Planting guide for Hamilton Basin

Kahikatea remnants

This planting guide is designed to assist anyone undertaking ecological restoration of kahikatea dominated forest remnants on the alluvial soils and flood plains of the Hamilton Basin. It is one in a series of planting guides covering different ecosystems in Waikato District, including sections of the Waikato and Waipa rivers; western Waikato ranges and peat lakes.

The species list is not intended to be a comprehensive description of the primeval forests that once existed in the Basin but a simplified recipe for the reconstruction of natural patterns and processes based on the practical knowledge and experience of plant growers involved in ecological restoration. It is worth remembering that ecological restoration is not usually a one-off activity but may require a number of interventions in order to restore natural patterns and processes.

Planting guide for kahikatea remnants

Kahikatea dominated forests would have once grown in damp soils with water ponding over the winter months and this is reflected by the raised roots of the remaining kahikatea and pukatea trees. Many remnants are located in areas that have been extensively drained so restoring the exact assemblage of plants that once existed may not be appropriate and plants need to be chosen based on whether the ground is now predominantly wet or dry.

Plants listed in the guide are divided into five categories or functional groups – colonisers; canopy trees; understory shrubs; grasses/sedges/ferns and ground covers; and climbers and epiphytes. Colonisers are typically quick growing and effective dispersers, providing shade and shelter for other species. Although quick to establish, they don't always endure. Hardy canopy trees such as totara, matai, kahikatea and pokaka can be included in an initial planting, with other trees added later once there is some shelter. Canopy trees take a long time to mature. Understory plants are usually more tolerant of shade and lower light than colonisers and are slower growing. However, many will tolerate exposed conditions to some extent and can be part of an open ground planting. Climbers and epiphytes are generally introduced to a site once the forest canopy is well established.

A representative range of species for each of the five categories is included in order that something resembling the natural structure of a forest can be restored over time. An indication is provided as to the total number of plants of each category (not individual species) that might be planted in a 100 square metre (10 x 10m) section in each of three situations - open ground, established cover and mature native canopy. **Note that in most situations, appropriate species of colonisers, canopy trees and understory plants can and should be planted in open ground or new sites**. Open ground could be areas between nearby stands or along the margins of stands. Exotic trees such as oak, cypress or pine may provide useful cover initially for establishing native forest. Mature native canopy may be largely intact but missing some or all of the understory species.

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Where a canopy already exists, the planting density will be less than open ground. It is worth looking at similar natural areas in the locality to gain a better appreciation of the mix and densities of species and the kind of conditions in which each thrives. Excluding stock from the area is a prerequisite to any planting programme.

The guide to tolerances/preferences is intended to give guidance for the positioning of each plant. This is only a rough guide. On the table ○ means this species is unlikely to survive the condition, ◌ means it may survive but may not thrive or compete well with other vegetation and ● indicates the species is well adapted to the conditions. It is recommended that plants are located in positions indicated by ● in the tolerances/ preferences section. The approximate final height of a plant is given where it is over one metre.

Some plants such as ferns and epiphytes may be best left to see if they come back naturally once conditions are right. Epiphytes are not the easiest plants to establish but if you want to assist natural processes there are several things you could do:

- place spores or seeds directly onto tree fern trunks (a good growing medium);
- surround roots of plant with a mixture of sphagnum moss and potting mix or compost, enclose with a suitable support (windbreak cloth, bird netting) and tie to a tree (do not use wire or nails);
- plant on a mound on the ground close to a tree in a shady place.

Planting to attract wildlife

The plants value as bird food is indicated by an N for nectar and F for fruit and seeds.

Many native birds such as tui, bellbird, kaka, kakariki and silvereye will feed on both fruit and nectar whereas kereru prefer fruit and foliage. For birds like fantail, grey warbler and whitehead plant varieties are not as important as a healthy mix of spiders, moths, beetles and earthworms. A good layer of leaf mulch on the forest floor should meet this need. Ruru (morepork) and kingfisher also eat insects as well as mice.

Ecological restoration in the Waikato

Always choose ecosourced plants when undertaking ecological restoration. Ecosourced plants are those which are grown from seeds or propagules (including spores and cuttings) collected from naturally-occurring vegetation in a locality close to where they are to be replanted as part of a restoration project. With seeds, attention must be paid to possible cross-pollination from nearby garden plants.

It's worth taking care to ensure plants are ecosourced from natural areas to:

- avoid the risk of planting species which are not native to the local area and which could become invasive;
- help maintain the unique local characteristics of the native plants in your area;
- obtain plants that have a greater chance of growing successfully because they are adapted to local conditions.

Ecosourced Waikato (a group representing plant growers, the Department of Conservation and local and regional authorities) has developed the native plant lists for the Lower Waikato and Waipa Rivers with funding support from the Waikato District Council and Department of Conservation.

Waikato Basin

Kahikatea remnants

Prior to human intervention, conifer forest (mainly kahikatea) with some tōtara, rimu and matai and occasional pukatea, titoki, pōkākā and tawa dominated the flood plains and extensive alluvial terraces. Where areas have been cleared for farmland, small remnants of this type of forest remain. Remnant understory is composed of those plants which have happened to survive grazing in the interim but many species have disappeared and require restoration planting.

Characteristic species		Planting			Plant tolerances / preferences							Planting tips		
		Suggested number of plants per 100 m^2			○ unlikely to survive ◌ may survive but not thrive ● well adapted to conditions							For an existing kahikatea stand, concentrate on planting around the edges to provide wind protection and put shade-loving understory plants in the centre of the stand. If there are gaps in the canopy, add canopy trees missing from the site. Kahikatea germinates freely and will grow if conditions are right and there is sufficient light. Planting of additional kahikatea may not be necessary except at the margins or to connect two stands.		
Botanical name	**Common name**	**open ground ***	**established cover**	**mature stage**	**flood**	**wet**	**moist**	**dry**	**sun**	**shade**	**frost**		**maximum height (approx) if over 1 metre**	**bird food type**
Colonisers Listed in order from wettest to driest habitat		**60**	**10**	**0**	***A mix of species that are frost, wind and sun hardy to create a windbreak or extend boundaries of the forest. Good weed control is essential as some species are slow growing at the start***									
Phormium tenax	harakeke/flax				●	●	●	●	●	○	●	very wet areas	2	N
Leptospermum scoparium	manuka				◌	●	●	◌	●	○	●	very wet areas	8	N
Cordyline australis	ti kōuka/cabbage tree				●	●	●	●	●	◌	●	most areas	12	F/N
Coprosma robusta	karamu				●	●	●	○	●	○	◌	good soil	5	F
Coprosma tenuicaulis	hukihuki/swamp coprosma				●	●	●	○	●	◌	●	boggy to damp areas	3	F
Carex secta	purei/pukio				●	●	●	◌	●	◌	●	wet open areas	1-2	
Carex virgata	purei/pukio				●	●	●	◌	●	◌	●	wet open areas	1	
Carex geminata	cutty grass				●	●	●	◌	●	◌	●	wet open areas	1-2	
Gahnia xanthocarpa	sedge				●	●	◌	○	●	●	●	shady boggy site	1.5	
Plagianthus regius	manatu/ribbonwood				●	○	●	◌	●	◌	●	open areas, quick growing	17	
Hoheria sexstylosa	lacebark				◌	○	●	◌	●	◌	●	open areas	12	
Coprosma areolata	thin-leaved coprosma				◌	◌	●	●	●	●	●	drier areas	5	F
Fuchsia excorticata	kotukutuku				○	◌	●	○	●	●	◌	wet areas above flooding	12	F
Coprosma rhamnoides					◌	○	●	●	●	●	●	sun or shade	2	F
Aristotelia serrata	makomako/wineberry				○	○	●	○	●	◌	●	not too wet or dry, open areas	8	F

Canopy trees listed in order of tolerance to exposed conditions		**15**	**15**	**0**	***Canopy trees are long-lived, tall and spreading, but slow to establish. Plant where there are gaps in the canopy - although the first five species, in particular, will tolerate open ground.***										
Podocarpus totara	totara				●	○	●	○	●	○	●	drier sites, suitable for open areas	30	F
Dacrycarpus dacrydioides	kahikatea				○	○	●	○	●	○	●	sunny moist site	60	F
Prumnopitys taxifolia	matai				●	○	●	○	●	●	●	wide range of tolerances	40	F
Sophia microphylla	kowhai				○	○	●	●	●	○	●	forest margins	10	N
Eleocarpus hookerianus	pokaka				●	○	●	○	●	●		moist sheltered site	14	F
Knightia excelsa	rewarewa				○	○	●	○	●	○	●	damp clay soils	30	N
Dacrydium cupressinum	rimu				○	○	●	○	●	●	●	essential to ecosource	35	F
Prumnopitys ferruginea	miro				○	○	○	●	●	●		drier areas	35	F
Alectryon excelsus	titoki				○	○	●	○	○	●	○	sheltered areas	10	F
Laurelia novae-zelandiae	pukatea				○	●	●	○	○	○	●	sheltered site	35	
Beilschmiedia tawa	tawa				○	○	●	○	○	●	○	sheltered areas	24	F
Syzygium maire	maire tawake/swamp maire				○	●	○	○	○	●	○	stable boggy sheltered areas	16	F
Understorey Listed in order of tolerance to exposed conditions		**25**	**25**	**15**	***Most understorey shrubs require the stable conditions created under trees although some will tolerate exposed conditions. Plant species to supplement what is already there.***										
Coprosma rotundifolia					●	●	●	○	●	●	●	sun or shade	4	F
Coprosma rigida					●	●	●	○	●	○	●	sun or shade	5	F
Pseudopanax crassifolius	horoeka/lancewood				○	●	●	●	●	○	●	exposed areas	13	F
Myrsine australis	mapou				○	○	●	●	●	●	○	anywhere but slow growing	7	F
Pennantia corymbosa	kaikomako				○	○	●	○	●	●	●	sun or shade	12	F
Carpodetus serratus	putaputaweta				○	○	●	○	●	●	○	sun or shade, avoid flooding	10	F
Melicytus ramiflorus	mahoe				●	○	●	○	○	●	○	sheltered site	10	F
Melicytus micranthus	swamp mahoe				●	○	●	○	●	●	○	sheltered site	5	F
Streblus heterophyllus	turepo				●	○	○	○	○	●	●	sheltered site initially	12	F
Dicksonia squarrosa	wheki				○	○	○	○	●	●	●	damp sheltered areas	2-8	
Cyathea dealbata	ponga/silver fern				○	○	○	○	●	●	●	damp sheltered areas	10	
Cyathea medullaris	mamaku				○	○	○	○	●	●	●	damp sheltered areas	15	
Coprosma grandifolia	kawariki/kanono				●	○	●	○	○	●	○	moist shady areas	7	F
Geniostoma ruprestre	hangehange				○	○	●	○	●	●	○	sheltered site	4	N
Rhopalostylis sapida	nikau				○	○	●	○	○	●	○	sheltered site	10	F
Nestegis lanceolata	white maire				○	○	●	●	●	●	●	damp sheltered areas	13	F

Schefflera digitata	pate/patete				○	◔	●	○	●	●	◔	wet areas	8	F
Hedycarya arborea	porokaiwhiri/pigeonwood				●	○	●	◔	◔	●	◔	sheltered site	12	F
Piper excelsum	kawakawa				○	○	●	●	●	●	○	sheltered site	3-7	F
Grasses, sedges, lilies, ferns and ground covers Listed in order of tolerance of wet conditions		**0**	**0**	**10**	**flood**	**wet**	**moist**	**dry**	**sun**	**shade**	**frost**	***Many ferns come back on their own accord if conditions are right***		
Astelia grandis	swamp astelia				●	●	●	○	●	●	●	shady boggy places		
Elatostema rugosum	parataniwha				●	●	●	○	○	●	?	shady wet areas		
Blechnum minus	swamp kiokio				●	●	●	◔	●	●	●	wet shady areas		
Carex dissita	forest sedge				◔	◔	●	○	●	●	●	damp site		
Lobelia angulata	pratia				◔	◔	●	●	●	●	●	shaded boggy site		
Machaerina tenax	sedge				●	●	◔	○	◔	●	●	shaded boggy site		
Carex uncinata	hook sedge				◔	◔	●	○	○	●	?	damp shady site		
Asplenium bulbiferum	pikopiko				○	●	●	○	◔	●	○	damp shady site		
Microlena avenaceae	bush rice grass				?	◔	●	○	◔	●	?	vulnerable to drought		
Blechnum novae zelandiae	kiokio				◔	◔	●	◔	●	●	●	anywhere		
Blechnum filiforme	thread fern				○	◔	●	●	○	●	○	damp shade		
Climbers and epiphytes		**0**	**0**	**10**	***These plants take advantage of trees to get their leaves up into the sunlight***									
Asplenium flaccidum	hanging spleenwort											attach to tree		
Asplenium polyodon	sickle spleenwort											attach to tree		
Astelia solandri	kaiwharawhara											attach to tree		
Astelia hastata	kahakaha											attach to tree		
Earina autumnalis	Easter orchid				Never collect orchid plants from natural areas							attach to tree		
Earina mucronata	peka-a-waka											attach to tree		
Dendrobium cunninghamii	winika											attach to tree		
Microsorum pustulatum	kowaowao/hounds tongue											attach to tree		
Microsorum scandens	mokimoki											attach to tree		
Pyrrosia eleagnifolia	leather leaf fern											attach to tree		
Freycinetia banksii	kiekie				◔	●	●	◔	◔	●	◔	moist sheltered areas		F/N
Fuchsia perscandens					○	◔	●	◔	●	●	?	boggy areas		
Parsonsia heterophylla	kaihua/NZ jasmine				●	●	●	○	●	●	○	moist sheltered areas		
Passiflora tetrandra	kohia/NZ passionfruit				●	○	●	●	●	○	●	open areas		F/N
Rubus australis	tätarämoa / swamp lawyer				●	●	●	●	●	◔	?	open areas		F

Metrosideros diffusa	akatea				○	○	○	●	●	●	●	well drained soil or base of tree		N
Metrosideros fulgens	rata				○	○	○	●	●	●	◐	well drained soil		N
Metrosideros perforata	akatea				○	○	○	●	●	●	●	well drained soil or base of tree		N
Ripogonum scandens	kareao / supplejack				●	◐	●	◐	●	●	○	moist shady areas		F

* An open ground planting should contain a mix of colonisers (60%) canopy trees (15 %) and understory plants (25%). Select plants that meet the conditions of the site e.g. that tolerate sun or frost or other relevant factors.

Take care to ensure plants have been ecosourced from the local area. Ecosourcing of the eventual climax species (canopy and understory) is a critical component of ecological restoration.