



For further information

The Auckland Regional Council can provide further information on ecological restoration, plant and animal pests and funding opportunities.

Contact us on (09) 366 2000 or visit www.arc.govt.nz for more information.

The ARC website has some useful specific restoration information and downloadable ARC factsheets including:

- Wetland Restoration Guide - with downloadable brochure on how to restore wetlands and what to plant in them.
- Streambank Planting Guide - detailed information and planting lists for establishing native vegetation around streams and river banks.
- Coastal Planting Guidelines - detailed information about restoring native vegetation in Auckland's coastal areas.
- Welcoming Wildlife brochure - information on planting native plants in your garden, especially to encourage native birds, lizards and insects.
- Forest Fragment Factsheet – a guide for managing and protecting forest fragments.
- Scrublands Factsheet – a guide to the values of scrubland habitats in the Auckland region.

Residents of the Auckland region can also obtain hard copies of the above factsheets by calling the ARC on (09) 366 2000 or by sending an email request to info@arc.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 ARC's Biosecurity section 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 ARC website or by calling (09) 366 2000.

Other useful websites:

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. The ARC's Environmental Initiatives Fund can assist both landowners and community groups. For more information contact the ARC on (09) 366 2000 or visit the ARC website.

Books

A comprehensive list of books about identifying and growing New Zealand native plants is available on the ARC website. 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:

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.

Metcalf, Lawrie (1995): The Propagation of New Zealand Native Plants. Godwit Press.

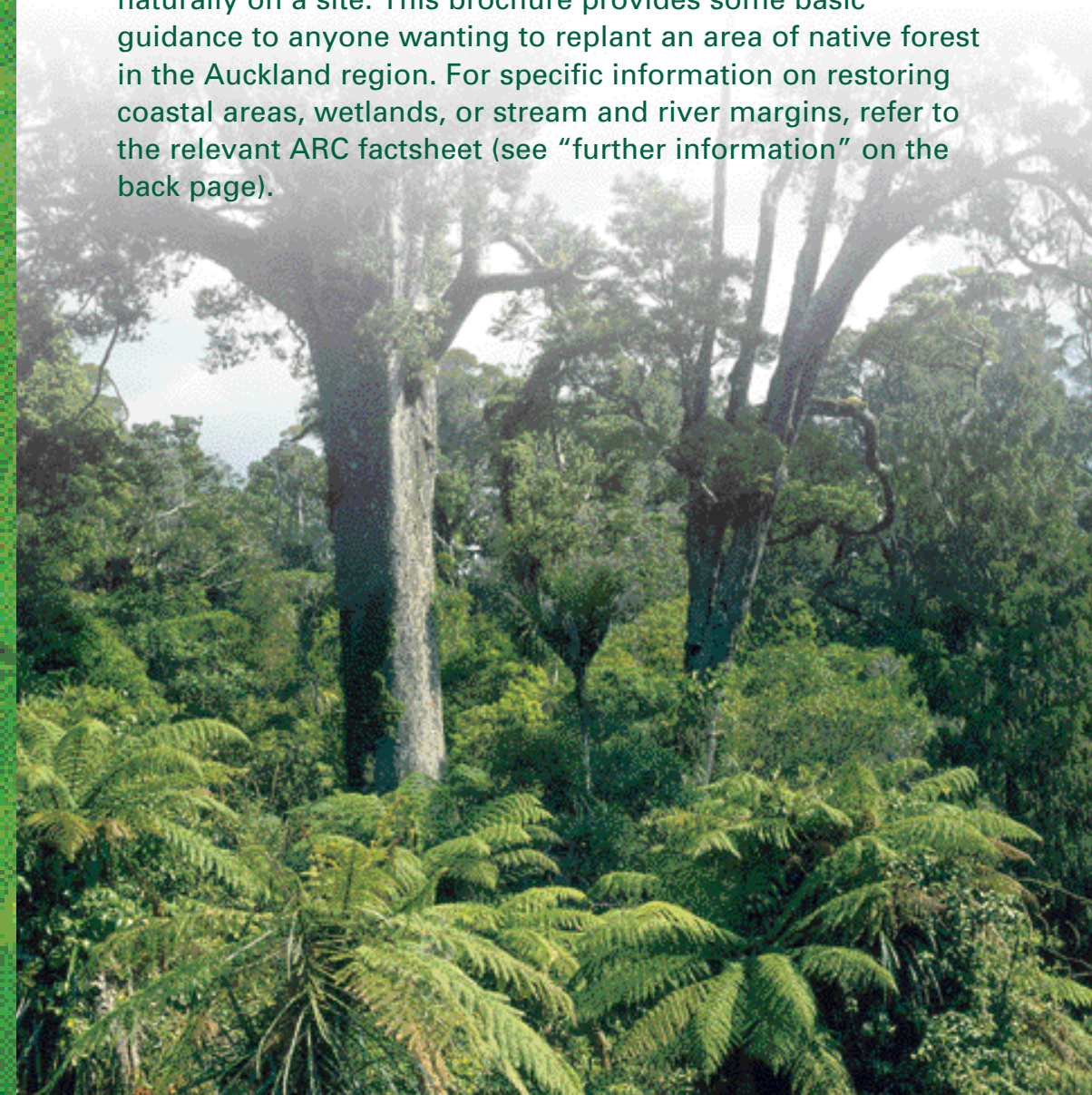
Porteous, Tim (1993): Native forest restoration: A practical guide for landowners, QEII National Trust, Wellington.

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

Native Forest Restoration Planting

Native forest restoration involves the recovery of a native area (ecosystem) that has been degraded, damaged, or destroyed. In existing areas of native forest for example, this invariably means looking after them by controlling weeds, animal pests and other threats to their survival.

In many parts of the Auckland region (due to loss of original forest cover), it means starting from scratch to re-establish the native vegetation communities that would have grown naturally on a site. 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 ARC 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.



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. With the right selection of plants, a successful planting can 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, totara, miro, tanekaha, kahikatea, and stands of kauri. Of the broadleaved species, taraire, puriri 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, manuka and kanuka 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 (pioneer/nurse species), that can tolerate exposed conditions. In addition, consider planting both bird and wind dispersed species.

Initial planting

Initial plantings will need to establish suitable pioneer (or nurse) vegetation. Pioneer 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 pioneer 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, pioneer 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.

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 ARC’s Wetland Restoration Factsheet. For coastal sites, refer to the ARC’s Coastal Planting Guides.

Common / Maori Name	Species	Ridges	Hillslopes	Gullies
kahikatea	<i>Dacrycarpus dacrydioides</i>			✓
cabbage tree/ ti kouka	<i>Cordyline australis</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>	✓	✓	✓
kanuka	<i>Kunzea ericoides</i>	✓	✓	
karaka	<i>Corynocarpus laevigatus</i>		✓	✓
karamu	<i>Coprosma robusta</i> or <i>C. lucida</i>	✓	✓	✓
karo (coastal sites)	<i>Pittosporum crassifolium</i>	✓	✓	
koromiko	<i>Hebe stricta</i>	✓	✓	✓
kowhai	<i>Sophora microphylla</i> , <i>Sophora chathamica</i>		✓	✓
mamangi	<i>Coprosma arborea</i>	✓	✓	
manuka	<i>Leptospermum scoparium</i>	✓	✓	✓
matipo/mapou	<i>Myrsine australis</i>	✓	✓	✓
rewarewa	<i>Knightia excelsa</i>	✓	✓	
whau	<i>Entelea arborescens</i>		✓	✓
whiteywood/mahoe	<i>Melicytus ramiflorus</i>	✓	✓	✓
puriri	<i>Vitex lucens</i>		✓	✓



Enrichment planting

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.

Common / Maori Name	Species	Ridges	Hillslopes	Gullies
Coprosma rhamnoides	<i>Coprosma rhamnoides</i>	✓	✓	
hinau	<i>Elaeocarpus dentatus</i>	✓	✓	
horoekea, lancewood	<i>Pseudopanax crassifolius</i>	✓	✓	✓
houpara (coastal sites)	<i>Pseudopanax lessonii</i>	✓	✓	
kahikatea	<i>Dacrycarpus dacrydioides</i>		✓	✓
kanono	<i>Coprosma grandifolia</i>		✓	✓
kauri	<i>Agathis australis</i>	✓	✓	
kawakawa (coastal sites)	<i>Macropiper excelsum</i>		✓	✓
kohekohe	<i>Dysoxylum spectabile</i>		✓	✓
mamangi	<i>Coprosma arborea</i>	✓	✓	
mangeao	<i>Litsea calicaris</i>		✓	✓
miro	<i>Prumnopitys ferruginea</i>	✓	✓	✓
nikau	<i>Rhopalostylis sapida</i>		✓	✓
pigeonwood	<i>Hedycarya arborea</i>	✓	✓	✓
pohutukawa (coastal sites)	<i>Metrosideros excelsa</i>	✓	✓	
pukatea	<i>Laurelia novae-zelandiae</i>			✓
puriri	<i>Vitex lucens</i>	✓	✓	✓
rangiora (coastal sites)	<i>Brachyglottis repanda</i>	✓	✓	
rata	<i>Metrosideros robusta</i>	✓	✓	
rewarewa	<i>Knightia excelsa</i>	✓	✓	
rimu	<i>Dacrydium cupressinum</i>	✓	✓	✓
taraire	<i>Beilschmiedia tarairi</i>		✓	✓
tawa	<i>Beilschmiedia tawa</i>	✓	✓	
titoki	<i>Alectryon excelsus</i>		✓	✓
totara	<i>Podocarpus totara</i> or <i>P. hallii</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 pioneer 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 ARC 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).



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 or cuttings 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.

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.

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)

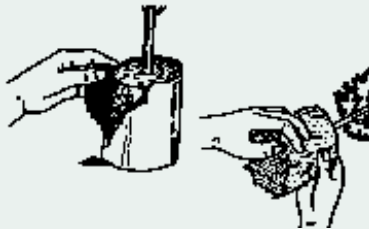


Prepare the planting hole

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 (1cm) ground level 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.



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 this 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 pioneering 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 (e.g. kahikatea, puriri) will eventually be the mature forest species and need more room – plant them 5m apart in amongst smaller, nurse species. If you choose to include ground covers and native grasses in your planting, these should be planted 30 cm 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 is lost or overlooked when doing 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.

“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*, *Macropiper excelsum*, *Melicytus ramiflorus*, *Carex flagellifera*, *Carex lambertiana*, *Microlaena avenacea*, *Microlaena stipoides*, and ferns and treeferns.

In natural forests, the soil supports a diversity of fungi and bacteria, which may be absent in restoration plantings located away from existing natural areas. One way to help establish such communities is to sprinkle leaf litter/forest duff in amongst the plantings. Source this material from the nearest mature forest area, to ensure that only local types are introduced to your restoration site (make sure you are not transporting weeds with this leaf litter and remember to seek relevant permission first!).

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 kereru, fantail and tui, 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 ARC's Welcoming Wildlife brochure or refer to the other useful documents listed below.

To make your site safer and more attractive for native wildlife and to help protect them into the future, consider undertaking animal and plant pest control. The ARC's Biosecurity staff can provide further advice on this.

