

Native forest restoration guide

We can all be part of protecting, restoring and connecting Auckland's biodiversity.

Native forest restoration planting.

Native forest restoration involves the recovery of a native area (ecosystem) that has been degraded, damaged, or destroyed. This can include new plantings as well as controlling weeds, pest animals and other threats to forest habitat.

In many parts of the Auckland region the original forest cover has been cleared with significant associated loss in biodiversity. This brochure provides some basic guidance to anyone wanting to replant an area of native forest in the Auckland region. For specific information on restoring coastal areas, wetlands, or stream and river margins, refer to the relevant Auckland Council factsheet (see "further information" on the back page).

Why plant?

Replanting native forests is a positive way to improve Auckland's biodiversity and natural environment. Native planting provides a wide range of benefits including increasing native biodiversity, creating habitat for native wildlife (insects, frogs, reptiles and birds), stabilising soil, recreating linkages and vegetation sequences, enhancing water quality and landscapes and providing a sense of place and New Zealand identity.

Restoration planting can also be a requirement of a resource consent, to remedy or mitigate the adverse effects of a proposed activity.



Protect. Restore. Connect.

Planting to restore

Native forest that would have once naturally occurred in an area can be recreated by actively replanting the area with the right plants, or by allowing natural succession and regeneration to occur. To restore an area successfully takes planning, effort and time. A successful restoration planting should create conditions where native plants can regenerate themselves, so that eventually the planting can become self sustaining like a natural forest. The right selection of plants will attract and provide habitat for native birds and other wildlife.

What to plant

Due to the mild climate, native forests in the Auckland region are complex and contain a large number of different native plants, which grow in a variety of combinations.

Existing natural forest areas commonly consist of broadleaved forest interspersed with taller canopy trees such as rimu, tōtara, miro, tānekaha, kahikatea, and stands of kauri. Of the broadleaved species, taraire, pūriri and kohekohe are very common canopy trees at lower altitudes, with tawa typically becoming more common above 200m and on cooler south-facing slopes.

Beneath the canopy trees there is usually a profusion of tree ferns, shrubs and ground layer plants. In younger regenerating stands of forest, mānuka and kānuka are dominant, often accompanied by treeferns in gullies.

Every site is unique and needs to be treated individually. For planting to be successful, it is important to identify the physical conditions of a site that will influence plant growth. Local site characteristics such as distance from the coast, the direction the slope faces (aspect), soil type and drainage will all determine what would have naturally grown there. The best way to find out exactly what to plant on your site is to look at existing mature stands of native forest on similar sites in your area, and to copy that pattern. The following list recommends plants to use in native forest restoration projects in the Auckland region. Factsheets detailing the plants to use in coastal areas and wetlands are available separately.

Many of the forest trees that thrive in mature forest are unsuitable for planting directly onto a bare site. In the forest, they are protected from wind, drying out and extremes of heat. On a bare site, these trees won't tolerate the exposed conditions and need some shade and shelter to be established first. Planting needs to be started with hardy trees and shrubs (coloniser/nurse species), that can tolerate exposed conditions. In addition, consider planting both bird and wind dispersed species.

Initial planting (stage 1 plantings)

Initial plantings will need to establish suitable coloniser (or nurse) vegetation. Coloniser species are those able to grow first at a site. They are able to cope with the drier, hotter conditions in open areas. These species should make up the bulk of a planting in an open area.

These coloniser plants will provide shelter for other species that will establish naturally or that are planted later in order to encourage a more diverse forest to develop.

The following list includes relatively hardy, coloniser species that can be used liberally for initial plantings on bare sites. Remember to choose plants which are characteristic of your site, and check what naturally grows there and the position of different species from stream-edge to ridge.

Consider planting a mixture of wind and bird dispersed species to help assist natural regeneration processes. Those species which should only be planted at coastal site have (coastal sites) after the species name in the table. Coastal sites are defined as those within 500 metres of the coast.

The categories for ridges, hillslopes and gullies in the table indicate drier, not so dry and damper sites respectively. For very wet or swampy sites refer to the Auckland Council's factsheet - Wetland facts 2. Wetland planting and restoration guide.

For coastal sites, refer to the Auckland Council's Coastal Forest planting guide.

Species abundance

The species abundance (+) in the table indicates the approximate proportion of a species that should be used within the planting. By following these recommendations the planting will replicate natural species abundance and groupings.

(+++use plentifully, ++use commonly, +use sparingly)



Enrichment planting (stage 2 plantings)

Sometimes enrichment planting will be required to assist with providing a natural species composition within the planting, such as when natural dispersers are absent i.e. birds, or the planting is isolated from natural seed sources. The following plants should be planted several years after the initial plantings have established some shelter. Once again, check surrounding natural areas to see what species are characteristic of your locality.



Initial planting (stage 1 plantings)

Maori name/common name	Species	Ridges	Hill slopes	Gullies	Abundance
					(+++ use plentifully, ++ use commonly, + use sparingly)
kānuka	<i>Kunzea ericoides</i>	•	•		+++
mānuka	<i>Leptospermum scoparium</i>	•	•	•	+++
karamū	<i>Coprosma robusta</i> or <i>C. lucida</i>	•	•	•	+++
whiteywood/māhoe	<i>Melicytus ramiflorus</i>	•	•	•	+++
<i>Coprosma macrocarpa</i> (coastal sites)	<i>Coprosma macrocarpa</i>	•	•	•	++
five-finger	<i>Pseudopanax arboreus</i>	•	•	•	++
hangehange	<i>Geniostoma rupestre</i> var. <i>ligustrifolium</i>	•	•	•	++
flax/harakeke	<i>Phormium tenax</i>	•	•	•	++
lacebark/houhere	<i>Hoheria populnea</i>	•	•	•	++
koromiko	<i>Hebe stricta</i>	•	•	•	++
matipou/māpou	<i>Myrsine australis</i>	•	•	•	++
Whau (coastal sites)	<i>Entelea arborescens</i>		•	•	++
karaka	<i>Corynocarpus laevigatus</i>		•	•	+
karo (coastal sites)	<i>Pittosporum crassifolium</i>	•	•		+
kōwhai	<i>Sophora chathamica</i> (coastal)	•	•	•	+
	<i>Sophora microphylla</i> , (inland)	•	•	•	+
mamangi	<i>Coprosma arborea</i>	•	•		+
rewarewa	<i>Knightia excelsa</i>	•	•		+
cabbage tree/ tī kōuka	<i>Cordyline australis</i>		•	•	+
pūriri	<i>Vitex lucens</i>		•	•	+

Enrichment planting (stage 2 plantings)

Maori name/common name	Species	Ridges	Hill slopes	Gullies	Abundance
					(+++ use plentifully, ++ use commonly, + use sparingly)
<i>Coprosma rhamnoides</i>	<i>Coprosma rhamnoides</i>	•	•		+
hīnau	<i>Elaeocarpus dentatus</i>	•	•		+
horoeka, lancewood	<i>Pseudopanax crassifolius</i>	•	•	•	+
houpara (coastal sites)	<i>Pseudopanax lessonii</i>	•	•		+
kahikatea	<i>Dacrycarpus dacrydioides</i>		•	•	+
kanono	<i>Coprosma grandifolia</i>		•	•	+
kauri (see Kauri Dieback note)	<i>Agathis australis</i>	•	•		+
kawakawa	<i>Macropiper excelsum</i>		•	•	+
kohekohe	<i>Dysoxylum spectabile</i>		•	•	+
māmāngi	<i>Coprosma arborea</i>	•	•		+
mangeao	<i>Litsea calicaris</i>		•	•	+
miro	<i>Prumnopitys ferruginea</i>	•	•	•	+
nikau	<i>Rhopalostylis sapida</i>		•	•	+
pigeonwood	<i>Hedycarya arborea</i>	•	•	•	+
pōhutukawa (coastal sites)	<i>Metrosideros excelsa</i>	•	•		+
pukatea	<i>Laurelia novae-zelandiae</i>			•	+
pūriri	<i>Vitex lucens</i>	•	•	•	+
rangiora (coastal sites)	<i>Brachyglottis repanda</i>	•	•		+
rātā	<i>Metrosideros robusta</i>	•	•		+
rewarewa	<i>Knightia excelsa</i>	•	•		+
rimu	<i>Dacrydium cupressinum</i>	•	•	•	+
taraire	<i>Beilschmiedia tarairi</i>		•	•	+
tawa	<i>Beilschmiedia tawa</i>	•	•		+
tītoki	<i>Alectryon excelsus</i>		•	•	+
tōtara	<i>Podocarpus totara</i> or <i>P. cunninghamii</i>	•	•		+

Planning

If you're planting a large area, work out a planting plan well in advance. In the plan you will need to consider:

- The physical characteristics of the area to be planted (dry, not so dry, damp), and how these will influence what plants will grow.
- What site preparation (e.g. fencing, pest and weed control) will be required.
- How many and what kinds of plants you will need for the area. For most shrub species and coloniser planting, estimate 1 plant per 1m².
- Timing for the planting, including the right time of year to plant, and further planting in future years.
- Check whether any archaeological sites are present on the site. Contact the Auckland Council for assistance with this.
- Look at surrounding natural areas and try to mimic local forest ecosystems and vegetation sequences. Check the proximity of your site to natural seed sources and other ecosystems.
- Think about the types of food for birds and other animals (e.g. insects and lizards) that you want your planting to provide. Try to ensure that fruit and nectar is available year round for birds. Visit www.doc.govt.nz for a 'food availability calendar'.
- How you will obtain the plants you need in time for each planting season (e.g. buy from a nursery or grow your own).
- Future maintenance activities and resources required to ensure the success of the planting (see 'ongoing maintenance', over page).
- The Auckland Council's biosecurity staff can provide further advice on pest animals and weed control, please contact them on 09 301 0101 or email biosecurity@aucklandcouncil.govt.nz.

Sourcing native plants

It is important that ecologically appropriate species are planted, and where practicable, to source plants that have been grown from local seeds (i.e. eco-sourced). These plants are better adapted to the local conditions and have a greater chance of surviving.

If you are purchasing plants, find a nursery that eco-sources, to ensure the plants you buy are best suited to your area's climate and soils. Avoid using unnatural cultivars of native plants such as variegated flax and garden variety *Hebes*.

You may be able to grow some of your plants from seeds taken from existing plants in nearby forest areas – remember to ask for permission before taking any plant material from any land area that you do not own, collect seed from many individuals to ensure diversity.

When to plant

The ideal time for planting in the Auckland region is between April and July, through to August at the latest. Planting at these times allows plants to establish before the heat and dry of summer and storms of the following winter. If your site is susceptible to frosts, plant frost sensitive species in early spring, or wait until you have got a good nurse crop to protect them. If autumn has been dry, it is important to ensure that plants are well watered at planting. Avoid planting on hot and sunny, or windy days as these conditions can quickly dry out small plants

How to plant

For the details on how to plant your native plants to ensure the best chance of survival, refer to the "Good Start Guide" on the back page.

Planting tips

- Before planting, fence out livestock and control pests such as possums and rabbits, which might eat your plants.
- Prepare the planting site by removing weeds. If kikuyu grass is present it may be necessary to spray this several months in advance.
- Avoid planting trees in rows! Aim for a natural look that mimics nature – not formal landscaping!
- Plant colonising shrubs 1m apart so that they can suppress weeds quickly by shading them out. Competition from weeds is one of the biggest obstacles to successful restoration planting in Auckland's mild climate. Larger tree species used in diversity plantings (e.g. kahikatea, pūriri) will eventually be the mature forest species and need more room – plant them 5m apart amongst smaller, nurse species. If you choose to include ground covers and native grasses in your planting, these should be planted 30cm apart.
- The goal of planting at this spacing is to create a canopy within a few years as the plants spread out. Establishing a canopy provides good conditions for trees needing more shelter when they are young, such as taraire. Also, most weeds are light demanding plants, so good canopy cover will shade them out and make it more difficult for them to establish.
- Mulching around the plants will suppress weeds and help plants survive in summer by keeping the soil moist.
- Bamboo stakes can help you find young plants so that none are lost or overlooked when undertaking weed control.

Ongoing maintenance

- For the first few years after planting, check how the plants are doing at regular intervals.
- Weeding around plants may be necessary to avoid competition and stress. This should be carried out as required.
- Monitor the growth of your planting – enjoy watching it grow, attract wildlife and become self-sustaining. Take photographs each year to follow the changes!
- Further planting can be carried out when the pioneer cover of the site has established successfully.



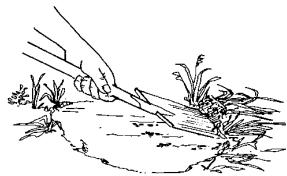
Kauri dieback disease

There is a high risk of spreading kauri dieback (the deadly kauri disease caused by *Phytophthora taxon Agathis*) around the Auckland region in contaminated soil and plant material. Auckland Council recommends extreme caution when using kauri in restoration plantings. Kauri seedlings should only be used in enrichment plantings. Kauri seedlings should be sourced from healthy disease free adult plants. Check that your nursery sources their plants and seeds from areas free of kauri dieback. Don't remove soil or plants from areas known to be infected with kauri dieback. Kauri seed can be tested for kauri dieback disease, free of charge, please contact the Auckland Council biosecurity team 09 301 0101. For more information visit www.kauridieback.co.nz



Planting guide

Decide on the plant's location

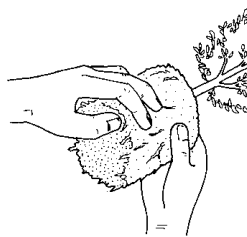
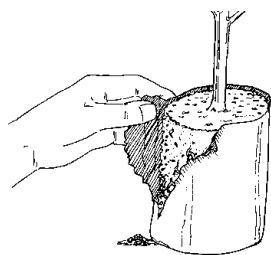
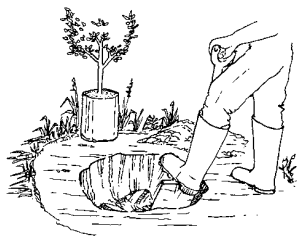


Skim any grass or weeds off the top of the planting site using a spade or grubber. If left they will compete with and could rapidly smother the plant, (you may need to spray if kikuyu is present. Do this several months in advance)

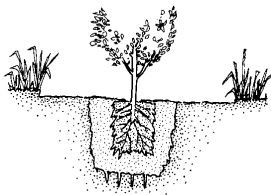
Prepare the planting hole

The hole should be larger than the plant container or root ball. Once the hole is large enough, loosen the soil on the sides and in the bottom of the hole, to allow the plant's roots to penetrate the soil more easily. The hole should be deep enough so the collar (base of the stem where the roots start) is slightly below ground level (1cm) on most sites, and slightly above (1-2cm) on wet or saturated sites.

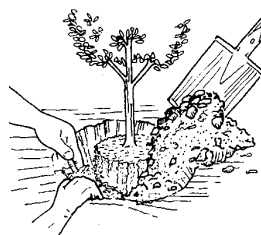
Remove the plant from its pot, plastic bag or root trainer carefully retaining as much soil around the roots as possible. If the roots are tightly bound, gently tease them apart. Root bound plants are slower growing and take longer to become well established.



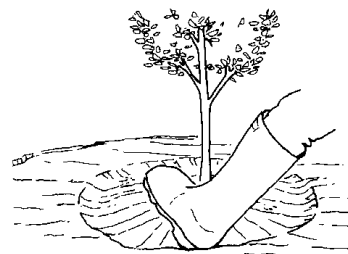
Place the plant in the hole so the stem is the correct depth in relation to the adjacent soil surface. Before placing the plant in the hole, apply fertiliser if there is some available, to give the plant an extra growing boost. Mix the fertiliser with the loose soil in the bottom of the hole. Don't spread the fertiliser on the surface as this will just promote more weed growth.



Gradually add soil into the hole around the roots, firming each layer with your hands.



Firm the soil well after the hole is filled with the heel of your boot, leaving a slight depression to catch any rain or water run-off.



"Extra for experts"

If you are restoring an isolated site, which is away from existing natural areas and potential seed sources, or has been significantly degraded through stock trampling and wind damage, the planting of understorey species may be required. This additional planting can be particularly important on the edges, where light gaps encourage weed growth and strong winds can have adverse effects.

Some plants which may be suitable for understorey planting include: *Coprosma rhamnoides*, *Geniostoma rupestre* var. *ligustrifolia*, *Macropiper excelsum*, *Melicytus ramiflorus*, *Carex flagellifera*, *Carex lambertiana*, *Microlaena avenacea*, *Microlaena stipoides*, and ferns and treeferns.

Wildlife restoration

Restoration planting using a broad selection of the recommended plants in this factsheet should eventually attract and provide habitat for a range of common forest birds such as kererū, fantail and tūī, particularly if the site is near existing bush. Forest birds need year-round food supplies and low predator numbers during nesting.

Reptiles and invertebrates also thrive in forest fragments with low pest numbers and plenty of moist soil, rotting logs, and thick leaf litter. You can help provide good habitat early on, even in bare and newly planted sites, by leaving or moving large logs into your planted area. This provides habitat immediately, which would otherwise take many years to develop. Fish living in the streams running through forest fragments need shaded, cool water with few aquatic weeds.

If you want to attract specific native birds or other native wildlife to your site, refer to the Auckland Council brochures *Wildlife and Your Backyard* and *Lizards Alive* or refer to the other useful documents listed below.

For further information

The Auckland Council biodiversity team can provide further information on ecological restoration. Contact us on 09 301 0101 or visit www.aucklandcouncil.govt.nz

Other Auckland Council factsheets:

- Wonderful wetlands – Facts No1. and Planting and restoration No.2
- Streambank planting guide
- Coastal planting guidelines 1-6 (includes dune, cliff tops, coastal forest and wetlands)
- Wildlife and your backyard
- Lizards alive factsheet
- Caring for forest fragments factsheet

Other Auckland Council factsheets continued

- Life on the edge – Shrublands
- Voluntary protection of natural areas on private land

These factsheets are available on the council website and residents of the Auckland region can also obtain hard copies of the above factsheets by calling the Auckland Council on (09) 301 0101 or by sending an email request to biodiversity@aucklandcouncil.govt.nz

The Auckland Botanic Gardens has a wide range of information on native plants, and its threatened plant garden is a great place to see some of New Zealand's rarest plants.

The Auckland Council biosecurity team has information about controlling the weeds and animal pests that are likely to threaten the success of your native planting. This information can be obtained from the Auckland Council website or by calling 09 301 0101.

Other useful websites:

New Zealand Plant Conservation Network: www.nzpcn.org.nz

New Zealand Ecological Restoration Network:
www.bush.org.nz

Royal Forest and Bird Protection Society:
www.forestandbird.org.nz

Queen Elizabeth II (QEII) National Trust:
www.nationaltrust.org.nz

Department of Conservation: www.doc.govt.nz

Manaaki Whenua Landcare Research:
www.landcareresearch.co.nz

New Zealand Landcare Trust: www.landcare.org.nz

Funding

Your restoration project may be eligible for funding. Auckland Council can assist both landowners and community groups with funding of ecological restoration projects. For more information contact Auckland Council on 09 301 0101 or visit the Auckland Council website.

Books

The following books are especially useful for people intending to carry out native forest restoration planting.

The most detailed and up to date New Zealand resource on forest restoration available is Davis, M. and Meurk, C. (2001) *Protecting and Restoring our Natural Heritage – a Practical Guide*. Department of Conservation. This excellent guidebook, produced by Department of Conservation, provides thorough information on protection, management and restoration of native ecosystems and can be downloaded free from www.doc.govt.nz

Other useful publications include:

Dawson, J and Lucas, R. (2000). *Nature Guide to the New Zealand Forest*. Random House.

Crowe, Andrew. (1997). *The Quickfind Guide to Growing Native Plants*. Touchwood Books.

Manukau City Council. (2006). *Manukau City Restoration Planting Guidelines*. Manukau City Council and Boffa Miskell.

Metcalfe, Lawrie. (1995). *The Propagation of New Zealand Native Plants*. Godwit Press.

Porteous, Tim. (1993). *Native forest restoration: A practical guide for landowners*, QEII National Trust, Wellington.

Waitakere City Council. (1997). *A guide for planting and restoring the nature of Waitakere City*. Waitakere City Council.