. in damp sites throughout
<i>Mimulus guttatus</i>	abundant in wet places
<i>Montia fontana</i>	occasional in sidestreams
<i>Muehlenbeckia axillaris</i>	abundant in dry open sites
<i>Myosotis caespitosa</i>	frequent in side streams

<i>M. discolor</i>	freq. dry grasslands throughout
<i>Myriophyllum elatinoides</i>	freq. sheltered damp substrates
<i>Nasturtium officinale</i>	abdnt. in side streams throughout
<i>Navarretia squarrosa</i>	occ. in dry places
<i>Onopordum acanthium</i>	occasional near Kurow
<i>Oreomyrrhis rigida</i>	few plants near dam
<i>Oxalis exilis</i>	occasional near dam
<i>Parahebe canescens</i>	exposed river bed, Black Point
<i>Parentucellia viscosa</i>	occasional in damp water course
<i>Plantago coronopus</i>	frequent near mouth
<i>P. lanceolata</i>	abdnt. on open river bed
<i>P. major</i>	occasional throughout
<i>P. triandra</i>	occ. near Hakataramea mouth
<i>Polycarpon tetraphyllum</i>	occ. in dry sandy areas
<i>Potamogeton cheesemani</i>	abundant in standing water
<i>Potentilla anserinoides</i>	occasional in bogs
<i>P. argentia</i>	occasional near dam
<i>Prunella vulgaris</i>	freq. in damp places throughout
<i>Ranunculus glabrifolius</i>	occ. near quiet backwaters
<i>R. lappaceus</i>	occ. in grassland near dam
<i>R. repens</i>	abundant near quiet backwater
<i>Raoulia australis</i>	frequent in dry riverbed
<i>R. haastii</i>	occasional in dry riverbeds
<i>R. subsericea</i>	occasional in dry riverbed
<i>R. tenuicaulis</i>	frequent on new surfaces
<i>Rumex acetosella</i>	abdnt. dry sites throughout
<i>R. flexuosus</i>	occasional in upper reaches
<i>R. obtusifolius</i>	occasional throughout
<i>Sagina ciliata</i>	occ. open habitats throughout
<i>S. procumbens</i>	freq. in open places
<i>Salicornia australis</i>	frequent near mouth
<i>Samolus repens</i>	frequent near mouth
<i>Sedum acre</i>	abundant especially in dry sites
<i>Senecio quadridentatus</i>	freq. in open sites esp. islands
<i>S. sylvaticus</i>	freq. on island esp. towards mouth
<i>S. vulgaris</i>	occasional throughout

<i>Sherardia arvensis</i>	occ. forms big patches in riverbed
<i>Silene conica</i>	occasional in grasslands
<i>S. gallica</i>	occ. in open places throughout
<i>S. vulgaris</i>	occ. on stony ground near dam
<i>Sisymbrium officinale</i>	occasional throughout
<i>Sonchus asper</i>	occ. throughout esp.towards mouth
<i>S. oleraceus</i>	occasional throughout
<i>Spergula arvensis</i>	occasional in sandy sites
<i>Stellaria alsine</i>	occasional in open situations
<i>S. media</i>	occasional throughout
<i>Taraxacum officinale</i>	occasional throughout
<i>Tillaea sieberiana</i>	abundant in dry open areas
<i>T. sinclairii</i>	occasional near Hakataramea river
<i>Trifolium arvense</i>	abundant in dry areas throughout
<i>T. dubium</i>	freq. in poor pastures throughout
<i>T. micranthum</i>	occasional in dry sites
<i>T. pratense</i>	frequent throughout
<i>T. repens</i>	abundant in fresh alluvium
<i>Urtica urens</i>	occasional
<i>Veronica arvensis</i>	freq. in dry places throughout
<i>V. anagallis-aquatica</i>	abundant near quiet backwaters
<i>V. serpyllifolia</i>	frequent in damp situations
<i>V. virgatum</i>	freq. throughout in open areas
<i>Vicia angustifolia</i>	frequent in rocky situations
<i>Viola cunninghamii</i>	frequent in moist grasslands
<i>Wahlenbergia albomarginata</i>	occasional on cliffs near dam
<i>W. gracilis</i>	occasional in shrublands
Ferns	
<i>Asplenium flaccidum</i>	occasional on cliffs near dam
<i>Cheilanthes sieberi</i>	occasional on cliffs near dam
<i>Pellaea rotundifolia</i>	occasional on cliffs near dam
<i>Polystichum vestitum</i>	occasional in sheltered sites