2| PLANNING YOUR PLANTING OR RESTORATION PROGRAMME

UNDERSTANDING THE SITE

Consider details such as:

- Location and microclimate - whether coastal (subject to sun, wind, sea salt and shore erosion/deposition) or inland (subject to fog and frost).
- Aspect - a north-facing slope will be markedly drier and more drought-prone than a slope with a southerly aspect.
- Slope - flat and easy slopes offer more options than steep slopes, which require careful plant choice, site preparation and planting.
- Soil type and stability - quite different soils can occur in close proximity; alluvial soils are usually deeper, more fertile and more stable than soils on hillsides; schist soils are more clayey and slip-prone than those formed on greywacke and volcanic rocks; Mineral belt (ultramafic) soils have peculiar combinations of elements that not all plants can tolerate.
- Drainage - wetlands require plants that can handle wet feet; elsewhere a wider range of species can be considered, but they need to be able to withstand dry periods when water levels are low.
- Risk of livestock damage - good fences are essential to protect plantings.
- Presence of animal and plant pests - feral animals can do major damage to new plantings and weeds can overwhelm planting sites unless kept under control.
- Existing native vegetation - what native species are growing naturally at or near the site, under similar conditions, and what shelter the existing native vegetation can provide for new plants.
- Timing of planting to avoid harsh frosts and dry soils, according to local conditions. Early spring planting while soil moisture is still high and after the worst of the frosts are over will give best results, in most areas.
- Stage and condition of existing vegetation (more on this below)

ESTABLISHMENT STAGES

Before people arrived, almost all of the land in North Marlborough was cloaked in forest. The valleys had towering forests of podocarps, beeches and broadleaved trees, festooned with vines and with abundant ferny undergrowth. On the slopes were beech forests, with various podocarps (especially rimu), a lot of kamahi and undergrowth of shrubs and ferns.

Widespread clearance of the original forest vegetation occurred for pastoral farm development. This was followed by a reduction in farmed area which has resulted in large areas of regenerating native vegetation since the 1950s. Vigorous regeneration occurs due to the warm moist climate, relatively fertile soils and proximity of mature forest that provides a seed source from both wind and bird spread seed.

Following natural disturbance, tall native forest gradually re-establishes (as long as seed sources are nearby) via three successional "stages". The first stage is the cover provided by quick-growing pioneer species such as manuka, kanuka, tauhinu, bracken, kamahi, five-finger, karamu, mahoe and tree ferns; the second stage is the development of a more diverse forest with a wide range of broadleaved species and the third stage is the transition back to the dominance of larger long lived forest trees with a complex understorey. These stages are described in more detail below in relation to North Marlborough.

The **first stage** is the establishment of pioneer species. Mostly they are natives such as such as manuka, kanuka, tauhinu, bracken, kamahi, karamu and tree ferns but they can also be exotic species such as gorse, broom and Spanish heath. These provide a nursery for other species to establish within. Mostly they are overtaken quite quickly (within 15 - 30 years), but kanuka grows taller and can remain in the canopy for the best part of a century and kamahi can become large and long-lived also. This stage can also include various weeds including wilding tree species. Weeds such as gorse, broom, blackberry, barberry and Spanish heath are generally not an ecological threat as they will eventually be overtaken, but tree weeds like wilding pines, wattles and hawthorn can become dominant and require control.

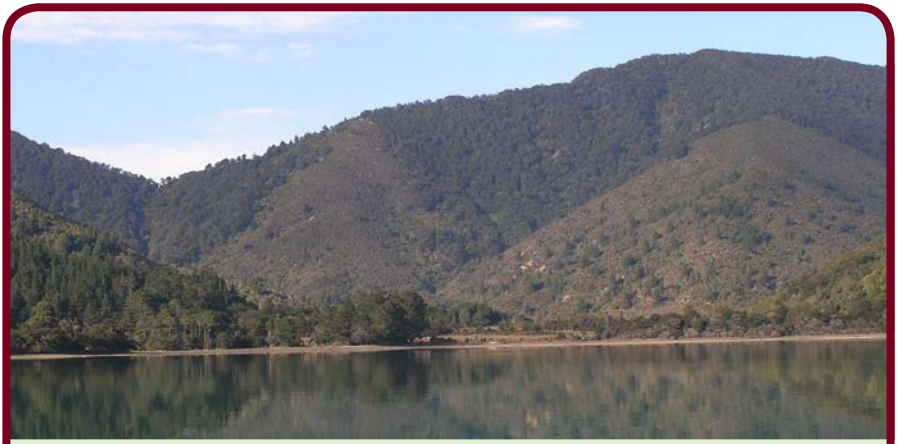
Gorse covered hillsides which will soon be taken over by regenerating native vegetation.

The **second stage** involves the establishment of a wide range of broadleaved trees and shrubs such as akeake, broadleaf, cabbage tree, five finger, hinau, heketara, kaikomako, kamahi, karamu, kawakawa, kohuhu, koromiko, lancewood, mahoe, mingimingi, pigeonwood, putaputaweta, rangiora, rewarewa and wineberry. They are usually accompanied by an array of ferns and ground-cover plants. Tree ferns, especially mamaku, are often abundant in moist or shaded places. These species can form a dense understorey for some time (in the case where the long lived kanuka is the original pioneer species), but usually begin to overtake and form low forests after twenty years or less (where shorter lived species such as gorse or tauhinu are the pioneer species). Broadleaved species provide a rich source of food for birds and gradually transition into taller more complex forests.

First stage kanuka forest with second stage ferns and broadleaved species coming through in the understorey.

The **third stage** is the transition to dominance by longer-lived canopy and sub canopy trees such as beeches, podocarps (rimu, totara, matai, miro and kahikatea) and large broadleaved species (kamahi, tawa, hinau, titoki, nikau, kohekohe, pukatea etc). This eventually results in forests like the existing mature remnants and tracts that are found in the district. This stage is dependent on the local availability of seeds or other plant material; all stages are dependent on lack of disturbance (by fire, mechanical clearance, weather extremes, domestic stock, feral animals or weed invasion).

Some sites would naturally have had different vegetation. Flood-prone stream and river banks would have had tough shrubs, small trees and flaxes. Wetlands and their margins would have had lowland flax, cabbage trees, sedges and rushes. Coastal faces had coastal flax, tough shrubs, silver tussock and a range of herbaceous plants tolerant of constant erosion, intense sun, salt spray and minimal soil. Most of these species are robust enough to plant in the open without a sheltering establishment stage.



Typical pattern of vegetation in the Sounds with mature native forest on the upper slopes and regenerating second stage vegetation on the lower slopes (with scattered wilding radiata pines), re-establishing after being burned and farmed until the 1950s.

Having noted conditions on the site and the native vegetation at the site or growing in similar conditions nearby, you can decide on the species you wish to plant or other management (for instance plant or animal pest control), you wish to put in place.

A well fenced planting of first stage species after three years.

EARLY STAGE PLANTING

Pioneer (or first stage) native plants grow well in the open (retired pasture and bare ground), can be used to suppress competing vegetation (such as grass) and provide protection from sun, wind and frost for subsequent plantings. They also provide habitat for birds, lizards and invertebrates and a nursery for natural establishment of other native species. It is best to densely plant pioneer species, so that canopy cover is achieved quickly (within a few years).

Typical North Marlborough native pioneer species that lend themselves to initial planting include plants that would be occurring in both the first and second stages of natural succession described above and include:

COMMON NAME	LATIN NAME
Akeake	*Dodonaea viscosa*
Akiraho	*Olearia paniculata*
Broadleaf	*Griselinia littoralis*
Cabbage tree	*Cordyline australis*
Coastal shrub daisy	*Olearia solandri*
Flax	*Phormium tenax & P. cookianum*
Kanuka	*Kunzea ericoides*
Karamu	*Coprosma robusta*
Kohuhu	*Pittosporum tenuifolium*
Koromiko	*Hebe stricta & H. parviflora*
Lancewood	*Pseudopanax crassifolius & P. ferox*
Manuka	*Leptospermum scoparium*
Mapou	*Myrsine australis*
Mingimingi	*Coprosma propinqua & C. crassifolia*
Narrow-leaved lacebark	*Hoheria angustifolia*
Ngaio	*Myoporum laetum*
Wineberry	*Aristotelia serrata*

Some of the longer-lived third stage tree species are quite hardy also and can be planted in the open in some circumstances. Lowland totara for example, is relatively frost tolerant and drought hardy so can be planted in the open and will grow faster in the light. Beech species will also establish in direct sunlight but grow better if sheltered from wind.

Exotic species can also be used to provide the initial shelter, for instance a shelter belt of tree lucerne or conifers such as pines. However, species such as pines are increasingly troublesome as ecological weeds in North Marlborough and if they are used to shelter native plantings it is advised that they are viewed as temporary and are removed as soon as the need for shelter ends.

ENHANCING EXISTING VEGETATION (LATER STAGE PLANTING)

In North Marlborough there are extensive areas of naturally regenerating native and exotic vegetation, generally on hill slopes once cleared for pastoral farming. These areas will generally slowly go through a process of vegetation succession without human intervention although the process can be enhanced in a variety of

ways including:

- Plant and animal pest control to assist regeneration
- Interplanting to speed the succession process
- Restoring the understorey in treeland remnants on farms

Plant and animal pest control

The presence of even quite low numbers of either animal and/or plant pests can slow the regeneration and succession process down. In many cases the best management a landowner can apply is active management of pests such as pigs, deer, goat and possums and control of weeds such as wilding pines and climbers like old man's beard, banana passionfruit and Japanese honeysuckle. Each site is different and will require consideration of what type of management is most relevant and how this might be carried out. Along with impacts on native plants, some introduced animal pests also have a serious impact on native animals, including birds, bats, lizards and insects. More detailed information on animal pest and weed control can be found in Chapter 5.

Inter-planting to speed the succession process

Landowners with areas of naturally regenerating vegetation, or who have carried out a native planting from scratch and wish to further speed up the process of regeneration, could add forest species that would not naturally arrive until later in the successional process, by inter-planting third stage plants into first or second stage vegetation. Local forest composition and site conditions should be used as a guide. Plants should be a good size before they are planted out - at least 40 - 60 cm in height. Inter-planting could include third stage species such as:

COMMON NAME	LATIN NAME
Black beech	*Nothofagus solandri*
Kahikatea	*Dacryrcarpus dacrydioides*
Kohekohe	*Dysoxylum spectabile*
Miro	*Prumnopitys ferruginea*
Matai	*Prumnopitys taxifolia*
Red beech	*Nothofagus fusca*
Rimu	*Dacrydium cupressinum*
Tawa	*Beilschmiedia tawa*
Titoki	*Alectryon excelsus*
Totara	*Podocarpus totara*

If inter-planting into well developed existing native vegetation, finding and utilising natural light wells may be all that is required. If interplanting on a bigger scale into exotic scrub like gorse, line cutting using a chainsaw, scrub bar, small excavator or bulldozer could be carried out.

As a general rule the width of the line cut should be about half of the height of the existing vegetation, ie, if being cut into 4 metre high gorse the line should be 1.5 – 2 metres in width. Line cutting is best completed in summer with planting to follow in the winter or spring, allowing time for the cut vegetation to decay and to allow control of any regrowth prior to planting. Further weed control along the lines until plants are well established may be required.

Restoring the understorey in treeland remnants on farms

Treeland remnants on farms can be very bare underneath if stock have had access to them for years. These areas will not last in the long term as the remnant older trees will eventually die out, unless replacement trees are planted or an understorey is allowed to develop, or is planted, underneath. In some instances simply removing stock by securely fencing the area will allow natural regeneration to occur (both from seed sources from the existing trees and from birds importing seed from elsewhere). Where conditions are favourable small seedlings will be evident on the ground under the trees within one to two years. However, if the ground is very compacted or there is rank grass growth, regeneration may not happen without some intervention and understorey planting. Rank grass will need to be sprayed at least six weeks prior to planting. If the treeland is dense enough to form a good canopy cover, plants that are frost tender can be planted (for instance five-finger, wineberry, kohekohe, titoki, akeake), along with a variety of other pioneer species from the first and second successional stages.

Remnant kahikatea, matai and totora trees in farmland, destined to slowly die with no young trees to replace them.

Koromiko school pupils learn about planting native trees (left).
Four year old new plantings under the old remnant trees are getting well established (right).

KOROMIKO FOREST RESERVE RESTORATION PROJECT

This reserve area supports old forest trees including matai, totara and beech species. While the area is owned by the Marlborough District Council it was leased and grazed for several decades until 2002 and so there was no understorey at all and over time as the old trees died out the area would have deteriorated. In 2002 the Council took over the management of the reserve and changed the focus to ecological restoration.

Since 2003 there has been extensive understorey planting, much of it carried out by the Koromiko school students and other community groups. Removing all stock has meant that most plants have done well and natural regeneration can also occur from the seeds from existing trees in the reserve and from birds bringing in new seed as they use the area.

Open areas where long grass had grown were sprayed about six weeks before planting, other areas under the trees did not need spraying before planting. The forest now has a healthy understorey and is developing into a functional lowland forest ecosystem. Toilets, a parking area and tracks through the forest mean that it is very accessible to the public travelling on State Highway 1 between Picton and Blenheim.

Funding for the project has come from the Council but also supported by the Honda Tree Fund over several years. The reserve was put into a Queen Elizabeth II Trust covenant in 2006 which protects it forever from any change of land use.

NOTABLE PLANTS AND RARE ECOSYSTEMS OF NORTH MARLBOROUGH

North Marlborough is home to a suite of plants that are notable because they are endemic (e.g. found only in the ultramafic zone or on the shores of Cook Strait), nationally or regionally threatened, at extremes of geographic distribution or associated with former Maori settlement. Quite a few of these species lend themselves to being propagated and planted out, so long as suitable sites are chosen and they receive special attention if required. That way you can make a contribution to the continued presence of these species in the region, especially if their use in your planting projects is documented. A selection of North Marlborough notable plants is included in the planting lists.

Cook Strait speargrass (foreground) grows only in exposed outer sounds locations.

Naturally rare ecosystems that occur in North Marlborough include dunes, gravel beaches, sea cliff systems, coastal wetlands (including estuarine vegetation) and ultramafic communities. Now rare because of past land use (mostly logging, clearance and drainage for farming) are native forests and wetlands on lowland alluvial flats and terraces (valley floors and coastal flats). Riparian zones in the region have also been highly modified.

If you have any of these rare ecosystems or plants on your property it is worth considering how to best protect and enhance these sites.

ECOSOURCING

Ecosourcing is one of the most important principles of native vegetation restoration. It is a key to successful planting and is the way to protect and celebrate our natural biodiversity. It involves the practice of sourcing plants or propagation material (seeds, cuttings, etc) solely from native plants growing locally, in the wild.

The definition of "local" varies with the species. For example, kanuka and karamu are widespread throughout North Marlborough, and it would be okay to use any North Marlborough material (but not that from South Marlborough). By contrast, swamp maire *(Syzygium maire)* occurs in only a few sites in North Marlborough, isolated from one another, and the nearest source should be used.

It is important to ecosource for three reasons. First, locally sourced stock is well adapted to local conditions, so has a best chance of survival and giving value to local native fauna.

Second, plants within the same species can adapt to local conditions to become genetically (and perhaps physically) distinct. For example, a tarata/lemonwood (Pittosporum eugenioides) tree growing in Nelson may look the same as one in the outer Marlborough Sounds, but there will be subtle differences in form and leaf characteristics and they will have quite different tolerances for frost, drought and wind.

Propagating from plant material of unknown origins risks interbreeding and therefore genetic "contamination" of local flora. This is true for several plants commonly used in revegetation including flaxes, kohuhu, cabbage trees, kowhai, manuka and kanuka.

Third, ecosourcing avoids the risk of planting species which are not native to North Marlborough. Some are potentially invasive and could spread into the wild, changing the nature of our native plant communities. Native species to avoid in an authentically North Marlborough planting include North Island lacebark *(Hoheria populnea)*, North Island kowhai *(Sophora tetraptera)*, karo *(Pittosporum crassifolium,* northern North Island), pohutukawa *(Metrosideros excelsa,* northern North Island) and *Pseudopanax lessonii* (northern North Island). Instead, plant narrow-leaved lacebark *(Hoheria angustifolia)*, local kowhai *(Sophora microphylla and S. molloyi)*, local kohuhu *(Pittosporum tenuifolium and P. colensoi)*, southern rata (Metrosideros umbellata), lancewood and five-finger *(Pseudopanax crassifolius, P. ferox and P. arboreus)*.

Some locally ecosourced plants may be available from local plant nurseries, as native plant nurseries are increasingly interested in producing ecosourcing plant material for restoration planting. Alternatively, you may like to collect your own seed for propagating by a local nursery or by yourself. This will require advance planning and patience, as it will mean at least a year (more likely two) before plants are ready to go in the ground. However, the payback in high plant survival and celebration of your local biodiversity should be worth it.

For seed collection, the closer the seed source to the restoration site, and the more similar the site conditions, the better. If collecting seed from private land permission from the landowner is obviously needed, and collection from conservation land requires a permit. Contact the Nelson/Marlborough Conservancy Office for information on permits (details in Appendices).

Beneath the canopy of rare lowland forest at the Redwood's place before it was fenced (left).
One year later regeneration is already underway with kawakawa and many other small seedlings including kahikatea, matai and kohekohe present (right).

Tony and Joy Redwood, along with their son Phil, farm on the western side of Anakoha Bay in the outer sounds. A survey of the property carried out by an ecologist in 2005 identified six significant natural areas, and since then the Redwoods have carried out protection fencing and weed control in two of these areas. They have also "helped" the regeneration process along in one of them – nine hectares of diverse lowland forest at the head of the bay which includes five podocarp species, including rimu and lowland totara, and several plants of botanical significance including ramarama, small-leaved milk tree *(Streblus heterophyllus)* and an unusual hybrid with the rare large-leaved milk tree *(S. banksii)*.

Joy explains that while vigorous regeneration is happening naturally in parts of the forest now that stock are fenced out, other more open areas that get swamped with long grass could do with a helping hand to speed the process along. She has tried directly transplanting some species like cabbage trees but mostly she pots up excess natives like titoki, lacebark, whitey wood (mahoe), kaikomako and kohekohe when they are small and plants them out into the sprayed open areas a year or two later when they are a minimum of 30 cm high.

Joy says, "It's just basic gardening really, I hate waste and if a plant is going to be removed or is in the way of another plant it may as well be relocated. We just thought it was a way of increasing the plantings, particularly in areas where pasture has been fenced off and it's open and light."