Exotic species	
Agrostis capillaris	browntop
Anthoxanthum odoratum	sweet vernal
Carex flacca	carnation sedge
Carex leporina	oval sedge
Cynosorus crinita	crested dog's-tail
Holcus lanatus	Yorkshire fog
Isolepis setacea	
Juncus tenuis	track rush
Leontodon taraxacoides	hawkbit
Lotus tenuis	bird's-foot trefoil
Plantago lanceolata	narrow-leaved plantain
Prunella vulgaris	selfheal
Rumex obtusifolius	dock
Trifolium repens	white clover

NATURE AND NURTURE IN A REVEGETATION PROJECT ON GLENTUI BENNETTS ROAD

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The article in the Canterbury Botanic Society Journal 47, 2016 by Geoff Henderson and Miles Giller, "Matawai park –regeneration 44 years on", prompted me to tell the story of my own revegetation project at the north end of Glentui Bennetts Road. There are parallels and contrasts between the two stories. This story is mainly about land owned by Environment Canterbury (ECan) adjacent to our property. When I first saw the place in 1968, it was dominated by an unholy mix of blackberry, Cotoneaster, gorse, broom (*Cytisus scoparius*), and *Muehlenbeckia australis*. When our family holidayed at the family residence, parents and children engaged in sporadic planting, including native species. We sought to buy the land from ECan and were turned down. In October 2009, with ECan's permission, I started to convert the reserve to shrubland and woodland with species that might have been there before human interference.

This article raises questions about the viability of a community of New Zealand native plants in the presence of naturalized competitors. Evidence is gathered from the family property, the ECan land described above (hereinafter referred to as the 'Reserve'), and the Waimakariri District Council legal road, which includes a formed track, its margins more or less tamed to grass or native woodland. In 2017 Waimakariri District Council gave me money for herbicides and native plants, after a visit by the Deputy Mayor.

The Reserve I was faced with included exotic garden plants, recognized weeds, native species that never grew here until planted, some local native species of doubtful provenance, and some true aboriginal species. Taking into account the impressive size of some natives, and the difficulty of obtaining plants of local provenance, I adopted a policy of planting species that seemed likely to have been present before pāheka interference. Where possible I sought plants of local or Canterbury provenance. Along with this moderately lax regime was progressive removal of plants outside these criteria where possible.

The species list that follows (Table 1) is intended to indicate progress and prospects for creating a resilient Canterbury native plant community. Species are listed only if they reproduced sexually on the Reserve, or volunteered.

Conclusions

With an average annual rainfall of about 800 mm and soil ranging from stony to clay, there would seem to be a good number of native species that will survive in my Reserve. However, if climate change should deliver long dry spells that kill sensitive plants or stop seeding and germination, floristic impoverishment of the plant community would be one consequence. There are a number of important species omitted from the table because they have not produced seedlings, for instance, tōtara. Even our largest tōtara, about 18 m tall, has not produced any reproductive organs. Tōtara on a cliff edge show good growth. Only the seedlings get watered. Nearly all kānuka flower well, but the only way to get seedlings on site would be to keep parts of the reserve bare dirt by some sort of weeding regime. Kānuka has the drawback of being flammable.

Weeding is a necessity in any small urban or rural native reserve, but if you are on top of the weeds, keeping in control isn't too onerous. Creating canopies that exclude light helps immensely (Fig. 1, p.28). My worst three weeds in order are *Clematis vitalba, Muehlenbeckia australis*, and blackberry. Blackberry isn't as much a threat to desired plants as the other two.

Our 'bush' has attracted native birds. A bellbird has established permanent residence. Kereru are frequent visitors. They probably brought poroporo to the Reserve. Large, probably native earthworms, which cannot tolerate cultivation, are numerous in the Reserve. Skinks inhabit the rocks and tall grass.

Figure 1 Creating canopies helps exclude light: tōtara, cabbage tree and *Coprosma* species.

Table 1 Native plant species present on the Reserve and reproducing sexually, with local, probable, and nearest known sources. Those already present when the family arrived denoted with a dagger symbol (†).

Species	Volunteer, Local (<5 km), probable, and nearest known potential sources	Notes
ANGIOSPERMS		
DICOTYLEDONS		
Acaena caesiiglauca	Source Canterbury via Trees for Canterbury; nearest potential source Ashley Gorge	
Acaena inermis	Probable source North Ashley Gorge via Trees for Canterbury	
Acaena novae-zelandiae?	Nearest known source Ashley Gorge, and was my actual source	
Coprosma propinqua†	Source probably local	Hybridizes with *C. robusta*. Seedlings prolific, even in

		grass.
Coprosma rhamnoides	Sources probably local; also Canterbury via Christchurch nursery	
Coprosma rigida	Probable source Oxford Forest via DoC Motukarara Nursery	
Coprosma robusta†	Local	Hybridizes with *C. propinqua*. Abundant seedlings, even in grass.
Fuscospora cliffortioides (syn. *Nothofagus solandri* var. *cliffortioides*)	Probable source(s) Christchurch nursery, Lewis Pass via Southern Woods, Lees Valley Road verge; nearest known potential source Glentui River	One mast year produced countless seedlings of which one survives as a healthy tree. Despite healthy mast flowering, there have been no more seedlings. Depredations by free range chooks? (They also wiped out broom seedlings.) Lack of water? Inadequate mycorrhizae?
Hoheria angustifolia	Probable source one seed from Blenheim RSA carpark; nearest known potential source Ashley Gorge, Mt Thomas	Seedlings, even in tall grass. Prolific elsewhere.
Hydrocotyle heteromeria†		In mown lawn.
Hydrocotyle moschata	Nearest source unknown	Aggressive in shade.
Kunzea robusta/serotina	Probable sources Banks Peninsula via Southern Woods; Eyrewell Forest. Nearest known potential source Lees Valley Rd	Prolific seedlings in flower and vegetable gardens.
Lophomyrtus obcordatum	Probable and nearest known source Glentui	One only.
Melicytis ramiflorus†	Nearest known source North bank of Ashley River opposite	One moderate-sized tree has produced a few seedlings under larger trees.
Muehlenbeckia axillaris†	Local	Succeeds other species in extreme drought situations (Fig. 2, p. 32).
Muehlenbeckia australis†	Local	The most difficult weed I encountered in this project. I have seen it throttle a

		Douglas fir sapling as thick as a leg. It forms a tangle of underground stems.
Oxalis exilis	Possible source an unplanned immigrant with a Trees for Canterbury purchase; nearest known source Hagley Park	
Parsonsia heterophylla	Local	
Pittosporum eugenioides	Probable source various nurseries; nearest potential source Glentui	Its canopy provides a nursery for other plants provided there is enough water.
Pittosporum tenuifolium†	One large tree probably has parentage from the north side of the Ashley River; most Reserve kohuhu have Arthurs Pass ancestry via Krakatoa (farm name), which had many seedlings from their bach at Arthurs Pass	The large tree on the edge of a cliff has never flowered. Prolific seedlings from other plants. Reasonable canopy species.
Pseudopanax arboreus	Probable source various nurseries	
Pseudopanax crassifolius	Probable source of the only volunteer lancewood (horoeka) in the Reserve was the north side of the Ashley River	
Solanum laciniatum	Probable and nearest known source upper German Road.	Kereru are the likely dispersal agent for the seeds. At this stage, poroporo are found mostly under or alongside large pine trees (Fig. 3, p. 32).
Senecio quadridentatus	Probable and nearest source Waimakariri River	This herb thrives in a drought and competes well with tall grasses such as cocksfoot. On this site the *Senecio* was absent in 2000
Sophora microphylla	Probable source a Christchurch garden; nearest known source	Tall kowhai to the west of my wife's vegetable garden deliver seeds up to 25 m in a

	Glentui	nor'wester. We have not found any lomenta (kowhai fruit) in the garden but the number of seedlings testifies to the distance the wind can blow these seeds. Seedlings are also found under the canopy of large kowhai, *Pittosporum* and *Hoheria*.
Veronica salicifolia	Local	These attractive flowering shrubs are found on the edges of woodland.
MONOCOTYLEDONS		
Carex comans	Local	
Microtis unifolia	Local	Died out in the 2017 drought; expected to return.
Poa cita	Nearest known source Lees Valley Rd	Only two plants survived competition from exotic grasses.
Juncus gregiflorus	Local	Only one clump survived the 2017 drought.
FERNS		
Blechnum penna-marina	Local	
Botrychium australe		Produces prolific spores. Only one plant.
Polystichum vestitum	Local	
Pteridium esculentum†	Nearest known potential source Summerhill Rd	

Figure 2 *Muehlenbeckia axillaris* colonises dry, bare sites.

Figure 3 *Solanum laciniatum* (poroporo) is often found under large radiata pine trees.