

Native Planting Guide - Dunedin ecosystems for revegetation and ecological restoration.

Background

One of the ways we can help sustain and improve our native biodiversity is to partially replace lost ecosystems by replanting indigenous vegetation. This increases the area of native ecosystems, creates more habitat for indigenous fauna, and can help with improved water quality and a range of other beneficial outcomes.

The DCC's Native Planting Guide provides practical information for small scale native planting projects. The additional materials provided online aim to support the Native Planting Guide and to inform larger native revegetation projects. These materials include:

- A webmap of potential native ecosystems in the Dunedin City district.
- Native plant species lists associated with each mapped native ecosystem.
- Descriptions of plant attributes associated with the species lists.

Knowledge of New Zealand's historic biodiversity is an essential pre-requisite for understanding and managing the value of our surviving indigenous ecosystems. It is particularly important in highly modified landscapes where relatively little indigenous biodiversity now survives; such as in much of New Zealand's lowlands, and in warm, dry climates on landforms prone to fire and/or suited to agriculture, such as the Waikato, Manawatu, and in the east from East Cape to Southland, including much of the Dunedin City district. In such areas the former character of native ecosystems must be pieced together from information gleaned from historic accounts and from the remnants that survive, although these are often small and highly modified¹.

Map

The potential ecosystem map is a broad scale guide to the main ecosystem areas in the Dunedin City district. The webmap was derived primarily from a potential ecosystems classification developed for Dunedin City Council. Potential indigenous vegetation is defined as that which could be expected in the absence of human activity and is broadly reflective of the likely distribution of native ecosystems historically.

The potential ecosystem classification for Dunedin City Council was designed to be sufficiently broad so that restoration/revegetation projects could use it to inform indigenous ecosystem restoration goals. There are many variations of different ecosystems and many are not represented on the map. This classification was developed using an expert panel approach, however, statistical modelling approaches have also been used to predict potential indigenous vegetation distribution in New Zealand. The silver beech distribution information in this guide was sourced from one such project.

The potential ecosystems within the silver beech distribution area were likely to have had a significant silver beech component and ecologically appropriate revegetation of forest in this area can include silver beech.

¹ Leathwick JR (2001) New Zealand's potential forest pattern as predicted from current species-environment relationships, New Zealand Journal of Botany, 39:3, 447-464.

Sources:

Mitchell R. 2010. *Dunedin District Ecosystem Mapping Project 2010. Kunzea Consultants Contract Report Prepared for the Dunedin City Council.*

Leathwick J, McGlone M, Walker S. *New Zealand's Potential Vegetation Pattern. Landcare Research.* <https://iris.scinfo.org.nz/layer/48289-potential-vegetation-of-new-zealand/> Retrieved 26 February 2019 (silver beech distribution).

Native plant species lists

The native plant species lists are designed to assist indigenous revegetation projects within the Dunedin City district. The objective is to provide guidance for ecologically appropriate plant species that could be planted within a broad ecosystem classification.

The scope of this guidance does not extend to describing all the suitable ecosystems for each listed species; rather, the focus of the lists is to give each ecosystem an assemblage of at least 10 suitable indigenous plant species for planting in restoration projects. Species lists for alpine ecosystems are not included here as most of the alpine areas within Dunedin City district are on protected land already and unlikely to be subject to revegetation efforts.

113 indigenous plant species are listed for the potential ecosystem types mapped for Dunedin City. Some generalist species are ecologically appropriate for several different ecosystems. These include cabbage tree (*Cordyline australis*), mingimingi (*Coprosma propinqua*), kahikatea (*Dacrycarpus dacrydioides*), broadleaf (*Griselinia littoralis*), mahoe (*Melicactus ramiflorus*), mapou (*Myrsine australis*), and lowland ribbonwood (*Plagianthus regius*), all of which are listed for four or more ecosystem types.

The lists of species for each ecosystem type are not exclusive. Many of the understorey and ground cover species listed would be ecologically appropriate in more ecosystems than those listed. The only ecosystem type where the recommended assemblage includes fewer than 10 species is the 'Sand dune sedgeland' ecosystem, which is naturally species-poor. Woody species are the primary focus of the list, as these are generally commercially available in good quantities in plant nurseries. Non-woody species are principally listed for ecosystems in which woody species do not dominate.

As some of the ecosystem types have very broad coverage, and contain many different habitats, it will not be appropriate to plant all of the species listed for these ecosystems in every habitat within the ecosystem type. The ecological attributes of each of the listed species provides additional guidance to help match plant species to different habitats. There are gradients in species tolerances and other attributes that are not captured, however the values given for each species should provide useful guidance for indigenous vegetation restoration projects. We recommend seeking expert advice for larger projects.

Source:

Wildland Consultants Ltd. 2013. *Plant Lists for Dunedin Ecosystems. Contract Report No. 3237 Prepared for the Dunedin City Council.*

Native Planting Guide - Plant species attributes

The following table explains the context of each of the selected species attributes included with the species in the plant lists for each ecosystem. These relate to environmental tolerance, habitat specificity, planting sequence, and value for indigenous fauna.

Generalist	The 'generalist' field relates primarily to forest species, as coastal, wetland, and alpine species are all subject to strong environmental constraints that limit competition from forest vegetation and require specialist traits for persistence. Generalist species can cope with multiple environmental stressors, so long as they are not too extreme. They are therefore found, and can be planted, across several ecosystem types and within different habitats within ecosystem types. Specialist species may cope with one or more environmental stressors at extreme levels, but do not persist in non-stressful environments due to the greater competitive ability of generalist species in favourable habitats.
Wetland sites	The 'wetland sites' field classifies species into those that are typically found in wetland habitats and those which are not. In practice, some species not typically found in wetlands do sometimes occur in them. Species found on the margins of wetlands are also identified.
Riparian sites	The 'riparian sites' field is intended to cover only those lowland and montane habitats in which planting of riparian habitats may be envisaged to help protect waterways from the adverse effects of adjacent land uses. Species that are suitable for such riparian planting are those with 'yes' entries.
Dry sites	The 'dry sites' field identifies species that can cope with dry soil conditions. These species should be considered for north-facing sites, particularly those at low-elevation or with rocky substrates.
Moist sites	Conversely, the 'moist sites' field identifies species that can cope with moist soil conditions. These species should be considered for south-facing sites, particularly in gullies, on toe-slopes, and on poorly drained flat land. Sites with moist soils are distinguished from wetland sites, which have a greater degree of soil saturation, either permanently or temporarily. Many species that require moist soils do not occur in wetlands.
Exposed sites	The 'exposed sites' field is most relevant to forest vegetation, as practically all species in coastal and alpine areas are tolerant of exposed conditions. Tree species with large, thin leaves tend to be more susceptible to exposure to wind, frost, and salt-spray, and generally need sheltered planting conditions if they are to thrive in restoration plantings.
Shade tolerance	The 'shade tolerance' field is most relevant to forest ecosystems, because few species of open habitats are tolerant of shade. Shade tolerant forest species can be planted later in the planting sequence.
Planting sequence	Most of the species listed for Dunedin City ecosystems can be planted in the early stages of indigenous restoration projects, but a subset of species require shelter from wind or frost or greater humidity to grow. These latter species should not be planted initially, but reserved for later infilling between

	established individuals. Species that can be planted later are generally shade tolerant and can regenerate beneath a forest canopy.
Palatability	Many indigenous tree species are susceptible to browse from domestic stock and feral herbivores such as hares, rabbits, red deer, and goats. Species are placed within a 'high/medium/low' framework for this attribute.
Fleshy fruit	Species with fleshy fruits that are often an important seasonal food source for indigenous birds and reptiles are identified in this column. If these species are used abundantly in plantings, the resulting vegetation is likely to provide good seasonal food sources for indigenous frugivorous fauna.
Nectar source	Likewise, species that provide nectar sources for indigenous birds, reptiles, and invertebrates are also identified. If these species are used abundantly in plantings, the resulting vegetation is also likely to provide good seasonal food sources for nectivorous indigenous fauna.

Source:

Wildland Consultants Ltd. 2013. Plant Lists for Dunedin Ecosystems. Contract Report No. 3237 Prepared for the Dunedin City Council.