

"Forest Vegetation of the Lower Taieri Gorge"

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The pattern of native forest vegetation in the gorge of the Taieri River near Taieri Mouth poses many interesting questions. How closely does it represent that present when the first Polynesians arrived? How did these people change it? What was present when the Europeans settled here? To what extent has it been modified over the last 150 years? Why is the flora so different from that around the hills of Dunedin? Why do podocarps seem to be regenerating so well here compared with on Dunedin's hills? Why is this the northern limit of kamahi on the east coast?

A bit of botanical detective work can provide at least tentative answers to many of these. For instance, much of the gorge is clothed with secondary forest: kanuka and small broadleaved trees. Amongst them can be found the remains of stumps of totara, the most durable of the podocarps, and the European historical record tells us that rimu, matai and kahikatea were also logged here. Seedlings and saplings of these species, as well as the occasional individual and group of adult trees, are found throughout. So it is reasonable to assume that podocarps dominated much of the vegetation at the time of European settlement.

However, the vegetation was hardly pristine at that time. The records of early Europeans such as the surveyors Tuckett and Munro, and the Weller brothers, who established a whaling station on Moturata (Taieri Island), indicate that tussockland, bracken and scrub were common alongside the river, and that the Maori inhabitants used fire to clear the land. Maps and descriptions made in the 1840s and 1850s show that bushland in coastal eastern Otago had a similar distribution to that at the present, with large expanses of tussockland and fernland between the stands of forest. Certainly, the stature of some of the kanuka and podocarps in the gorge today suggests

establishment not long before European settlement, following destruction of former forest.

A bit of botanical licence allows us to reconstruct the pattern of the 1830s. Tall forest with a more or less continuous canopy of totara, matai, kahikatea and rimu, perhaps with less common miro and a little Hall's totara, occupied gullies with relatively deep, moist soils, where it was reasonably well protected from fire. The rocky ridges and broad faces between, with thin, drought-prone soils, carried a range of vegetation types, representing different stages of recovery from fire. Low bracken with scattered small plants of manuka and kanuka, and perhaps scattered silver tussock, marked frequently-burnt sites, with increasing dominance of manuka and kanuka, development of a shrubby understorey, establishment of broadleaved trees and, finally, the reappearance of podocarps - perhaps a century or two since the last fire. The boniest sites - rocky bluffs and steep narrow ridges - may well never have supported more than a sparse cover of stunted kanuka and manuka.

The flora of the gorge is particularly interesting for the range of species seldom seen nearer to Dunedin. Prominent examples include Olearia fragrantissima, fierce lancewood, Scandia geniculata, Coprosma virescens, korokio, Helichrysum glomeratum, totara and kahikatea. It could be speculated that these were once common on the Otago Peninsula, and they certainly reappear on the low coastal hills north of Dunedin, and even up the north branch of the Waikouaiti River. Differences in climate, particularly rainfall (Dunedin experiences about 200 mm more annually than the areas to its north and south), coupled with soil structure and parent material (volcanic rocks with brown granular loams and clays around Dunedin; schist- and loess-derived yellow-brown to yellow-grey earths further afield), probably explain much of the floristic difference.

The presence of kamahi, in small quantities in gullies on the south side of the gorge, is less easily

accounted for. It is abundant between the Catlins and Akatore, a few kilometres south of the Taieri River, but, apart from a few trees above Sawyers Bay, seems to be absent north of the river. It is said to have been logged for tramlines in Leith Valley, but certainly there is no evidence of it there today.

Silver beech, present as a healthy and regenerating population in a major tributary on the southern side of the gorge near Taieri Mouth, probably arrived by water, as seed carried down the river from the extensive beech forests of the Waipori Gorge and the Maungatua Range. Beech established as an opportunist at the water's edge, and wind carried its seed a few hundred metres away from the river. Newly-established trees displaced slower-growing competitors, and eventually beech became a permanent feature of the hillside forests. The beech population was much reduced by logging earlier this century, but representative stands remain with almost unmodified podocarp forest just outside the present eastern boundary of the Taieri River Scenic Reserve.

Compared with the forests on Dunedin's hills, that in the lower Taieri gorge contains prolific podocarp regeneration. Seedlings, saplings and young trees of rimu, matai, and totara are quite common, particularly under tall kanuka, and especially where the canopy and understorey are sparse on spurs and ridges. Young kahikatea are found on deeper soils, usually near or in the relatively low vegetation of moist alluvial valley floors. Miro and Hall's totara are much less common but, conversely, are the only podocarps really regenerating at all adequately at Dunedin.

Again, climate and soil/rock differences have some relevance, but perhaps forest history is also important. Kaikawaka is widespread through the montane forests around Dunedin's hills, but almost all trees are old, moribund, or dead. Kaikawaka regeneration only occurs on open sites - it is common in tussock grassland at the forest fringe near Double Hill, for instance, and in the scrub that established

after the fire of 1914 on Mt Cargill. If it is assumed that the old stands of kaikawaka established some 400-600 years ago, then these trees are about the same age as the podocarps that remain in the same forests. Did they all get started as a result of a conflagration that cleared forest from Dunedin's hills about that time?

The stature and density of broadleaved tree species and the density of the understorey of Dunedin's present forests evidently don't provide conditions conducive to podocarp regeneration. The open nature of forest within which podocarps regenerate in the Taieri gorge, much more recently disturbed, provides a stark contrast. Sites in Dunedin that probably carried forest similar to that in the Taieri gorge - the sunny side of North-east Valley, parts of Leith Valley, parts of the Peninsula - are all so thoroughly modified that it is impossible to judge what podocarp regeneration would be taking place there today.

The role of large herbivores in these forests is also open to conjecture. Where podocarp regeneration is happening, both in the Taieri gorge and on the hills of north Otago, the forests have been frequented by goats, pigs, sheep, cattle and possums for decades. Where it isn't, in the forests largely protected in Dunedin's city water supply catchments, or by their peri-urban setting, mammalian herbivory has been insignificant. Does podocarp regeneration depend to some extent on the control of plant competitors by browsing - once the task of large avian herbivores, and more recently achieved by the introduced mammals? Ironically, the recent and enormous surge in feral goat numbers in forested reserves around Dunedin might soon provide us with part of the answer.

The native vegetation of the lower Taieri gorge, both inside and adjacent to the Taieri River Scenic Reserve, has a marvellous diversity seldom seen in such a small geographical area. The wide variety of plant communities, and the large and unusual flora, reflect the range of habitats and the long history of

disturbance. The flora and the population dynamics of the vegetation provide distinct contrasts with forests on Dunedin's hills to the north. Opportunities exist here for elucidation of many of the plant ecological processes that have puzzled New Zealand botanists. But most importantly, the lower Taieri gorge is a lovely place for people to get together with native plants, to observe and learn, and, hopefully, to cherish and protect.

Species

beech = Nothofagus menziesii
 bracken = Pteridium esculentum
 fierce lancewood = Pseudopanax ferox
 Hall's totara = Podocarpus hallii
 kahikatea = Dacrycarpus dacrydioides
 kaikawaka = Libocedrus bidwillii
 kamahi = Weinmannia racemosa
 kanuka = Kunzea ericoides
 korokio = Corokia cotoneaster
 manuka = Leptospermum scoparium
 matai = Prumnopitys taxifolia
 miro = Prumnopitys ferruginea
 podocarps = Podocarpaceae
 rimu = Dacrydium cupressinum
 silver beech = Nothofagus menziesii
 silver tussock = Poa cita
 totara = Podocarpus totara