



# Toitū te marae a Tāne

Restoration Planting Sites





# Ihirangi

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Toitū te marae a Tāne-mahuta,  
Toitū te marae a Tangaroa,  
Toitū te tangata.

If the land is well and the sea  
is well, the people will thrive.

Our Council vision - 'Kiā mahi ngātahi mō Poneke mō tona āpōpō' 'Working together for Wellington's future', is most beautifully illustrated by the way Council and community are working together to protect and restore the natural environment of this place.

Our vision is for our city to again be ringed with dense indigenous forests, feeding restored healthy streams, wetlands, and coastal environments. It is for forests echoing with native birdsong and the buzz of insects and scurry of native lizards. It is for streams filled with īnanga and kōura. It is for great rātā, rimu and kahikatea dominating the treescape, above an understorey of lower trees and impenetrable vines and ferns.

Wellington was once cloaked in forest just like this before most of it was lost to fire and axe. However since 1992 Wellington City Council and thousands of Wellingtonians have been working together on an incredible restoration journey.

We've established the globally renowned Zealandia, which with Otari-Wilton's Bush is at the heart of this restoration vision. Over nearly 30 years, Council has acquired huge tracts of land to create our Outer Green Belt. This landscape is rapidly regenerating from largely grass and gorse, supported by sustained pest management and over 120 community groups undertaking active restoration - weed control, planting and predator control all over our city. Many thousands more householders are backyard trappers. This is truly community wide kaitiakitanga.

Our exciting journey together continues. 'Toitū te marae a Tāne' is a guide to how best to plant and restore precious taonga, from planning a restoration project, to what to plant and where to plant in Wellington's diverse natural environment. I know from my own hands-on involvement, that it will be a wonderful resource for us all in our restoration work.

Mana tiaki,

We care for these places, to protect the environment for its own sake and for future generations.



Mayor Andy Foster



“Nature is a vacuum, as soon as you pull something out, it will fill back up again with a weed – especially in Wellington where the wind blows seed around all the time. So, start small, really small, so you can keep the ‘unfun’ stuff like weeding under control.”

Sue Reid, Owhiro Bay

# Te whakamahere kaupapa whakatō tipu

## Planning your planting project

Restoration planting in Wellington requires careful plant selection, matching plants to site conditions, ground preparation and ongoing management. Before putting plants in the ground, take the time to assess your site, talk to people who could help, and make a plan.

"Right plant in the right place."

This is a guide to understanding specific habitats and how to restore them in your local context. It should be read alongside *Restoration Planting Techniques*.

### 1. What do you want to achieve? Do you want to restore an existing site, encourage birds, create a community project etc?

Check out other restoration projects on similar sites and find out how they have been done.

### 2. Where is your site, what are the conditions and what does it look like now?

Map out or draw your proposed site. Council Webmaps has downloadable maps that show existing vegetation and property boundaries. Include key features like existing native plants and weeds, animal pests, conditions like shelter, wet/dry areas, prevailing winds, special habitats etc.

### 3. Who can help?

Contact your local Wellington City Council Ranger or another community group/landowner doing similar work. Council Rangers can help with selection and sourcing of plants, animal control and weed clearance on public land, communication between other organisations etc. If your project is larger than your own backyard, think about who you could get involved like neighbours, local pest control groups, schools, recreational groups etc. If you are working on public land you need to work with Council to establish a joint work program and get permission. For example, any weed spraying needs to be done by Council contractors. Council will help to develop an MOU with your group that sets out everyone's responsibilities.

Wellington City Council Rangers 04 499 4444

### 4. What work will you do, when and how?

Write a plan that sets out the work that needs to be done and when. This helps to ensure for example that all the weeding and pest control is done before your plants go in the ground. It is useful to have a 5 year plan at least in Wellington because it takes time for plants to grow, particularly on windy and exposed sites. Make your plan 'fit for purpose' - include the information you (and your group) need - it doesn't have to be onerous. Talk your plan over with your Council Ranger, particularly if you need assistance with work on public land as Council needs to plan ahead for contractors and growing plants.

### 5. Site prep, planting and monitoring - make it happen!

Getting the ground ready and getting your plants in is really rewarding. Check out Wellington City Council resources for each stage you are at, talk to others doing restoration planting or your local Council Ranger for advice, assistance and inspiration.

# Ngā tāhuahua, ngā ākau tokatoka me ngā whīra pātītī

## Sand dunes, rocky shore and turf fields

Wellington's coastal fringe is a wild and dynamic mix of dunes, rocky foreshore and turf fields (or herb fields). A history of clearance and development for housing, roading, rail and industry has significantly changed the shape and nature of the coastal fringe native plant and animal communities.

Restoring these areas provides habitat for species like banded dotterel, little penguin and geckos. It also helps to bring back some of Wellington's unique plant species that would once have clung to the rocks, sprawled across the gravels, and hugged the sands.





# Ngā tāhuahua

## Sand dunes



Coastal dunes remain in small pockets from Owhiro Bay around the coast to Karori Stream.

These tiny areas are the best remaining dune sites in Wellington. This section of the South Coast is the only site in the North Island where Marlborough ‘Minimac’ geckos occur.

Other dune areas, like Lyall Bay, Seatoun and Worsler Bay, are much narrower than they would have been originally and are managed to balance both the ecological and recreational values of Wellingtonians.

The aim of restoration planting on sand dunes is to establish the foredune with spinifex and pīngao and progressively plant the backdune where there is space. This will increase diversity and natural resilience.



(Above) Three children, sitting on a hillside, look down over Lyall Bay, toward Moa Point. Taken circa 1895.

(Left) Lyall Bay with Moa Point in the background. Note the airport and area of housing that is now covering all of the dune area, August 2020. The dune area is now restricted to a narrow strip due to housing and road infrastructure. The dunes in 1895 were quite extensive and would have had a full foredune and backdune structure.



(Left) Spinifex seedling exposed by wind action. Plant sand binding species deeply or they will be blown out of the dune in the Wellington winds.

(Right) Spinifex, growing well at Princess Bay.

# Nōhanga Habitat

## Foredunes and backdunes

Sand dune systems are naturally dynamic. Sand is constantly moving between the sea, beach and the dunes. This process is hardly noticeable most of the time but can be dramatic during storms.

During storm events, large waves erode the beach level, depositing sand out to sea as sand bars.

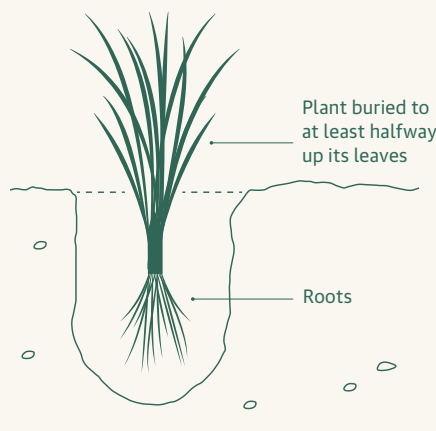
Following storm events, the sand is slowly deposited back on shore and blown back into the foredunes (dune closest to the sea).

Our two native foredune plants, spinifex and pīngao, are specially adapted to catch this windblown sand and trap it to re-build dunes. Both plants are stimulated to grow when they are buried by windblown sand. They send out trailing roots that grow and move with the sands, effectively 'binding' the sand to form low, regular and stable dunes. The width of the dune area, dune sand binders and accumulating driftwood all help to trap the drifting sand.

Behind the foredunes, further from the sea, are the backdunes. These are typically sedges and rushes merging into coastal shrubs. Very few areas of naturally occurring backdunes remain in Wellington because they have been heavily modified by development and separated from foredune areas by roads.

Backdunes are more stable than foredunes and support a wider range of species. Although slightly less exposed than foredunes, they are still prone to salt spray and wind during storms. Plants need to be firmly planted into the ground and, if in sand, buried past the crown to ensure survival.

Diagram of planting spinifex and pīngao



## Tips for planting spinifex and pīngao on the foredunes

You may need to fence off your planting site to reduce any damage from people and dogs. Make sure public accessways are clearly defined. Talk to a Wellington City Council Ranger for advice.

Marram grass, an exotic species, was planted on many dunes in Wellington in the 1900s. It is invasive and forms tall steep, less stable dunes. Remove all marram before planting unless you have a very large site where removing it all at once may cause significant sand loss.

Plant spinifex and pīngao on the toe of the dune, above the high tide mark.

When setting plants out, follow the natural curves of any existing vegetation or plant in groups. Avoid planting in straight lines as this will cause wind funnelling.

Space plants no more than 50cm apart.

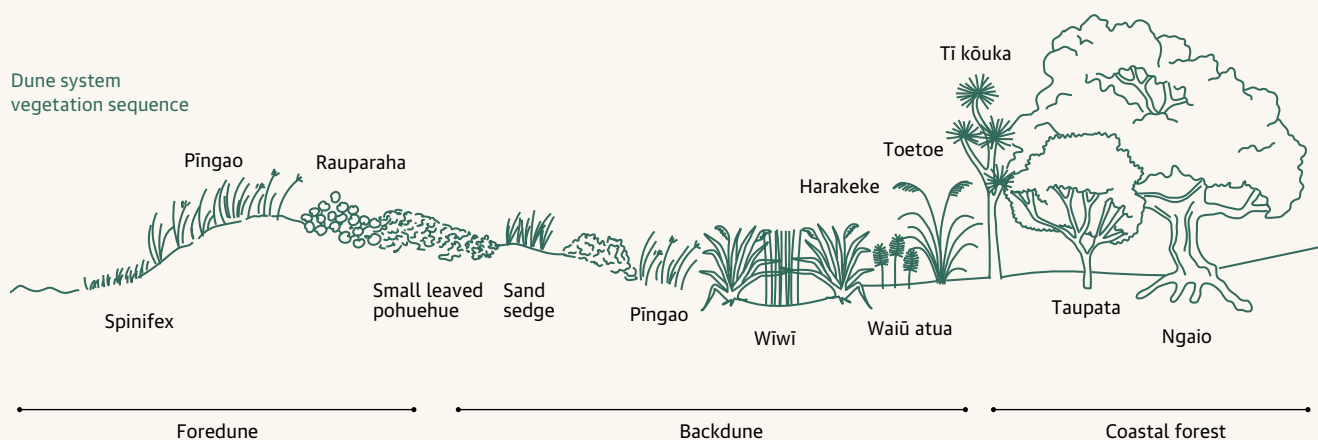
Place one single slow release fertiliser tablet in the bottom of each planting hole to assist with initial plant establishment or apply fertiliser around the plant during the growing season.

Bury spinifex and pīngao partway up the leaves when planting, preferably in contact with moist sand.

Rabbits will eat young dune plants. Use rabbit repellent and protect seedlings on the backdune with tree shelters.

Common dune weeds are lupin, climbing dock, sea couch and gazania. Hand pulling is often the best way to remove these weeds on dunes because of the loose sandy soils.

Foredune with pīngao spreading out by runners and back dune with wīwī and coastal shrubs, Tarakena Bay.



## Plant list for sand dunes in Wellington

Sand dunes	Planting site	Life form	Plant preferences & tolerances					Abundance		
			Fore dune	Back dune	Soil moisture needs	Light levels	Frost tolerant	Wind tolerant	Early stage / initial planting	Later stage / shelter established
Pīngao / Golden sand sedge	<i>Ficinia spiralis</i>	Sedge	•	•	Semi-moist	Sun	Moderate	✓	+++	
Kōwhangatara / Spinifex	<i>Spinifex sericeus</i>	Grass	•		Semi-moist	Sun	Moderate	✓	+++	
Sand sedge	<i>Carex pumila</i>	Sedge	•	•	Semi-moist	Sun	Moderate	✓	++	
Hinarepe / Sand tussock	<i>Poa billardierei</i>	Grass	•		Semi-moist	Sun	Moderate	✓		+
Sand bidibidi	<i>Acaena pallida</i>	Herb		•	Semi-moist to dry	Sun	Moderate	✓		+
Rauparaha / Shore bindweed	<i>Calystegia soldanella</i>	Herb	•	•	Semi-moist to dry	Sun	Moderate	✓		++
Wīwī / Knobby club rush	<i>Ficinia nodosa</i>	Sedge		•	Moist	Sun	Moderate	✓	++	
Sand coprosma	<i>Coprosma acerosa</i>	Scrub		•	Semi-moist to dry	Sun	Moderate	✓		++
Waiū-atua / Shore spurge	<i>Euphorbia glauca</i>	Herb		•	Semi-moist	Sun	Moderate	✓		+
Small leaved pohuehue	<i>Muehlenbeckia complexa</i>	Scrambler		•	Semi-moist to dry	Sun	✓	✓	++	
Harakeke / Flax	<i>Phormium tenax</i>	Flax		•	Moist	Sun	✓	✓		++

+ use sparingly   ++ use commonly   +++ use plentifully   ✓ yes   • categorised



# Ngā tāhuahua me ngā whīra pātītī

## Rocky shore and coastal turf fields

Wellington’s rocky shore is made up of rocky outcrops interspersed with debris fans spilling out of gullies, gravel beaches and coastal turf fields. Rocky shore plants are adapted to tolerate salt, infertile soil, wind and drought. They have thicker, shorter, fleshier leaves and will grow to the conditions, often appearing sculptured by the wind. The hardy mingimīngi can grow to 3m tall in a sheltered site but will grow as a low cushion along the Wellington coastal fringe.

Rocky shore vegetation is sadly depleted in Wellington. Remnants of natural vegetation can be found clinging to rocky outcrops, like thick leaved māhoe, small leaved pohuehue and other wind sculpted shrubs. Between these plants are small pockets of native grasses, sedges and herbs.

Coastal turf fields are classified as nationally critically endangered and few remain intact in the country. A few areas still remain on Taputeranga Island, Houghton Bay and around the South Coast.

### Tips for rocky shore and turf fields

Shelter is key in these areas - use a limited range of very hardy plant species in the first few years to establish shelter and then gradually add in other types of plants.

These areas often have very compacted ground/soil. When planting, look for natural shelter at the base of rocks or close to existing vegetation to plant in to. These areas often have higher moisture levels.

Add coastal stone mulch to help retain moisture.

Control weeds and animal pests to help seedlings naturally regenerate.



(Above) Newly planted area at Oruaiti Reserve, including taupata, oioi, silver tussock and wharariki. Taupata plants can be seen clinging to the cliff faces and foreshore.

(Below) Planting is slowly establishing at this extremely windy site on the rocky shore at Te Raekaihau Point. Silver tussock is one of the few plants that will survive this tough environment.



New Zealand celery and glasswort, sheltering at the base of rocks. Many seepage plants such as glasswort are difficult to grow in nurseries and are best left to naturally establish.

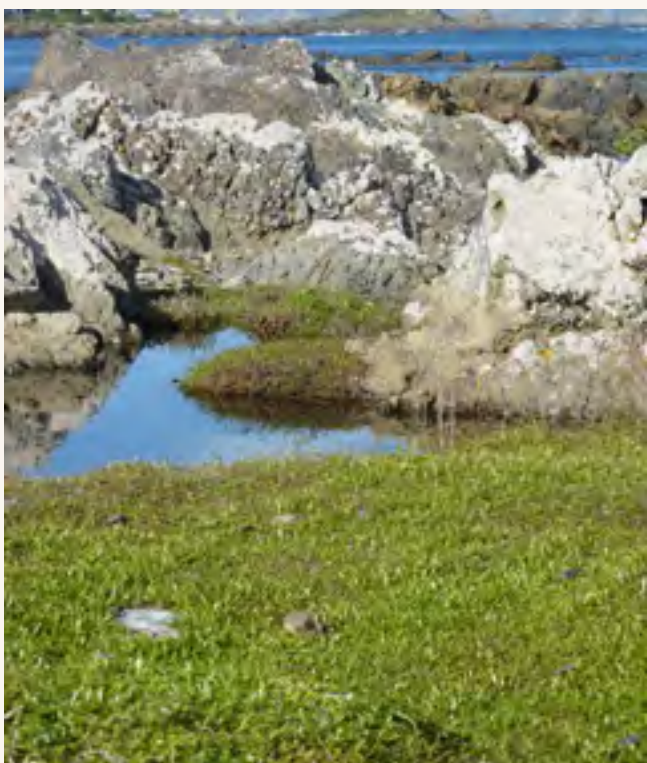
Coastal turf fields contain ground-hugging short herbs, grasses and sedges. They usually form on solid exposed rock headlands with a layer of peat or consolidated sands and gravel. These areas are prone to constant salt-laden winds and wave splash and occasional inundation during high tides or storm surges. They are often damaged in storm events and from trampling. Plants growing in these zones are halophytic - salt tolerant.

Within pockets of rocks throughout the rocky shore and turfs are small brackish wet areas called seepages, often supporting salt marsh ribbonwood and oioi.

(Left) A coastal turf, area of brackish water surrounded by remuremu and shore primrose. This type of environment is often damaged in storms or from trampling.

Often, the best management for rocky shore and turf fields is to control the weeds and leave the rest to nature. Wellington City Council is undertaking weed management at sites around the South Coast to protect these areas from exotic weed species.

(Right) Rocky shore planting at Ōwhiro Bay. Image Sue Reid.



## Plant list for rocky shore in Wellington

Rocky shore		Life form	Plant preferences & tolerances				Abundance	
Māori/ Common name	Botanical name		Soil moisture needs	Light levels	Frost tolerant	Wind tolerant	Early stage / initial planting	Later stage / shelter established
Blue wheat grass	<i>Anthosachne solandri</i>	Grass	Semi-moist	Sun	✓	✓		+
Coastal tree daisy	<i>Olearia solandri</i>	Shrub	Semi-moist	Sun	✓	✓	++	
Horokaka / NZ ice plant	<i>Disphyma australe</i>	Herb	Semi-moist	Sun	Frost tender	✓	++	
Māhoe / Thick leaved māhoe	<i>Melicytus crassifolius</i>	Stout bushy shrub, 1.5m	Semi-moist	Sun	Moderate	✓		+
Mingimingi	<i>Coprosma propinqua</i>	Shrub	Semi-moist	Sun	✓	✓	+++	
Pinātoro	<i>Pimelea prostrata</i>	Herb	Semi-moist	Sun	Moderate	✓		+
Broadleaved poa	<i>Poa anceps</i>	Grass	Semi-moist	Sun	Moderate	✓		+
Silver tussock	<i>Poa cita</i>	Grass	Semi-moist	Sun	✓	✓	+++	
Pohuehue / Small leaved pohuehue	<i>Muehlenbeckia complexa</i>	Scrambler	Semi-moist	Sun	✓	✓	+++	
Puawānanga / Small white clematis	<i>Clematis forsteri</i>	Climber	Semi-moist	Sun	Moderate	✓		+
Rauparaha / Shore bindweed	<i>Calystegia soldanella</i>	Herb	Semi-moist	Sun	Moderate	✓	+	
Sand coprosma	<i>Coprosma acerosa</i>	Ground cover / Shrub	Semi-moist	Sun	Moderate	✓		+
Sand sedge	<i>Carex pumila</i>	Sedge	Semi-moist	Sun	Moderate	✓	++	
Scab weed	<i>Raoulia hookeri subsp. hookeri</i>	Herb	Semi-moist	Sun	Moderate	✓		+
Taramea	<i>Aciphylla squarrosa var. squarrosa</i>	Herb	Semi-moist	Sun	✓	✓		++

+ use sparingly    ++ use commonly    +++ use plentifully    ✓ yes    • categorised



## Plant list for rocky shore in Wellington (cont.)

Rocky shore		Life form	Plant preferences & tolerances				Abundance	
Māori/ Common name	Botanical name		Soil moisture needs	Light levels	Frost tolerant	Wind tolerant	Early stage / initial planting	Later stage / shelter established
Tauhinu	<i>Ozothamnus letophyllus</i>	Shrub	Semi-moist	Sun	Moderate	✓		++
Taupata	<i>Coprosma repens</i>	Shrub	Semi-moist	Sun	Frost tender	✓	++	
Toetoe	<i>Austroderia toetoe</i>	Grass	Semi-moist	Sun	✓	✓	++	
Waiū atua/ Shore spurge	<i>Euphorbia glauca</i>	Herb	Semi-moist	Sun	Moderate	✓		+
Wharariki/ Mountain flax	<i>Phormium cookianum subsp. hookeri</i>	Herb	Semi-moist	Sun	✓	✓	+++	
Wīwī/ Knobby club rush	<i>Ficinia nodosa</i>	Sedge	Semi-moist	Sun	Moderate	✓	+++	

+ use sparingly   ++ use commonly   +++ use plentifully   ✓ yes   • categorised

## Plant list for coastal turf fields and seepages

Coastal turfs & seepages (seep's)		Site type		Plant type	Plant Preferences				Abundance	
Māori/ Common name	Botanical name	Turfs	Seeps	Plant type	Soil moisture needs	Light levels	Frost tolerant	Wind tolerant	Early stage / initial planting	Later stage / shelter established
Oioi	<i>Apodasmia similis</i>	•	•	Sedge	Semi-moist	Sun	Moderate	✓	+++	
Remuremu	<i>Selliera radicans</i>	•	•	Herb	Semi-moist	Sun	✓	✓	+	
Salt marsh ribbonwood	<i>Plagianthus divaricatus</i>		•	Shrub	Semi-moist	Sun	Moderate	✓	+	
Kāpūngāwhā / Lake clubrush	<i>Schoenoplectus tabernaemontani</i>		•	Rush	Semi-moist	Sun	✓	✓	++	
New Zealand Celery	<i>Apium prostratum subsp. prostratum</i>	•	•	Herb	Semi-moist	Sun	✓	✓	++	

+ use sparingly   ++ use commonly   +++ use plentifully   ✓ yes   • categorised

# Ngā kūrae me ngā paripari takutai

## Coastal headlands, cliffs and escarpments

Steep faces along the Wellington coastline are home to a surprising range of hardy plants. Often called coastal or grey scrub, these plant communities are dominated by clumps of wharariki, interspersed with broad-leafed poa and taupata or tauhinu. Orchids, ferns and herbs nestle amongst the larger shrubs and cling to craggy rock faces. These plants are adapted to survive blustering salt-laden winds and very little water. They provide habitat to several unique species including the Hutton's speargrass weevil and geometrid moth.

One of Wellington's important plant communities grey scrub, is found from Oruaiti around to Whitirea on the coastal escarpments and across the harbour. Grey scrub includes climbers like pohuehue and woody shrubs with fine, right-angled branches that grow in tangled mats. The nationally endangered shrub tororaro and regionally threatened matagouri both naturally grow amongst grey scrub.



Restoring these areas is slow going and requires hardy plants and hardy humans to look after them! They are often overrun with thick gorse and other equally tough weeds. The aim of planting projects at these sites is to plant natives between or within the gorse bushes, rocks and natural outcrops. The gorse acts as a shelter for young seedlings and the site is not opened up to the wind.

**Tips for planting on and around headlands, cliffs and escarpments**

Safety first! Watch out for loose rocks.

Ensure all seedlings to be planted are hardened off to salt spray and wind before planting them. Do this by slowly introducing them to the conditions, salt spray and wind, before planting them.

One of the biggest threats to young plants in these areas is browsing from rabbits and hares. Carry out rabbit control before planting and monitor animal damage throughout your project.

Shelter is key to establishing plants in these areas. Plant young plants firmly in the shelter of existing vegetation and rock formations, where there are gullies between landforms, plant taller shrubs and trees.

If there is gorse present, clear small areas between the bushes and plant into them. The gorse will act as a shelter while the young plants establish. Keep the cleared areas small so wind can't funnel through the site between young seedlings.



(Above) Coastal cliffs and scree slope with pockets of sand, tussock, flax and scab weed, Te Kopahau, South Coast.

(Middle) Silver tussock establishing well in the lower quarried areas of Te Hape Stream.

(Below) The nationally endangered tororaro, South coast, growing amongst grey scrub.



## Plant list for coastal headlands, cliffs, escarpments & gullies

### Coastal headlands, cliffs & escarpments

Māori/ Common name	Botanical name	Life form	Plant preferences & tolerances				Abundance	
			Soil moisture needs	Light levels	Frost tolerant	Wind tolerant	Early stage / initial planting	Later stage / shelter established
Akiraho / Golden akeake	<i>Olearia paniculata</i>	Dense shrub, 4m	Dry to semi-moist	Sun	✓	✓	++	
Blue wheat grass	<i>Anthosachne solandri</i>	Grass	Dry to semi-moist	Sun to semi shade	Moderate	✓		+
Coastal tree daisy	<i>Olearia solandri</i>	Bushy shrub 3m	Dry to semi-moist	Sun	✓	✓	++	
Common broom	<i>Carmichaelia australis</i>	Shrub 3m	Semi-moist	Sun	✓	✓		++
Cook Strait kōwhai	<i>Sophora molloyi</i>	Shrub up to 3m	Dry to semi-moist	Sun	Moderate	✓		++
Cook Strait melicytus	<i>Melicytus orarius</i>	Shrub	Semi-moist	Sun	Frost tender	✓		+
Tree Hebe	<i>Veronica parviflora</i>	Bushy shrub 2-4m	Semi-moist	Sun	✓	✓	+++	
Horokaka, NZ ice plant	<i>Disphyma australe</i>	Ground cover	Semi-moist to dry	Sun	Frost tender	✓	++	
Karamū, shining karamu	<i>Coprosma lucida</i>	Shrub 3m	Semi-moist to dry	Sun to semi shade	✓	✓		++
Kōkihi, NZ spinach	<i>Tetragonia implexicoma</i>	Herb	Semi-moist to dry	Sun	Frost tender	✓	++	
Koromiko	<i>Veronica stricta</i>	Shrub, up to 4m	Semi-moist	Sun	✓	✓	++	
Matagouri	<i>Discaria toumatou</i>	Shrub	Semi-moist to dry	Sun	Moderate	✓		+
Mingimingi	<i>Coprosma propinqua</i>	Shrub	Semi-moist	Sun	✓	✓	+++	
Mīkoikoi / NZ iris	<i>Libertia ixioides</i>	Flax-like shrub, 0.7m	Dry to semi-moist	Sun to semi-shade	✓	✓		+
Pinātora / NZ daphne	<i>Pimelea prostrata</i>	Herb	Semi-moist	Sun	Moderate	✓		+

+ use sparingly   ++ use commonly   +++ use plentifully   ✓ yes   • categorised

Note: In the table above a 'herb' is a plant that is not woody and a 'shrub' has a hard woody stem with branches but no defined trunk.

## Plant list for coastal headlands, cliffs, escarpments & gullies (cont.)

Coastal headlands, cliffs & escarpments		Life form	Plant preferences & tolerances				Abundance	
Māori/ Common name	Botanical name		Soil moisture needs	Light levels	Frost tolerant	Wind tolerant	Early stage/ initial planting	Later stage/ shelter established
Poa/ Broadleaved poa	<i>Poa anceps</i>	Grass	Semi-moist	Sun to semi-shade	✓	✓	++	
Puawānanga/ Small white clematis	<i>Clematis forsteri</i>	Climber	Semi-moist	Sun	✓	Moderate		++
Rangiora	<i>Brachyglottis repanda</i>	Shrub 3m	Semi-moist to dry	Sun to semi shade	Moderate	✓		++
Scab weed	<i>Raoulia hookeri subsp. hookeri</i>	Herb	Semi-moist to dry	Sun	Moderate	✓		+
Silver tussock	<i>Poa cita</i>	Grass	Semi-moist to dry	Sun	✓	✓	+++	
Small leaved pōhuehue	<i>Muehlenbeckia complexa</i>	Scrambler	Semi-moist to dry	Sun	✓	✓	+++	
Taramea	<i>Aciphylla squarrosa var. squarrosa</i>	Herb	Semi-moist	Sun	✓	✓		+++
Tauhinu	<i>Ozothamnus leptophyllus</i>	Shrub 1-2m	Semi-moist to dry	Sun	✓ When Mature	✓	++	
Taupata	<i>Coprosma repens</i>	Shrub / small tree up to 4-6m	Semi-moist	Sun	✓ When Mature	✓	+++	
Thick leaved māhoe	<i>Melicytus crassifolius</i>	Shrub	Semi-moist	Sun	Moderate	✓		++
Ti kōuka/ Cabbage tree	<i>Cordyline australis</i>	Tree up to 20m	Moist	Sun to semi-shade	✓ When Mature	✓		+
Toetoe	<i>Austroderia toetoe</i>	Grass	Semi-moist	Sun	✓	✓	++	
Tororaro	<i>Muehlenbeckia astonii</i>	Shrub up to 4m	Dry to semi-moist	Sun	✓	✓		+
Wharariki / Mountain flax	<i>Phormium cookianum subsp. hookeri</i>	Flax up to 1.5m	Dry to semi-moist	Sun	✓	✓	+++	

+ use sparingly   ++ use commonly   +++ use plentifully   ✓ yes   • categorised

# Ngā puketai me ngā awaawa takutai

## Coastal hillsides and gullies

Coastal forest in Wellington City has a character all of its own. Unlike other parts of the country where pohutukawa is the iconic coastal species, in Wellington our coastal forests are naturally dominated by Northern rātā and kohekohe along with ngaio, akiraho, wharangi and kōwhai. Remnants of old coastal forest cling to the steep Wellington harbour escarpment stretching along the motorway from the Ngauranga Gorge to Petone and survive in pockets in gullies around the South Coast. A good example well worth visiting is Te Hape Stream in Te Kopahou Reserve where spectacular tree hebe are interwoven with native jasmine and native clematis.

In the past, geckos, skinks and tuatara would have scurried through the forest floor amongst tīti, little penguin and kiwi burrows. The forest would have been alive with insects in summer and kākā, tīeke and tūi would be heard squawking through the trees.

The surviving forest remnants and the areas being restored are very important for the returning native wildlife. Helping to restore and plant additional sites will extend the habitat and feeding grounds for these species.

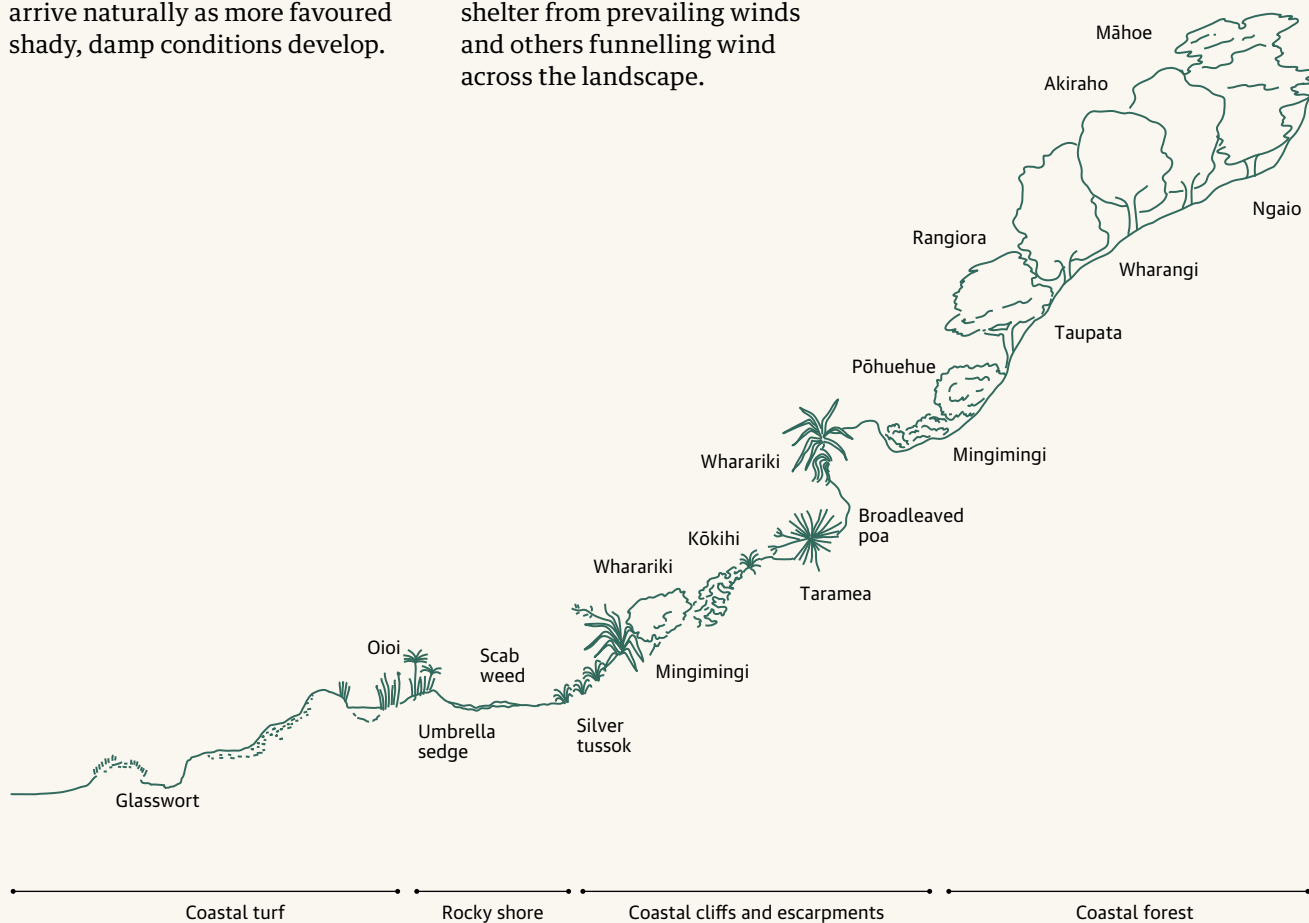




# Nōhanga Habitat

Forests grow in layers over time. Hardy shelter plants like kānuka and mānuka will grow first and provide shelter to species like kohekohe, wharangi and māhoe to grow through and form a canopy. Taller ‘emergent’ trees will grow through this canopy. Ferns, ground covers and forest floor shrubs often arrive naturally as more favoured shady, damp conditions develop.

A range of conditions occur in coastal gullies and hillsides. Gullies and valleys tend to have higher moisture content and more fertile soils. Hillsides are freer draining and higher sunlight. Wind conditions depend on the aspects of the gully or hillsides, some offering shelter from prevailing winds and others funnelling wind across the landscape.



# Te whakatō tōmua/matua

## Early stage/initial planting

The goal of early stage restoration planting in coastal forests is to establish shelter. Select early stage species from the plant list on the next page spread.

Coastal forest often establishes first in gullies, where there is more shelter and moisture, then gradually spreads out into more exposed, drier zones. This is a useful model to follow with restoration planting.



(Above) Coastal forest in Te Kopahau Reserve, starting to establish in gullies.

(Right) Well established coastal forest on the Harbour escarpment, predominantly māhoe and wharangi. Some species won't tolerate being planted directly into windy, salt laden sites - for example, even though māhoe covers much of Wellington's hills, it is difficult to establish without shelter.



(Below) Coastal forest early stage plants on exposed site, Oku St





# Te whakatō ā muri ake/whakarākei

## Later stage/enrichment planting

Once shelter has been established and a canopy of low shrubs is visible (three to five years) the next stage of vegetation can be added. These trees and shrubs will eventually form the coastal forest canopy. Many of them are not wind tolerant when they are young, but will be once they mature.

### Tips for planting on coastal hillsides and in gullies

Choose early stage species to create shelter. Plants that are frost tender, have low wind tolerance or need shade, will not survive open conditions.

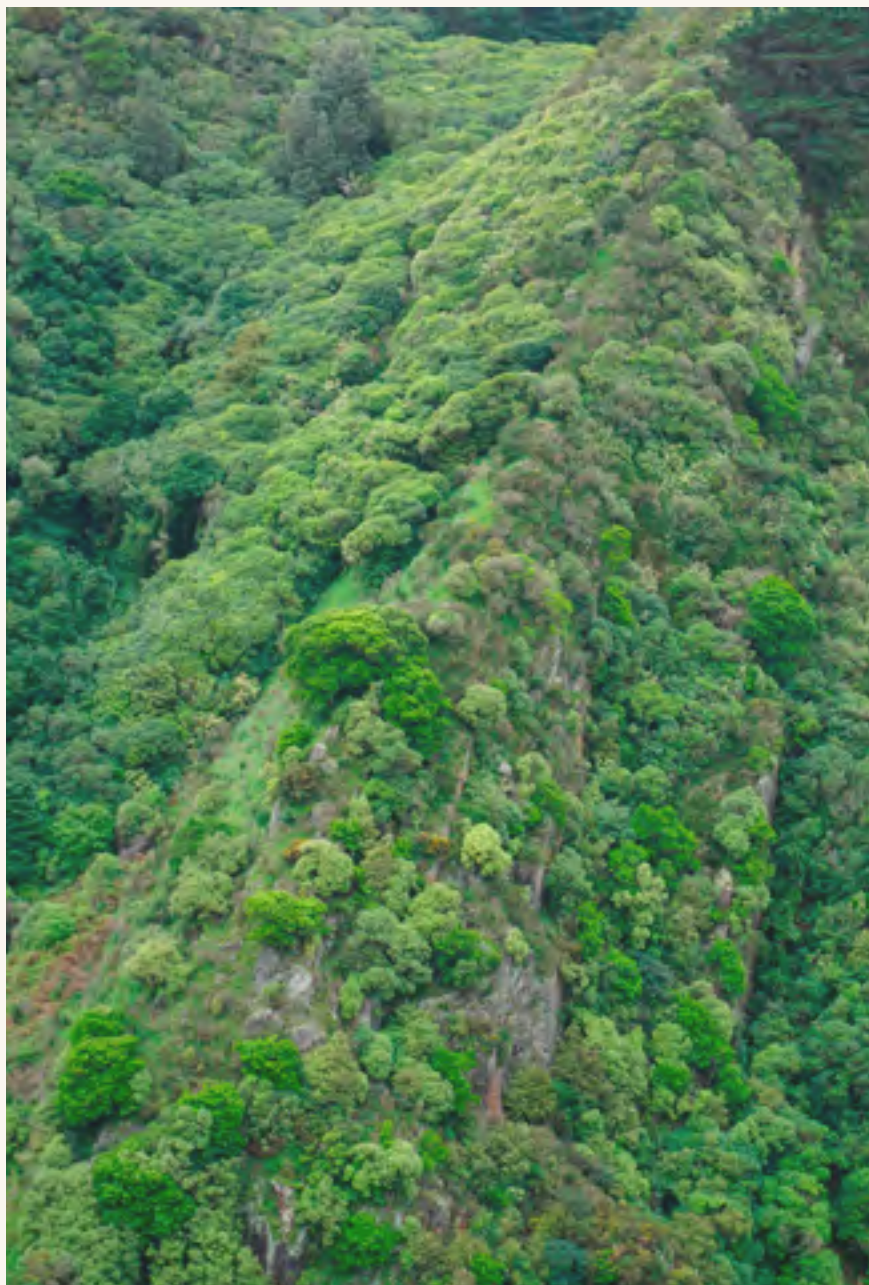
Choose smaller, stockier plants that have been hardened to coastal salt and wind before planting, often plants straight from the nursery can be too "soft" for coastal conditions. Harden off seedlings by slowly exposing them to the salt air while they are still in their planter bags.

Plant at around 1m spacings using the sheltered side of rocks, existing vegetation (including gorse) as shelter. Use tree shelters to reduce wind exposure and damage by rabbits or possums.

In areas where soil moisture is low, consider using crystal rain to improve the conditions, or water the plants. See *Restoration Planting Techniques* for the Wellington Conditions for further information.

Once shelter is established, or where shelter already exists, plant in between existing species with later stage/enrichment plants. Timing is important, as these plants are still dependent on light for good growth. Plant before the canopy closes.

Control weeds around both planted and naturally occurring native seedlings.



(Above) Taller canopy species starting to emerge through a māhoe canopy. A lone nīkau and rewarewa, top centre of the gully. Akapuka and akiraho colonise the exposed ridges, Ngauranga Gorge.



## Plant list for coastal forest in gullies and on hillsides

Māori/ Common name	Botanical name	Life form			Plant preferences & tolerances				Abundance	
		Exposed hillsides	Sheltered sites / gullies	Under canopy	Soil moisture needs	Light levels	Frost tolerant	Wind tolerant	Early stage / initial planting	Later stage / shelter established
Akapuka	<i>Griselinia lucida</i>	•	•		Bushy shrub to 5m or epiphyte	Dry to semi-moist	Sun	Frost tender	✓	+
Akiraho / Golden akeake	<i>Olearia paniculata</i>	•	•		Dense shrub, 4m	Dry to semi-moist	Sun	✓	✓	++
Coastal tree daisy	<i>Olearia solandri</i>	•			Bushy shrub 2 -3m	Dry to semi-moist	sun	✓	✓	++
Common broom	<i>Carmichaelia australis</i>	•			Bushy shrub 3m	Well drained	Sun	✓	✓	+
Cotula	<i>Leptinella squalida subsp. squalida</i>			•	Herb	Semi-moist to dry	Sun to shade	✓	✓	+
Whauwhau- paku	<i>Pseudopanax arboreus</i>	•	•		Small tree, up to 6m	Semi-moist	Sun to semi- shade	✓	✓	++
Hangehange / NZ privet	<i>Geniostema ligustrifolium var. ligustrifolium</i>		•		Small tree, up to 3m	Semi-moist	Shade	Frost tender	Sheltered	+
Tree Hebe	<i>Veronica parviflora</i>	•	•		Bushy shrub 2-4m	Semi- moist	Sun	✓	✓	+++
Hīnau	<i>Elaeocarpus dentatus</i>		•		Canopy tree, 20m	Semi-moist	Semi- shade	✓ When mature	Sheltered	+
Kaihua / NZ jasmine	<i>Parsonsia heterophylla</i>	•	•		Climber,	Semi-moist	Semi- shade	✓	Moderate	+
Kaikōmako	<i>Pennantia corymbosa</i>		•		Small tree, up to 8m	Semi-moist	Sun to semi- shade	✓ When mature	✓	+
Kānuka	<i>Kunzea robusta</i>	•	•		Tree up to 10m	Dry to semi moist	Sun to semi- shade	✓	✓	++
Karamū	<i>Coprosma robusta</i>		•		Small tree, up to 5m	Semi-moist	Sun to semi- shade	✓	✓	+

+ use sparingly   ++ use commonly   +++ use plentifully   ✓ yes   • categorised

**Plant list for coastal forest in gullies and on hillsides (cont.)**

Māori/ Common name	Botanical name	Life form			Plant preferences & tolerances				Abundance		
		Exposed hillsides	Sheltered sites / gullies	Under canopy	Soil moisture needs	Light levels	Frost tolerant	Wind tolerant	Early stage / initial planting	Later stage / shelter established	
Karamū / Shining karamu	<i>Coprosma lucida</i>	•	•		Small tree, up to 3m	Semi moist to dry	Sun to Semi- shade	✓	✓	++	
Kawakawa	<i>Piper excelsum</i>		•	•	Shrub, up to 4m	Semi-moist	Semi- shade to shade	Frost tender	Sheltered		++
Kohekohe	<i>Dysoxylum spectabile</i>		•		Canopy tree, 15m	Semi-moist	Semi- shade	Frost tender	Sheltered		++
Köhühū	<i>Pittosporum tenuifolium</i>		•		Small tree, up to 6m	Semi-moist	Sun to semi- shade	✓	✓	+	
Koromiko	<i>Veronica stricta</i>	•	•		Shrub, up to 4m	Semi-moist	Sun	✓	✓	+++	
Kötukutuku / Tree fuchsia	<i>Fuchsia excorticata</i>		•		Small tree, up to 6m	Moist	Shade	✓ When mature	Sheltered		+
Kōwhai	<i>Sophora microphylla</i>		•		Small tree, up to 8m	Dry to semi-moist	Sun	✓	✓		+
Māhoe / Whitey wood	<i>Melicytus ramiflorus</i>		•		Small tree, up to 8m	Dry to semi-moist	Semi- shade	✓ When mature	Moderate		++
Mānuka / Tea tree	<i>Leptospermum scoparium</i>	•	•		Small tree up to 5m	Semi-moist to wet	Sun to semi- shade	✓	✓	++	
Māpou / Red matipou	<i>Myrsine australis</i>	•	•		Small tree, up to 5m	Semi-moist	Semi- shade	✓ When mature	✓	++	
Mikoikoi / NZ iris	<i>Libertia grandiflora</i>			•	Flax-like shrub, 0.7m	Dry to semi-moist	Sun to semi- shade	✓	✓		++
Mikoikoi / NZ iris	<i>Libertia ixioides</i>			•	Flax-like shrub, 0.7m	Dry to semi-moist	Sun to semi- shade	✓	✓		++
Mingimingi / Twiggy coprosma	<i>Coprosma rhamnoides</i>	•	•		Shrub, up to 2m	Semi-moist	Sun	✓	✓	+++	

+ use sparingly   ++ use commonly   +++ use plentifully   ✓ yes   • categorised

## Plant list for coastal forest in gullies and on hillsides (cont.)

Māori/ Common name	Botanical name	Life form			Plant preferences & tolerances				Abundance	
		Exposed hillsides	Sheltered sites / gullies	Under canopy	Soil moisture needs	Light levels	Frost tolerant	Wind tolerant	Early stage / initial planting	Later stage / shelter established
Ngaio	<i>Myoporum laetum</i>	•	•	Dense tree, up to 7m	Semi-moist	Sun	✓ When mature	✓	++	
Nīkau	<i>Rhopalostylis sapida</i>		•	Palm tree, up to 10m	Moist	Shade	Frost tender	Sheltered		+
Porokaiwhiri/ Pigeonwood	<i>Hedycarya arborea</i>		•	Tree up to 15m	Dry to semi-moist	Semi-shade	✓ When mature	✓		+
Rangiora	<i>Brachyglottis repanda</i>	•	•	Shrub, up to 8m	Semi-moist	Sun	✓ When mature	✓	+	
Tarata / Lemonwood	<i>Pittosporum eugenioides</i>		•	Tree, up to 12m	Dry to semi-moist	Sun to semi-shade	✓ When mature	✓		+
Tauhinu	<i>Ozothamnus letophyllus</i>	•		Shrub, up to 3m	Dry	Sun	✓	✓	+++	
Taupata	<i>Coprosma repens</i>	•	•	Shrub / small tree up to 4-6m	Semi-moist	Sun	✓ When mature	✓	++	
Tawa	<i>Beilschmiedia tawa</i>		•	Canopy tree, up to 24m	Semi-moist	Shade	Frost tender	Sheltered		+
Ti kōuka/ Cabbage tree	<i>Cordyline australis</i>	•	•	Tree up to 20m	Moist	Sun to semi-shade	✓ When mature	✓	+	
Titoki / New Zealand ash	<i>Alectryon excelsus subsp. excelsus</i>		•	Tree, up to 17m	Dry to semi-moist	Semi-shade	Frost tender	Moderate		+
Toetoe	<i>Austroderia toetoe</i>	•		Tussock-like grass up to 4m	Semi-moist	Sun	✓	✓	+++	
Wharangi	<i>Melicope ternata</i>		•	Shrub, up to 8m	Dry	Semi-shade	Frost tender	Sheltered		+
Wharariki	<i>Phormium cookianum subsp. hookeri</i>	•		Herb/ flax	Dry to semi-moist	Sun	✓	✓	+++	

+ use sparingly   ++ use commonly   +++ use plentifully   ✓ yes   • categorised



# Te ururua mānuka-kānuka

## Mānuka-kānuka scrub

Mānuka-kānuka scrub is generally found on disturbed, previously forested land and lightly grazed hill country. It has become relatively rare in Wellington because it must compete with gorse for habitat. However, some large areas that have been retired from grazing on farms in the city are slowly regenerating.



“Much of the Wellington gorse-dominated hillside is regenerating in māhoe broadleaf forest, which has a very different composition from a mānuka-kānuka dominated scrub.”

Anita, Wellington City Council

Mānuka-kānuka scrub plays a unique part in the growth and succession of forests over time. They are relatively fast growing and will quickly take over an area that has been destroyed or disturbed (eg by clearance, fire, wind damage). They form a canopy that provides suitable conditions for more mature forest trees, like rimu and mataī, to establish under. Within these areas a diverse range of ground orchids and other small herbs and ferns will grow. When gorse arrived in Wellington, it soon out competed mānuka and kānuka in this role and now dominates much of this process. Whilst native trees will grow within gorse, the diversity of species found is much lower.

Restoring scrub is important because the biodiversity that establishes underneath a mānuka-kānuka canopy has proven to be much more diverse than if it establishes under gorse. Mānuka-kānuka scrub is establishing well in several sites in Wellington including retired pasturelands.

Soils under natural mānuka-kānuka scrub contain a high diversity of native fungi, which helps plants manage nutrient and moisture uptake.

These fungi can be introduced into plants in your nursery to assist growth. Collect some from under established scrub.



Mānuka scrubland, South Makara Road.



# Te whakatō tipu kia ora anō ai

## Planting, or encouraging regeneration

The aim of planting mānuka-kānuka scrub is to create a canopy to provide shelter for more mature forest species and to shade out the gorse. Gorse can be used as shelter for planting projects, however it is important to monitor which species are establishing underneath and add in additional plants to increase diversity over time.

### Mānuka or kānuka?

Mānuka has many growing forms from a small shrub to a tree around 6 metres high. Kānuka is taller and grows as a tree up to 15 metres.

Mānuka will grow in a wider range of conditions from wet through dry whereas kānuka likes dry hillsides.

Mānuka has sharp-tipped leaves that feel prickly when you crush them, kānuka leaves are softer with no sharp tips. Think ‘mean for mānuka, kind for kānuka’!

Both species have white flowers in Wellington, but mānuka flowers tend to be larger, 10-12mm and kānuka 4-5mm.

### Tips for planting mānuka-kānuka scrub

Both species will tolerate poor infertile soils and windy sites, but growth will be improved with shelter and good soil - generally the warmer northern slopes are preferred.

Mānuka and kānuka have a mycorrhizal fungal association with their root systems. Fungi help the plants draw more nutrients and water from the soil and can increase a plant's tolerance to environmental stressors. You may get some loss of young plants in the short term until they establish.

If gorse is present, cut pockets or strips in it and plant mānuka and kānuka in between. Gorse needs full sunshine to thrive, so it will eventually die off under the emerging canopy.

Control weeds around planted seedlings and naturally regenerating seedlings.

Control any animal pests that might be eating seed off the ground, and damaging seedlings. Once established, mānuka and kānuka are less palatable to rabbits and hares than other species.

Once a complete canopy of mānuka-kānuka has established, look to introduce later stage species that add diversity to the forest. Before you plant, check whether there are any natural seed sources close by, like old trees and neighbouring forest areas - it will take longer for seeds to disperse and germinate naturally but will ensure the plants are local to Wellington and save money.



Mānuka



Kānuka

## Plant list for mānuka-kānuka scrubland

Mānuka and kānuka scrubland		Planting site conditions			Life form	Plant preferences & tolerances				Abundance	
Māori/Comon name	Botanical name	Exposed sights	Sheltered sites	Under canopy		Soil moisture needs	Light levels	Frost tolerant	Wind tolerant	Early stage / initial planting	Later stage / shelter established
Coastal tree daisy	<i>Olearia solandri</i>	•			Bushy shrub 5m	Dry to semi-moist	Sun	✓	✓	++	
Tree Hebe	<i>Veronica parviflora</i>	•	•		Bushy shrub 2-4m	Semi-moist	Sun	✓	✓	+++	
Kānuka	<i>Kunzea robusta</i>	•	•		Tree up to 15m	Dry to Semi-moist	Sun to semi-shade	✓	✓	+++	+
Karamū	<i>Coprosma robusta</i>	•	•		Bushy shrub to 6m	Semi-moist	Sun	✓	✓	+++	
Mānuka/Tea tree	<i>Leptospermum scoparium</i>	•	•		Small tree 5m	Semi-moist to wet	Sun	✓	✓	+++	
Mīkoikoi / NZ iris	<i>Libertia grandiflora</i>			•	grass 0.5m	Semi-moist	Sun to semi-shade	✓	✓		++
Mīkoikoi / NZ iris	<i>Libertia ixioides</i>			•	grass 0.5m	Semi-moist	Sun to semi-shade	✓	✓		++
Mingimingi	<i>Coprosma propinqua</i>	•	•		Shrub	Semi-moist	Sun	✓	✓	+++	
Bush rice grass	<i>Microlaena avenacea</i>			•	grass	Semi-moist	Semi-shade	✓	Moderate		++
Taupata	<i>Coprosma repens</i>	•	•		Shrub / small tree up to 8m	Semi-moist	Sun	Frost tender	✓	+	
Tauhinu	<i>Ozothamnus leptophyllus</i>	•	•		Bushy shrub 2m	Dry to Semi-moist	Sun	✓	✓	++	
Tī kōuka/Cabbage tree	<i>Cordyline australis</i>	•	•		Tree up to 20m	Moist	Sun	✓	✓	+	
Toetoe	<i>Austroderia toetoe</i>	•	•		Tussock-like grass up to 4m	Semi-moist to wet	Sun	✓	Moderate	+++	
Tūrutu/ NZ blueberry	<i>Dianella nigra</i>			•	Grass like	Semi-moist	Semi-shade	✓	Moderate		++

+ use sparingly   ++ use commonly   +++ use plentifully   ✓ yes   • categorised



# Ngā wahapū, ngā repo wai tai me ngā rohe kōreporepo wai māori

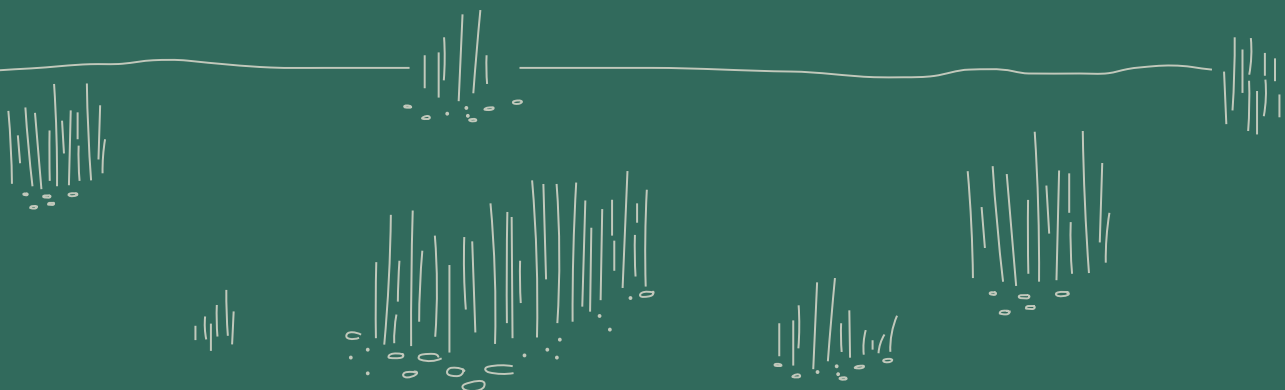
## Estuaries, saltwater marshes and freshwater wetlands

Wellington's landscape of steep catchments, basins and extensive coastline, along with our high rainfall, would naturally support an extensive network of bogs, salt marshes, estuaries and freshwater wetlands. However, over time as the city was developed, most of these wet areas were drained, piped, channelled or built over. Those that remain are precious.

Makara estuary is the biggest and best salt marsh in the city and well worth a visit. It is a spawning ground for inanga and is home to many species of wetland birds and coastal waders including the threatened Reef heron, Caspian tern and Pied shag. Zealandia's lake, edges and wetlands are being restored and provide habitat for plants and animals. Very few bogs and seepages still remain, but those that do are very small, often in pasture and heads of some streams. Opau

Bay in Makara area is one of the few remaining areas of wetland with ti kouka and raupō still present in Wellington City boundaries.

Restoring or creating additional wetland areas - no matter how small - will help support the return of wildlife specifically adapted to wetland ecosystems.



# Ngā nōhanga rohe kōreporepo

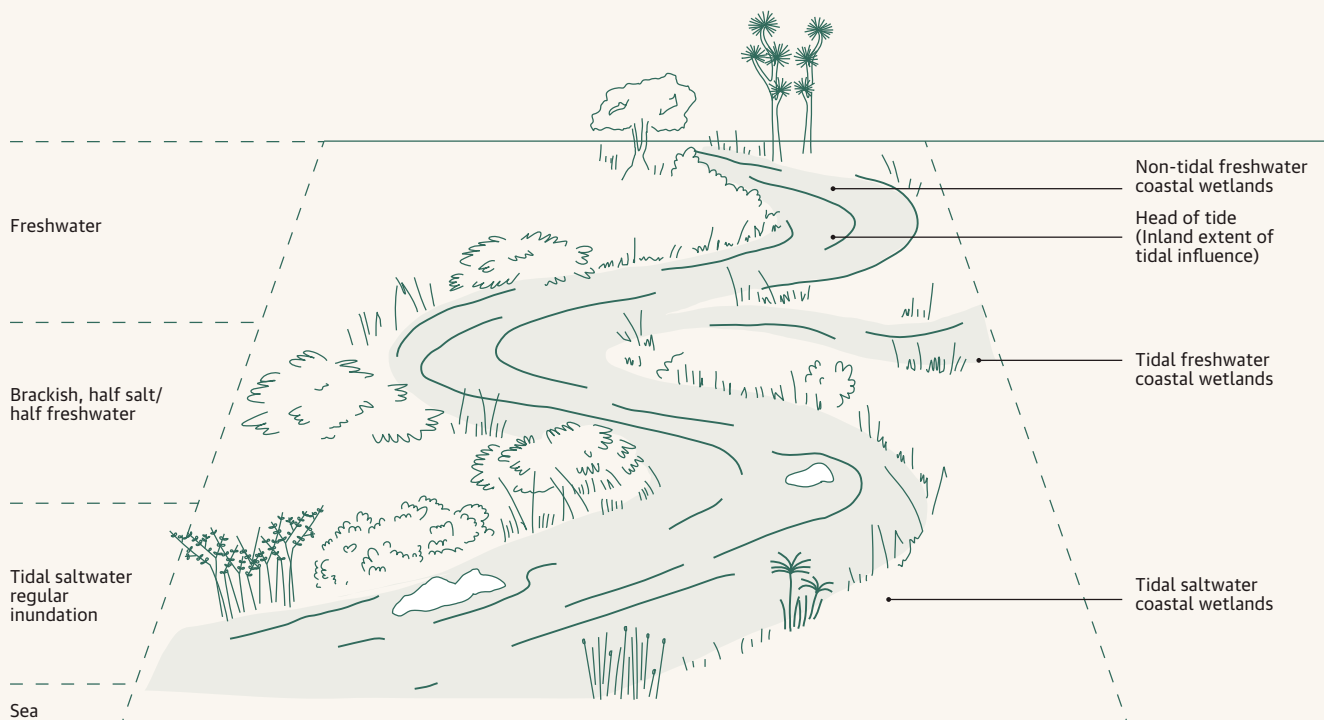
## Wetland habitats

Wetlands are areas where water accumulates naturally such as where land meets streams, rivers, lakes and the sea. They could be permanently or intermittently wet.

Healthy and functioning wetlands act like a giant sponge - helping to naturally regulate water flow and quality. Their plants slow the flow of water from the land so in times of flood more can be absorbed into the soil. In summer, stored water is slowly released, maintaining water flows. Micro-organisms (fungi and bacteria) in the damp soils clean the water by absorbing, breaking down and recycling nutrients.

Wetlands are one of our most productive ecosystems. They support a rich diversity of plant and animal life that is uniquely adapted to a variety of conditions from wet to dry, salty to freshwater and constantly changing water levels.

Wetlands are deeply embedded in kaupapa Māori as they provide and nurture important plants and animals used for food, medicine, building and weaving.



# Te whakaora rohe kōreporepo

## Restoring wetlands

If your aim is to restore the natural wetland system you will need to consider restoring natural water levels and flow. This may involve engineering solutions and impact on existing infrastructure so get advice from Council before you start.

Once an area is fenced, water levels are restored or adequate, and weeds and pests controlled, native wetland and estuarine plants should come back themselves. However, planting can speed up the natural process and help to fill in space that would otherwise be overtaken by weeds.

Different plants will grow in freshwater wetlands to salt water wetlands. Make sure to choose plants that are tolerant to your site conditions, see the plant lists in the following pages of this chapter.

### Tips for restoring wetlands in Wellington

Get a good pair of gumboots!

Get advice on whether the water levels or flows could be improved and how to do this.

Fence the wetland from any stock and plan for planting and maintenance activities. Also check if the area is used for any recreational activities and what access is needed.

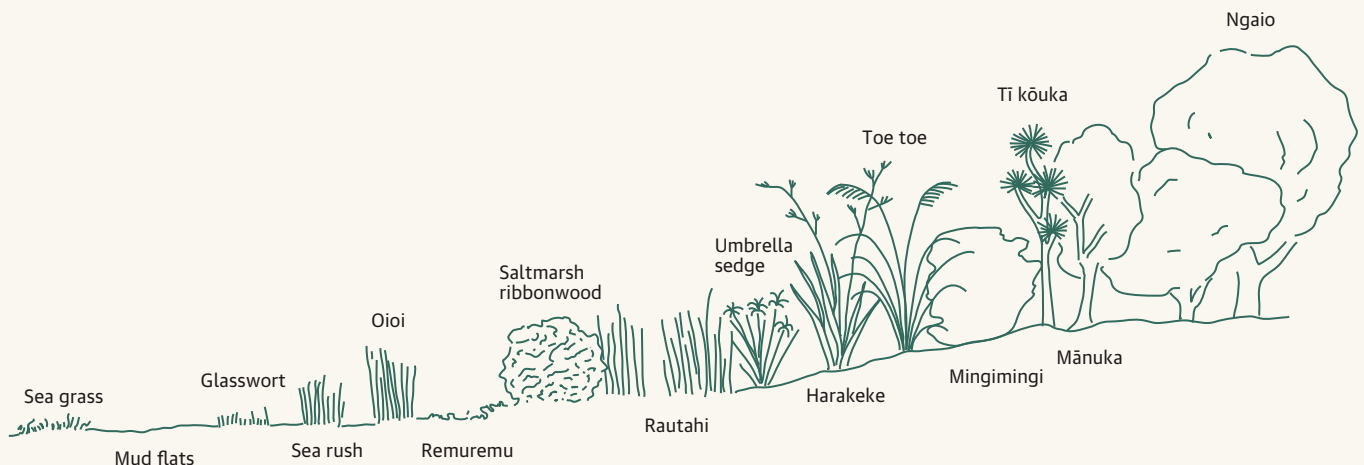
Control weeds and animal pests (eg pampas, blackberry, possums, rats, stoats, feral cats).

Plant spacings will differ depending on the plant. Plant rushes and sedges 0.5m apart and larger shrubs and trees 1-1.5m apart. See *Restoration Planting Techniques* for the Wellington conditions.

Set plants out in groups of 3-5 so plants give each other shelter and make sure the person/people setting out plants knows how to match them with the various water and salt levels across the site.

Larger trees, such as kahikatea will need to be at least 5m apart.

Use the abundance measure indicated in the table to work out the proportion of each plant to set out. This will replicate natural species abundance and groupings.



(Above) Vegetation sequence for estuarine wetland in Wellington

# Ngā rohe kōrerorepo takutai

## Coastal wetlands

### Estuaries

Estuaries form at the coast where fresh water in rivers and streams meets and mixes with salt water from the sea, often forming small lagoons or swampy areas. They are the most productive of all wetlands and especially rich in animal life. Not many plant species grow in the subtidal zone or intertidal zone except for sea grass.

### Saltmarshes

Inland, from the sea to the edges of an estuary, saltmarsh vegetation grows; typically low-growing and very wind and salt tolerant. The marsh areas are regularly inundated with saltwater and the plants have adapted to growing in this salty environment. Many of these species are difficult to cultivate. Salt marsh ribbonwood and oioi can be established in low-lying damp areas.

“Coastal estuaries are so exposed, especially in Wellington. We don't just get windstorms, we get salt storms! Be really careful with plant selection. We started with just oioi and planted thousands of them. We transformed the eroding banks.

Now the banks are stabilised, we are planting in the middle of the islands. We found that salt marsh ribbonwood wasn't tough enough by itself and needs shelter. Even ngaio is stripped of its leaves in a salt storm. We built driftwood shelters and placed boulders and planted on the leeward side of them.”

Rebecca, Makaracarpa community group, Makara Estuary



(Above) Sea rush, oioi and salt marsh ribbonwood along the edges of the Makara Estuary, providing important habitat for the coastal sea birds.

(Right) Makara Estuary, further upstream, still with brackish water, dominated by cutty grass and salt marsh ribbonwood.





## Plant lists for coastal estuaries and salt marshes

Coastal estuaries & salt marsh		Life form	Plant preferences & tolerances				Abundance	
Māori/ Comon name	Botanical name		Soil moisture needs	Light levels	Frost tolerant	Wind tolerant	Early stage	Later stage
Glasswort	<i>Salicornia quinqueflora</i>	Herb	Moist	Sun	Frost tender	Exposed		++
Kāpūngāwhā	<i>Schoenoplectus tabernaemontani</i>	Rush	Wet	Sun	✓	Exposed	+++	
Mākaka/ Saltmarsh ribbonwood	<i>Plagianthus divaricatus</i>	Shrub	Moist	Sun	Moderate	Exposed	++	+
Oioi/ Jointed wire rush	<i>Apodasmia similis</i>	Rush	Moist	Sun	✓	Exposed	+++	
Remuremu	<i>Selliera radicans</i>	Herb	Moist	Sun	✓	Exposed		++
Sea rush	<i>Juncus kraussii subsp. australiensis</i>	Rush	Wet	Sun	✓	Exposed	++	
Sea primrose	<i>Samolus repens</i>	Herb	Moist	Sun	✓	Exposed		++
Sea blight	<i>Suaeda novae-zelandiae</i>	Herb	Moist	Sun	Frost tender	Exposed		+
Umbrella sedge	<i>Cyperus ustulatus</i>	Sedge	Moist	Sun	✓	Exposed	++	

Note: Some species will be difficult to obtain for planting projects as they are not easy to grow in plant nurseries.

+ use sparingly   ++ use commonly   +++ use plentifully   ✓ yes   • categorised

# Ngā rohe kōreporepo wai māori

## Freshwater wetlands

### Swamps, seepages, bogs and shallow lakes

Few freshwater wetlands remain in Wellington and most have had their natural water flow modified by draining, piping or infill. Seepages may stop flowing altogether over the drier summer months. They are also often grown over or around with weeds.

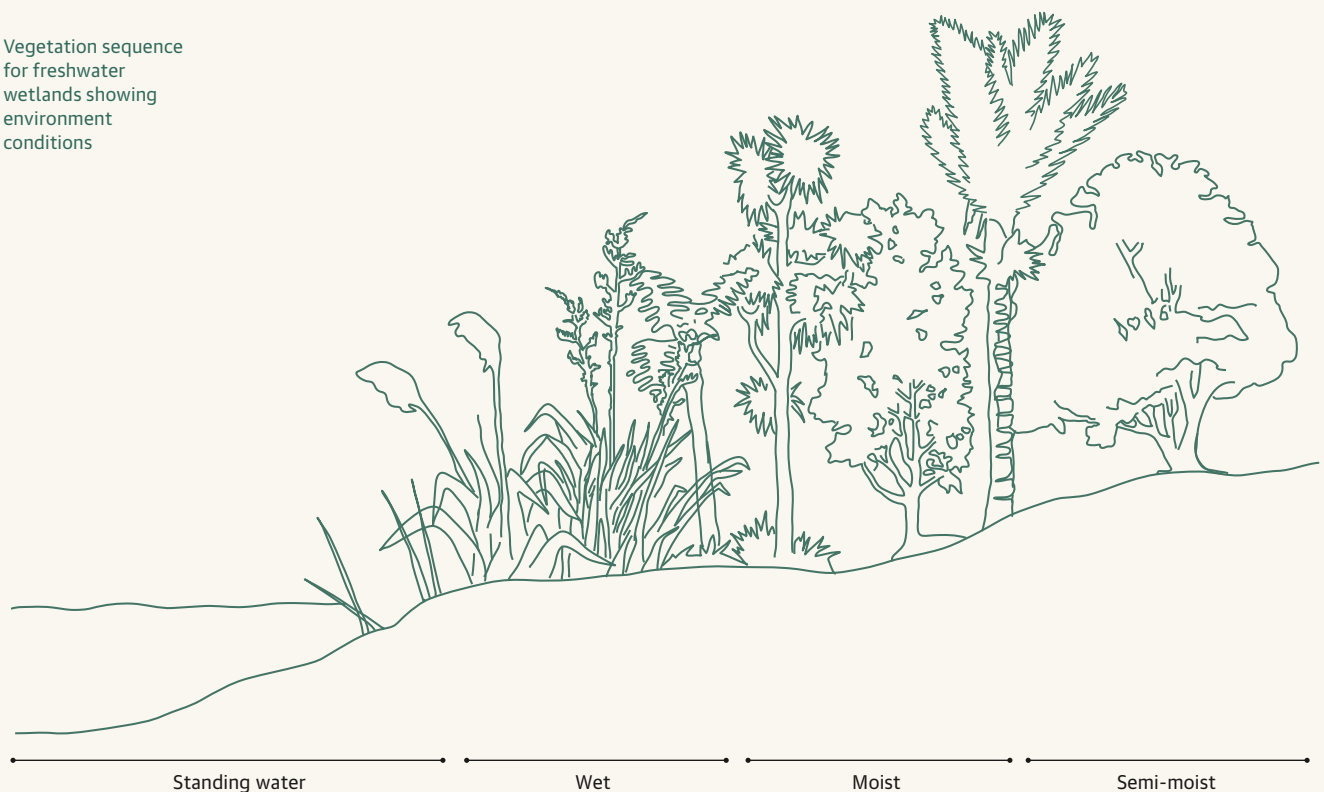
The range of plants growing in these habitats depends on proximity to the coastal or inland areas and is generally dominated by sedges and rushes. Wetlands are fragile so protecting the edges is important - choose plants from the wet to semi-moist zones to protect wetland edges from the table.

(Below, left) Rautahi growing well with toetoe and harakeke, Lake Kohangapiripiri

(Below, right) Rautahi in foreground with raupō dominating the lake edges. Lake Kohangapiripiri is located east of Pencarrow Head. Although not in the Wellington City Council boundary, it is a good example of a sedge and rush dominated wetland



Vegetation sequence for freshwater wetlands showing environment conditions



## Plant list for freshwater wetlands

Freshwater wetlands	Botanical name	Site type See previous diagram			Plant type	Plant preferences & tolerances				Abundance	
		Standing water	Wet	Moist / semi moist		Soil moisture needs	Light levels	Frost tolerant	Wind tolerant	Early stage	Later stage
Giant rush	<i>Juncus pallidus</i>	•	•		Rush	Moist	Sun	Frost tender	Exposed	++	++
Harakeke / Swamp flax	<i>Phormium tenax</i>		•	•	Herb	Moist	Sun	✓	Exposed	++	
Kāpūngāwhā	<i>Schoenoplectus tabernaemontani</i>	•	•		Sedge	Wet	Sun	✓	Exposed	+++	+
Mānuka	<i>Leptospermum scoparium</i>		•	•	Tree	Moist	Sun	✓	✓		++
Mingimingi	<i>Coprosma propinqua</i>			•	Shrub	Moist	Sun	✓	✓		++
Pūkio / Swamp sedge	<i>Carex virgata</i>		•	•	Sedge	Wet	Sun	✓	Exposed	++	
Pūrei	<i>Carex secta</i>	•	•	•	Sedge	Wet	Sun	✓	Exposed	+++	
Raupō / Bullrush	<i>Typha orientalis</i>	•			Rush	Wet	Sun	✓	Exposed	+	
Rautahi / Cutty grass	<i>Carex geminata</i>		•	•	Sedge	Wet	Sun	✓	Exposed	+++	
Rautahi / Cutty grass	<i>Carex lessoniana</i>		•	•	Sedge	Wet	Sun	✓	Exposed	++	
Ti kōuka / Cabbage tree	<i>Cordyline australis</i>			•	Tree	Moist	Sun to semi-shade	Exposed ✓	✓		++
Toetoe	<i>Austroderia toetoe</i> or <i>A. fulvida</i>		•	•	Grass	Moist	Sun	✓	✓		++
Umbrella sedge	<i>Cyperus ustulatus</i>			•	Sedge	Moist	Sun	✓	✓	++	

+ use sparingly   ++ use commonly   +++ use plentifully   ✓ yes   • categorised

# Ngā tahataha manga

## Stream sides

Wellington's hilly landscape is drained by streams with comparatively small catchments close to the coast. Most of the city's streams have been significantly modified over time by vegetation clearance and engineering to channel and pipe water away from housing, road and rail. Very few streams flow along a completely unmodified course from catchment to sea, with some being completely piped underground through the city. However, even with the significant changes that have occurred, Wellington streams are home to several nationally threatened species including the giant kōkopu, longfin eel and shortjaw kōkopu.

Although many of the city's streams are small, with some only running at certain times of the year, their health is important for the health of the harbour and sea they flow into.

Significant efforts are being made by community groups and landowners to improve the health of streams throughout the city by restoring their riparian margins. For example, the *Kaiwharawhara Stream Project* aims to create an eco-corridor along the length of the stream from Karori through Otari and Wellington's western suburbs to its outlet at the western shore of Wellington Harbour.





# Ngā tahataha wai māori

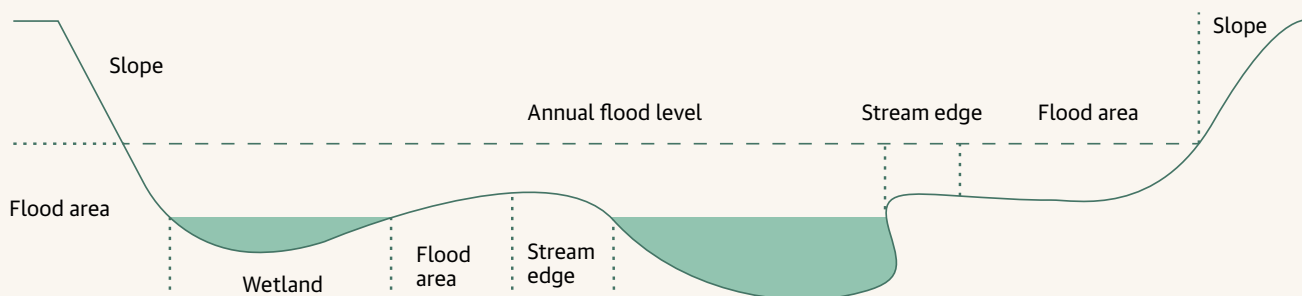
## Riparian margins

Riparian margins are the borders along or around streams, lakes, rivers and other bodies of surface water. The areas include both the immediate edges and banks of the water body as well as the floodplain where water will reach periodically during high rainfall (see below). They support a wide range of plants and animals because of the range of habitat conditions available, from very wet and swampy to drier banks, varying temperatures and light levels (see right).

Riparian plants are very important for water quality and erosion control. They act like sponges, slowing down surface and ground water as it runs off land, filtering out nutrients, pollutants and sediment. They create habitat for aquatic wildlife and help keep the stream cool and shaded.



Showing planting zones before planting a site, check where the likely floodplain would be.



Stream cross section showing edges, banks and floodplain

The aim of riparian planting in Wellington is to recreate the right conditions so that overall stream health can recover. Ultimately this means restoring an over-arching canopy along both sides of a stream to provide shade and shelter. This will encourage aquatic species and help control exotic weed species that require good light levels and high nutrient levels to flourish.

### Tips for restoring streams in Wellington

Get a good pair of gumboots!

Look at the whole stream, find out who owns it, whether you need permission to work on it and who could help. Look for any engineering works like culverts and check with Council how best to manage these areas.

Identify any weeds and animal pests and decide which are important to control and how you will do it. Water weeds like *monkey musk* and *water celery* are difficult to control so get some advice on weed control methods.

Stream edges are often infested with weeds like *Tradescantia/ Wandering Willie*. Removing these plants can increase erosion until new seedlings have established. Time your work programme so that you plant the stream edges soon after weed removal to minimise how long the edges are bare. Plant close together (50cm) to ensure quick ground cover. If you are working on a large site, consider breaking it in sections and staging it over a couple of years to ensure good ground cover of plants throughout the project.

Identify the different planting 'zones' along your stream, edges, banks and drier areas further back. Draw up a *planting plan* showing which plants are suitable for which sites and make sure the person(s) who set out the plants matches them to the site conditions.

Set out plants in groups along the stream, rather than lines so that the water doesn't channel between them and so they look more natural.

Plant seedlings firmly into the ground so that they don't move as the water rises. Check out our *Restoration Planting Techniques* guidelines for more information.

When planting stream edges, choose plants that will bend with the water flow without blocking the stream and are happy being submerged for periods of time. Plant flaxes and larger shrubs and trees further back on the stream banks where the water is less frequent. Flaxes can block stream flow and cause erosion if they are too close to the edges. Over time, more fern species and shrubs will naturally fill in the edges of the forest streams.



Before/after photos by Stu Farrant, Mt Victoria





Kaiwharawhara  
Stream edge in  
good condition with  
an overhanging  
canopy and ferns



(Above) Carefully  
consider the  
placement of grasses  
and flaxes before  
planting. Flaxes  
especially can cause  
more damage by  
blocking streams in  
high flows, causing  
more erosion.  
Always plant sedges  
that bend with the  
water flow on the  
stream banks closest  
to the water.



(Below) Water celery  
and monkey musk  
taking over the  
restoration planting  
at Karori Stream.  
Both these weeds are  
difficult to eradicate.

## Plant list for freshwater stream edges

Stream edges		Site type		Plant type	Plant preferences & tolerances				Abundance	
Māori/ Comon name	Botanical name	Streams in the open	Streams in forests	Plant type	Soil moisture needs	Light levels	Frost tolerant	Wind tolerant	Early stage	Later stage
Rautahi Cutty grass	<i>Carex geminata</i>	•		Sedge	Wet	Sun	✓	✓	++	
Hook grass	<i>Carex uncinata</i>		•	Sedge	Semi-moist	Shade	Moderate	Moderate	++	++
Kawakawa	<i>Piper excelsum</i>		•	Shrub	Semi-moist	Shade	Frost tender	Needs shelter	+++	++
Kiokio	<i>Parablechnum novae- zealandiae</i>		•	Fern	Semi-moist	Semi- shade	Moderate	Moderate		+
Kōtuketuku/ Tree fuchsia	<i>Fuchsia excorticata</i>		•	Tree	Semi-moist	Semi- shade	✓ When mature	Needs shelter		++
Pūrei	<i>Carex secta</i>	•		Sedge	Wet	Sun	✓	✓	+++	
Rautahi/ cutty grass	<i>Carex lessoniana</i>	•		Sedge	Semi-moist to wet	Sun to semi- shade	✓	✓	++	
Pūkio/ swamp sedge	<i>Carex virgata</i>	•		Sedge	Wet	Sun	✓	✓	+++	
Toetoe	<i>Austroderia fulvida</i>	•		Grass	Semi-moist	Sun	✓	✓	+++	
Umbrella sedge	<i>Cyperus ustulatus</i>	•		Sedge	Semi-moist to wet	Sun	✓	✓	++	

+ use sparingly   ++ use commonly   +++ use plentifully   ✓ yes   • categorised



“Sedges love the edges.”  
Tim, Wellington City Council

Community  
planting day, upper  
Kaiwharawhara  
Stream, restoring  
the stream bank  
with a mix of trees,  
shrubs and grasses.



# Ngā riu me ngā puketai tuawhenua

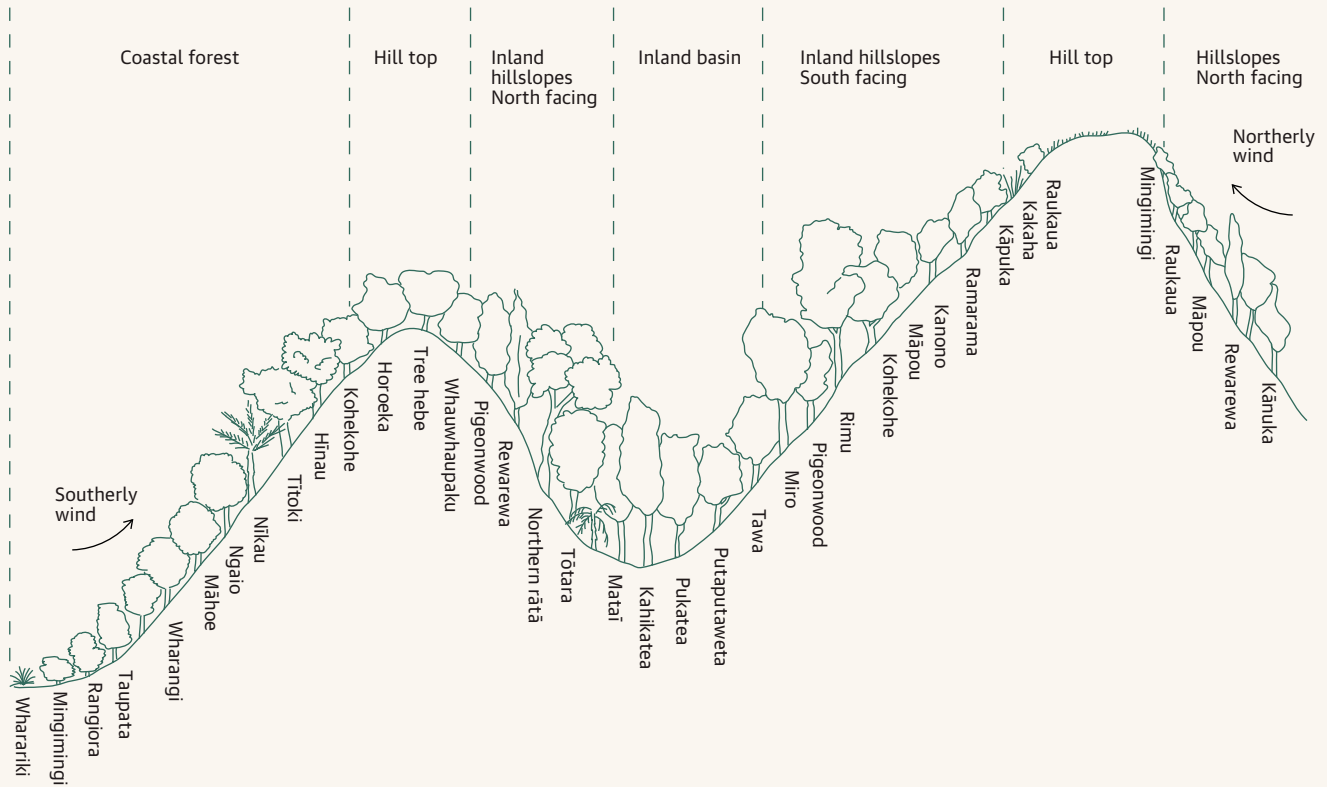
## Inland basins, valleys and hillsides

Lowland broadleaf-podocarp forest once covered most of Wellington's inland basins and valleys, less than 5% remains today. Rimu towered above a dense canopy of broad-leaved trees like kohekohe, tawa and hīnau. Epiphytic Northern rātā, that started its life as a seedling in the crook of a tall tree branch would have grown up to emerge as a forest giant. Kahikatea, pukatea, miro, mataī, and tōtara stood tall across the forests, their branches decorated with perching lilies, hanging orchids, epiphytic ferns and shrubs. Below the tallest trees a rich sub-canopy of nīkau, supplejack, māhoe, porokaiwhiri and kawakawa provided food and habitat for kākā, kākāriki, bellbird, tūi, insects, tuatara and geckos.

Otari-Wiltons Bush and the gullies of the Wellington Botanical Garden are two examples of the few remnants of old forest remaining. They are being preserved by the significant efforts of council and community members. These areas are very important seed sources for natural regeneration and for collecting seed to grow seedlings.



# Nōhanga Habitat



Wellington forest vegetation sequence

A range of conditions occur in inland gullies and hillsides. Gullies and valleys tend to have higher moisture content and more fertile soils. Hillslopes are freer draining and have higher sunlight. Wind conditions depend on the aspects of the gully or hillslope, some offering shelter from prevailing winds and others funnelling wind across the landscape.

Kererū are important for seed dispersal in Wellington's forest as they are the only bird that actively disperses larger fruits. Flying long distances between forested areas, browsing on foliage as well as fruits such as tawa, miro, hīnau and matai.



Kererū feeding on hīnau by T Stoddard, Kererū Discovery

# Te whakatō tipu

## Planting

The aim of restoration planting for these areas is to increase (or create) the buffer zone around any existing vegetation to protect it and create ‘stepping-stones’ or corridors of planted areas that connect forest remnants to each other across the landscape. This extends the habitat and food sources for birds like tūī, kākā, tieke, kererū, and other wildlife. As birds are attracted to newly established plantings, they disperse seed which slowly regenerates the forest ecosystem.

Gullies are often the easiest areas to establish plants, having more shelter and generally deeper soils with year-round moisture available, ideal for plants like kahikatea and pukatea. A shelter layer is still needed using species from the early stage/primary plant list. Once this has established, around three to five years, the next tier of plants can be added.

“My key recommendation for a site like this - keep it native - non-natives don't survive! Find out what plants are suited to your site and just choose a few hardy species at the beginning to create some shelter. Add in trees you like, to attract birds, later on. Fertilise, water and weed the plants for the first few years or they will struggle. Think about your neighbours too - I used lower growing plants anywhere that might affect their views.”

Ian McGregor, Crofton Downs



Plants in the Takapu Stream gully, 3 years after planting in 2014. They established very well, using plant species able to survive heavy frosts and strong wind gusts funnelling through the valley. Pukatea and kahikatea are now establishing within the closed canopy.



Further up the hillsides (ie the mid-slopes but not tops of ridges and spurs) where there is more wind, poorer soils and full sun, use a smaller range of plant species until shelter can be created. Identify the prevailing winds, light levels and aspect of your site, this will help to choose plants from the list.

**Tips for planting basins, gullies and hillslopes**

Choose hardy early stage plants that can tolerate strong winds and drought and can grow well in full sunlight. Once these have established, introduce a greater diversity of trees and shrubs.

If you are on hillslopes, mulch around trees when planted and water if possible.

If your site is a gully, start in the lower parts where there is good moisture and shelter and work up the gully and out towards the ridges over time.

Inland areas can be affected by frost so choose plant species and individual plant locations carefully to avoid frost damage. Areas with more wind flow will usually be frost-free and support a greater range of species.



(Left) A typical hill slope with a range of conditions as you go uphill, from a sheltered gully to the ridge line. The plant selection would need to change for the environmental conditions in each zone.

**Example of restoration planting on an upper inland hillside in Crofton Downs**



(Above, left) November 2014. Site preparation included removing all the gorse and cutting the grass. Plants were sourced from a commercial nursery, planted with compost and watered. I McGregor



(Middle) January 2017. Three years into the project toetoe, flax and grasses start to create shelter. At this stage weed control was critical. I McGregor

(Below) August 2018. Pittosporums showing through, grasses, toetoe and flax have completely covered the ground. I McGregor



## Plant list for inland gullies and basins

Inland gullies and basins		Life form	Plant preferences & tolerances				Abundance	
Māori/ Comon name	Botanical name	Plant type	Soil moisture needs	Light levels	Frost tolerant	Wind tolerant	Early stage	Later stage
Round leaved coprosma	<i>Coprosma rotundifolia</i>	Tree to 5m	Semi-moist	Semi-shade	✓	Moderate	++	
Houhere / Lacebark	<i>Hoheria sexstylosa</i>	Tree up to 18m	Semi-moist	Semi-shade	✓	✓	++	
Kanono / Large leaved coprosma	<i>Coprosma grandifolia</i>	Tree, to 6m	Semi-moist	Semi-shade	✓ When mature	✓	++	
Karamū	<i>Coprosma robusta</i>	Tree to 6m	Semi-moist to dry	Sun to semi-shade	✓	✓	++	
Kawakawa	<i>Piper excelsum</i>	Tree	Semi-moist	Shade	Frost tender	Sheltered		++
Kōtukutuku / Tree fuschia	<i>Fuchsia excorticata</i>	Tree	Semi-moist	Semi-shade	✓ When mature	Sheltered	+	
Māhoe	<i>Melicytus ramiflorus</i>	Tree	Semi-moist	Semi-shade	✓ When mature	Moderate		++
Makomako / Wineberry	<i>Aristotelia serrata</i>	Tree	Semi-moist	Sun to semi-shade	✓ When mature	✓	+++	
Patē/ seven-finger	<i>Schefflera digitata</i>	Tree to 8m	Semi-moist	Semi-shade	✓ When mature	Moderate		++
Porokaiwhiri / Pigeonwood	<i>Hedycarya arborea</i>	Tree	Semi-moist	Semi-shade	✓ When mature	Moderate		++
Ribbonwood	<i>Plagianthus regius</i> (Churton Park, Glenside, Tawa only)	Tree to 15m	Semi-moist to moist	Semi-shade	✓	Moderate		+
Whauwhaupaku / Fivefinger	<i>Pseudopanax arboreus</i>	Tree to 6m	Semi-moist	Sun to semi-shade	✓	✓	+++	

+ use sparingly   ++ use commonly   +++ use plentifully   ✓ yes   • categorised

## Plant list for inland hillslopes

### Inland gullies and basins

Māori/ Common name	Botanical name	Requires shelter	North facing exposed to wind & sun	South aspect, shady, sheltered, higher moisture level	Plant type Plant preferences & tolerances					Abundance	
					Plant type	Soil moisture needs	Light levels	Frost tolerant	Wind tolerant	Early stage	Later stage
Kanono/ Large leaved coprosma	<i>Coprosma grandifolia</i>		•	•	Broadleaf shrub 6m	Semi moist	Semi shade	✓	✓		+
Round leaved coprosma	<i>Coprosma rotundifolia</i>	•		•	Bushy shrub 5m	Semi moist	Semi shade	✓	Moderate		++
Karamū	<i>Coprosma robusta</i>		•	•	Bushy shrub 6m	Semi moist	Sun or semi shade	✓	✓	+++	
Kānuka	<i>Kunzea robusta</i>		•		Tree up to 15m	Dry to Semi moist	Sun	✓	✓		++
Māpou	<i>Myrsine australis</i>		•	•	Bushy shrub 6m	Semi moist	Sun or semi shade	✓	✓	+++	
Kaikōmako	<i>Pennantia corymbosa</i>	•		•	Dense tree 8m	Semi moist	Semi shade	✓ When mature	Moderate		+
Whauwhaupaku / Fivefinger	<i>Pseudopanax arboreus</i>		•	•	Bushy tree 6m	Semi moist	Sun or semi shade	✓	✓		++
Horoeka / Lancewood	<i>Pseudopanax crassifolius</i>	•	•	•	Bushy tree 10m	Semi moist	Semi shade	✓	✓		++
Koromiko	<i>Veronica stricta</i>		•	•	Bushy shrub 2-4m	Dry to Semi moist	Sun	✓	✓	+++	

+ use sparingly   ++ use commonly   +++ use plentifully   ✓ yes   • categorised

## Plant list for inland hillslopes (cont.)

Inland gullies and basins				Plant type Plant preferences & tolerances					Abundance		
Māori/ Common name	Botanical name	Requires shelter	North facing exposed to wind & sun	South aspect, shady, sheltered, higher moisture level	Plant type	Soil moisture needs	Light levels	Frost tolerant	Wind tolerant	Early stage	Later stage
Rangiora	<i>Brachyglottis repanda</i>		•		Large shrub 6m	Semi moist	Semi shade	✓ When mature	✓	++	
Thin leaved coprosma	<i>Coprosma areolata</i>		•	•	Shrub 5m	Semi moist	Sun to Semi shade	✓	✓	++	
Tī kōuka/ Cabbage tree	<i>Cordyline australis</i>		•	•	Tree up to 20m	Moist	Sun	✓	✓	+	
Mānuka	<i>Leptospermum scoparium</i>		•		Small tree 5m	Moist	Sun	✓	✓	+++	
Māhoe	<i>Melicytus ramiflorus</i>	•	•	•	Tree up to 15m	Semi moist	Semi shade	✓ When mature	Moderate		++
Coastal tree daisy	<i>Olearia solandri</i>		•		Bushy shrub 5m	Semi moist	Sun	✓	✓	++	
Tarata / Lemonwood	<i>Pittosporum eugenioides</i>		•	•	Tree 12m	Semi moist	Sun to Semi shade	✓ When mature	✓	+	
Köhühū	<i>Pittosporum tenuifolium</i>		•	•	Small tree 10m	Semi moist	Sun or semi shade	✓	✓	++	
Makomako/ Wineberry	<i>Aristotelia serrata</i>	•		•	Small tree 10m	Semi moist	Sun or semi shade	✓ When mature	✓	+++	

+ use sparingly   ++ use commonly   +++ use plentifully   ✓ yes   • categorised

"It's critical to source the right pittosporum, mānuka, kānuka and hebes for your project. These plants are highly variable across New Zealand."

Anita, Wellington City Council

# Ngā kahiwi, ngā pīnakitanga me ngā taumata

## Ridgelines, upper slopes and hilltops

Wellington City is surrounded by a dramatic backdrop of ridgelines and hilltops, stretching from the South Coast to Colonial Knob in the north and horseshoeing the city in the town belt. Once cloaked in lowland and coastal forests, these areas have been completely altered over time. A history of logging, burn-off, clearance for farming, and planting of macrocarpas and pines has resulted in a very different mix of plants, often overrun with weed species like gorse and barberry. Whilst there are pockets of original forest in gullies and lower slopes, the original forests and scrubland vegetation on the ridgelines and hilltops has largely disappeared.

Along with the Council, there are many community groups and landowners working hard both planting and encouraging regeneration of these upper areas.

“We started out planting along the sides of new mountain bike tracks to fill in the bare ground. Then it became about getting a greater diversity of plants and a canopy over the tracks. Then the goal moved to planting the top of Polhill itself. Now my goal is restoring a podocarp forest and planting 1000 nīkau back in Polhill! It’s taken a while to get to understand how we can meet this goal but now I’m looking 100-200 years ahead...”

Garth, Highbury,  
Polhill Reserve planting volunteer





# Nōhanga Habitat

Site conditions on the hilltops and ridgelines of Wellington City can be extreme.

They are exposed to winds from all directions, often strong. They are exposed to full sun yet, conversely, often sit in low cloud. They can be extremely dry, then very wet. Many of these hilltops and faces are also exposed to salt spray and have shallow stony or clay soils. Establishing plants in these conditions can be extremely challenging.



(Above) South of the Brooklyn wind turbine, native vegetation emerges through gorse; tree ferns cover lower south-facing gullies

(Left) Hillside vegetation at the top of Belmont trig, raukahu, kāpuka and kakaha are sculpted to the wind.



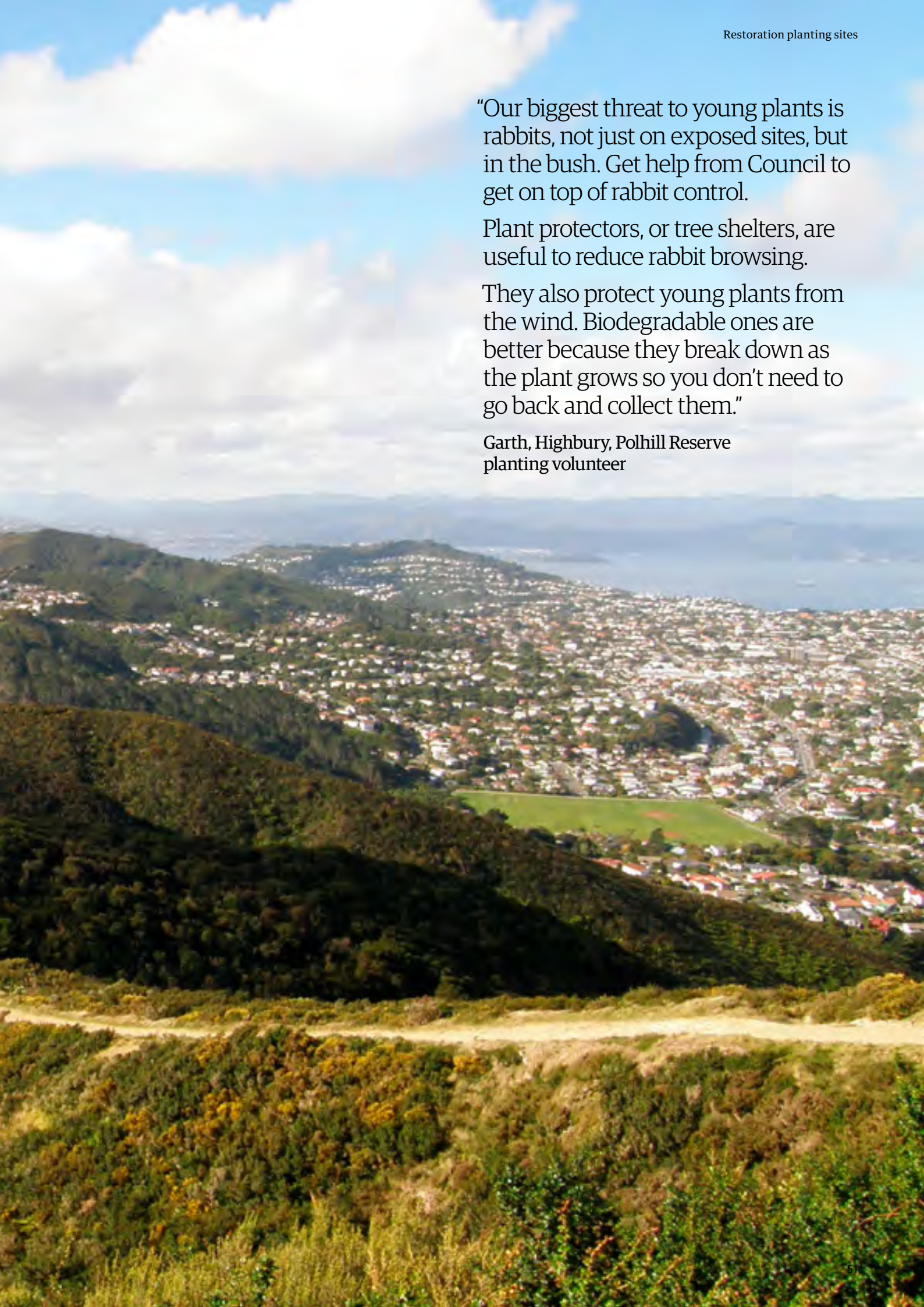


“Our biggest threat to young plants is rabbits, not just on exposed sites, but in the bush. Get help from Council to get on top of rabbit control.

Plant protectors, or tree shelters, are useful to reduce rabbit browsing.

They also protect young plants from the wind. Biodegradable ones are better because they break down as the plant grows so you don't need to go back and collect them.”

Garth, Highbury, Polhill Reserve  
planting volunteer





# Ngā kahiwi, ngā pīnakitanga me ngā taumata

## Ridgelines, upper slopes and hilltops

The aim of restoration planting on ridgelines and hilltops is to support natural regeneration of existing native plants, create shelter, and over time, plant forest or scrubland species that will develop a canopy. Assess the site carefully before removing weeds, as plants like gorse can help shelter young seedlings. Work out the prevailing wind direction and pick areas that might hold

soil moisture over the summer period. Tree shelters and even young seedlings can be blown off hilltops in a stiff Wellington breeze.

Success with planting these areas requires careful plant selection. The range of species to choose from initially is very limited. Once shelter is established more species can be added.



(Above) Planting on Brooklyn Hill has been a staged project, with removal of broom and gorse in small sections. Tree shelters have been used to assist growth of the plants as well as providing relief from rabbits browsing.

(Below) Planting on Brooklyn Hill, using a biodegradable tree shelter will not be so intrusive as the green shelters.



### Tips for planting on ridgelines, upper slopes and hilltops

One of the biggest threats to young plants in these areas is browsing from rabbits and hares. Carry out rabbit control before planting and monitor animal damage throughout your project.

Plants suited to these sites may grow lower and more compact than if they were placed in more sheltered sites. Space plants close together, 0.5-1 m from each other.

Shelter is key to establishing plants in these areas. Plant in the shelter of existing vegetation and rock formations. Plant 3-5 plants together in clumps so they shelter each other.

If there is gorse present, clear small areas between the bushes and plant into them. The gorse will act as a shelter while the young plants establish. Keep the cleared areas small so wind can't funnel through the site between young seedlings. Gorse needs full sunlight to thrive, so will naturally die back as a new canopy of trees takes over.

Use one fertiliser tablet for each plant where soils are low in nutrients and add crystal rain if watering plants is unrealistic.

Plant in late June and July, once ground moisture is reliable, allowing time for the new plants to settle in before the next summer.

Exposure to wind can dry out plants and loosen them in the soil, damaging their roots and sometimes blowing them away. Use tree shelters, firmly staked into the ground. Biodegradable shelters are preferred as they break down naturally so don't need to be collected as the plant grows or if they are blown off.

Mulch around plants where possible to retain moisture, keep weed growth down and add nutrients to the soil.



(Above) A new biodegradable tree shelter, made of coconut husk.

(Below) Taupata and other young seedlings can quickly be destroyed by rabbit browse.

## Plant list for ridgelines, upper slopes and hilltops

Ridgelines, upper slopes and hilltops		Life form	Plant preferences & tolerances				Abundance	
Māori/ Common name	Botanical name	Plant type	Soil moisture needs	Light levels	Frost tolerant	Wind tolerant	Early stage	Later stage
Coastal tree daisy	<i>Olearia solandri</i>	Bushy shrub to 5m	Dry to semi-moist	Sun	✓	✓	++	
Whauwhaupaku	<i>Pseudopanax arboreus</i>	Small tree to 3-6m	Semi-moist	Sun to semi-shade	✓	✓	+	
Kakaha, bush lily	<i>Astelia fragrans</i>	Flax like to 2m	Semi-moist	Sun to semi-shade	✓	✓		++
Kāpuka / Broadleaf	<i>Griselinia littoralis</i>	Small tree up to 4m	Semi-moist	Sun to semi-shade	✓	✓	++	
Tree Hebe	<i>Veronica parviflora</i>	Tall shrub up to 5m	Semi-moist	Sun	✓	✓	+++	
Koromiko	<i>Veronica stricta</i>	Shrub up to 4m	Semi-moist	Sun to semi-shade	✓	✓	++	
Mingimingi	<i>Coprosma propinqua</i>	Shrub 2-5m	Dry to semi-moist	Sun	✓	✓	+++	
Mingimingi / Twiggy coprosma	<i>Coprosma rhamnoides</i>	Shrub up to 1.5m	Semi-moist	Sun	✓	✓	++	
Broad-leaved poa	<i>Poa anceps</i>	Grass, 1m	Semi-moist	Sun to semi-shade	✓	✓		++
Silver tussock	<i>Poa cita</i>	Grass, 0.7m	Dry	Sun	✓	Exposed	+++	
Ramarama	<i>Lophomyrtus bullata</i>	Shrub to small tree, 3-6m	Semi moist	Sun to semi-shade	✓	✓		++
Raukaua	<i>Raukaua anomalus</i>	Shrub up to 3m	Semi-moist	Sun	✓	Exposed	++	
Stinkwood	<i>Coprosma foetidissima</i>	Shrub to 3m	Semi moist	sun	✓	✓		++
Tauhinu / Cottonwood	<i>Ozothamnus leptophyllus</i>	Shrub, 2m	Dry	Sun	✓	✓	++	
Thin-leaved coprosma	<i>Coprosma areolata</i>	Shrub up to 5m	Semi-moist	Sun	✓	✓		++
Toetoe	<i>Austroderia toetoe</i>	Grass up to 4m when flowering	Semi-moist	Sun	✓	Exposed	++	
Wharariki / Mountain flax	<i>Phormium cookianum</i>	Flax up to 1.5m	Dry to semi-moist	Sun	✓	✓	+++	

+ use sparingly   ++ use commonly   +++ use plentifully   ✓ yes   • categorised

# Te whakatō tipu whakapaipai ngahere

## Forest enrichment planting

Diverse and abundant plants and animals once cloaked the Wellington landscape from hilltops to sea. Northern rātā was a common sight emerging through the canopy along with rimu, mataī, kahikatea, pukatea and tōtara. Below them stood a dense cover of tawa, kohekohe, kāmahi, titoki, hīnau and kōwhai. The forest interiors were thick with climbers like kiekie and supplejack, and the forest floor carpeted with ferns. Tieke, piopio, robin, kokako, stitchbird, banded rail, kiwi, weka, kererū, kākā and huia would have called through the trees and tuatara would have scurried in and out of sea bird burrows feasting on eggs.

A history of logging, burn-off, clearance for farming and development, and planting of macrocarpa and pines has resulted in a substantial loss of Wellington's forests over time.

Today only 5% of Wellington's original lowland broadleaf-podocarp forest and 1% of original coastal forest remains. These remnants provide sanctuary for the surviving native birds and insects and are an important seed source for forest restoration and planting.

In the remaining old forest remnants, like Otari-Wilton's Bush and the Botanic Garden, the range of native plants and animals present is much diminished from what it once was.

Council, community groups and landowners throughout the city are working hard to re-establish a wider range of species in the regenerating forests to bring back some of the rarer species that are special to Wellington. Planting a wider range of species in regenerating forests is known as 'enrichment planting'. Enrichment planting can both increase biodiversity as well as start to provide for more complex ecological relationships between plants and animals.



# Nōhanga Habitat

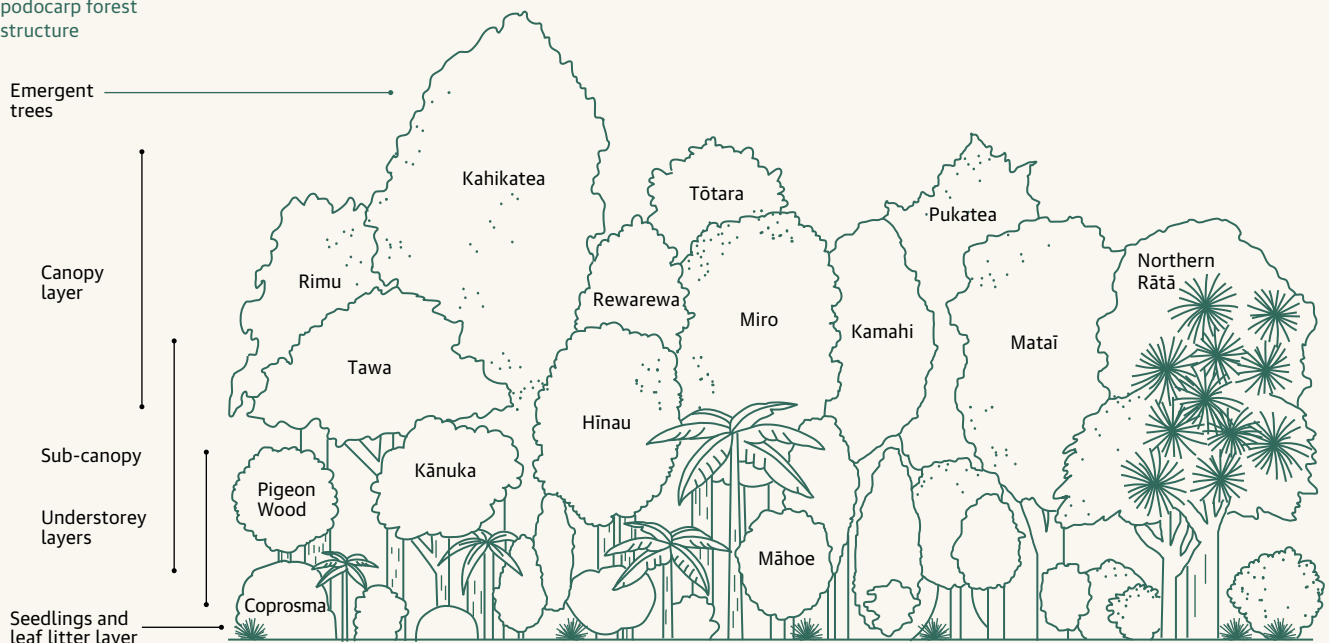
Typically, the structure of Wellington forests would have looked similar to the diagram below. Otari-Wilton’s Bush is one of the few areas where this structure remains, including a rich abundance of ferns and grasses covering the ground.

The composition of the species changes depending on aspect, whether it is a valley floor or hillside, elevation, and whether the canopy is dominated by māhoe, tawa or kohekohe as well as proximity to the sea.



Tawa dominated canopy with typical gully species

Broadleaf-podocarp forest structure





# Te whakatō tipu

## Planting



The aim of enrichment planting is to re-establish a more natural composition of native plants by reintroducing absent species and increasing the number of species through a site or local area.

Your site should already have shelter from existing native shrubs and trees, and weeds and animal pests should be well managed so that young planted and regenerating seedlings can survive. There will likely be seedlings already naturally regenerating on the forest floor and a range of microclimates throughout the site. If your site does not have adequate shelter, check out other sections for earlier stage planting, eg Restoration planting on inland hillsides, valleys and basins.

Usually, enrichment planting does not require close spacing of plants - in fact, it is better to distribute the plants more widely within existing plantings. Look for suitable microsites and think about the conditions that the plants naturally prefer.

It is necessary to plant species where there is no, or limited, seed source close by. For species where seed source exists, you can help the natural process of bird and wind seed dispersal by controlling weeds to reduce competition for space, light and nutrients. Dropping seed into suitable locations may be all that is required to establish some species.

As plants establish and start to produce seed and the conditions for natural seed germination and seedling establishment improve, the natural forest structure will gradually redevelop. Seed dispersers, like tūi, kererū and kākā, will move from area to area feeding and introducing other native species.

(Above) Bush rice grass, establishing well on the forest floor.

“Get to know and understand the whole ecosystem you are working in. It’s not just about getting plants in the ground, it’s about looking at ecological relationships, mix of species, pollination, habitat for rare species - all the things that mean a forest can sustain itself.

Check out old photos, visit the old remnant forests, talk to or join other planting groups, or look for books and science papers that describe what the forests used to look like. Make a plan and stage your planting over several years to get the right mix of shelter and species.”

Joakim, Miramar

# Te papa ngahere me ngā momo tipu kei raro iho i te kāuru o te ngahere

## Forest floor, understorey and sub-canopy species

The forest floor includes a wide range of mosses, ferns, grasses, ground covers and leaf litter dropped from taller canopy plants. It is generally a shady and moist environment that provides the conditions needed for native seeds to germinate and grow. A wider range of forest floor, understorey and sub-canopy shrubs can be planted once there is a canopy of taller trees providing shelter and lower light levels.



(Above, right) Ferns and seedlings colonising the damp understorey on the valley floor



(Right) *Microsorium scandens* with ripe spores - try pinning spore-laden fern fronds spore side down, on the forest floor. Check first to make sure the spore is ripe

### Tips for planting and restoring forest floor, understorey and sub-canopy species

Control weeds such as Wandering willie so that native seeds and fern spore can germinate and grow without being smothered. Weed around young naturally regenerating seedlings as well as planted seedlings.

Plant in between naturally regenerating seedlings. Plant in groups of about 3 plants in a triangular pattern so they shelter can each other. Mix species up so you don't have a monoculture.

Plant ground covers, herbs and ferns at around 0.5 metre spacings. Plant shrubs and smaller plants at around 0.1 metre spacings.

Ferns are notoriously hard to grow but will naturally colonise bank and rock faces in damp shady situations. Try making small vertical cuts into sloping ground in suitably damp, shady places on your site to encourage fern development. Lay fertile fronds from fern and tree ferns onto damp surfaces; hold them in place with something heavy.

Once the canopy has reached a height that can be walked under, try establishing some of the wind and frost tender species such as kawakawa or hangehange.



Ferns often colonise banks and rock faces in damp, shady situations; spores are blown onto these faces. Try making small vertical cuts into sloping ground in suitably damp, shady places on your site to encourage fern development.

## Plant list for forest floor, understorey and sub-canopy species

### Enhancement forest planting - forest floor, understorey and subcanopy

Māori/ Common name	Botanical name	Planting site			Life form	Plant preferences & tolerances				Abundance
		Forest floor	Under- storey	Sub canopy		Soil moisture needs	Light levels	Frost tolerant	Wind tolerant	
Bush rice grass	<i>Microlaena avenacea</i>	•			Grass, 0.4m	Semi-moist	Shade	✓	Exposed	++
Fine-leaved hook sedge	<i>Carex banksiana</i>	•			Sedge, 0.5m	Semi-moist	Semi- shade	✓	Exposed	+
Forest sedge	<i>Carex dissita</i>	•			Sedge, 0.5m	Semi-moist	Semi shade	✓	Exposed	++
Trip-me-up	<i>Carex flagellifera</i>	•			Sedge, 0.4m	Semi-moist	Semi- shade	✓	✓	++
Hangehange	<i>Geniostoma ligustrifolium var. ligustrifolium</i>		•		Shrub to 2 m	Semi-moist	Semi- shade	Frost tender	✓	++
Kamu / Hook grass	<i>Carex uncinata</i>	•			Sedge, 0.4m	Semi-moist	Semi- shade	✓	Exposed	++
Kakaha / Bush flax	<i>Astelia fragrans</i>	•			Flax-like herb, 1m	Semi-moist	Semi- shade	✓	Exposed	+
Kanono	<i>Coprosma grandifolia</i>		•	•	Shrub	Semi moist	Semi shade to sun	✓	Exposed	+++
Kawakawa	<i>Piper excelsum</i>		•		Shrub/ small tree	Semi-moist	Semi- shade	Frost tender	Exposed	+++
Lowland horopito	<i>Pseudowintera axillaris</i>			•	Small tree, 7m	Semi moist	Semi shade	✓ When mature	Exposed	+
Māhoe / Whitey wood	<i>Melicytus ramiflorus</i>			•	Tree to 5m	Semi moist to dry	Semi shade	✓ When mature	Moderate	++
Māpere / Razor sedge	<i>Gahnia setifolia</i>	•			Sedge, flowers to 3m	Dry	Sun	✓	Moderate	+
Mikoikoi / New Zealand iris	<i>Libertia grandifolia</i>	•			Flax-like shrub, 0.7m	Semi-moist	Semi- shade	✓	✓	++
Mikoikoi/ New Zealand iris	<i>Libertia ixioides</i>	•			Flax-like shrub, 0.7m	Semi-moist	Semi- shade	✓	✓	+

+ use sparingly    ++ use commonly    +++ use plentifully    ✓ yes    • categorised

## Plant list for forest floor, understorey and sub-canopy species (cont.)

### Enhancement forest planting - forest floor, understorey and subcanopy

Māori/ Common name	Botanical name	Planting site			Life form	Plant preferences & tolerances				Abundance
		Forest floor	Under- storey	Sub canopy		Soil moisture needs	Light levels	Frost tolerant	Wind tolerant	
Porokaiwhiri, pigeonwood	<i>Hedycarya arborea</i>			•	Tree to 8m	Semi moist	Semi shade to sun	✓ When mature	Moderate	+++
Putaputawētā	<i>Carpodetus serratus</i>			•	Tree to 5m	Moist to semi moist	Shade	✓ When mature	Moderate	++
Ramarama	<i>Lophomrytus bullata</i>		•		Tree to 5m	Moist to semi moist	Shade	✓ When mature	Moderate	++
Round-leaved coprosma	<i>Coprosma rotundifolia</i>		•		Shrub 2 - 4m	Semi moist	Semi shade	✓ When mature	Moderate	++
Speckled sedge	<i>Carex testacea</i>	•			Sedge, 0.4m	Semi-moist	Semi- shade	✓	✓	++
Thin-leaved coprosma	<i>Coprosma areolata</i>		•		Shrub to 3m	Semi moist	Semi shade to sun	✓	✓	++
Tūrutu / NZ blueberry	<i>Dianella nigra</i>	•			Tussock- like herb, up to 0.5m	Semi-moist	Semi- shade	✓	Moderate	+++

+ use sparingly   ++ use commonly   +++ use plentifully   ✓ yes   • categorised



# Te kāuru o te ngahere me ngā rākau teitei e tipu tonu ana

## Canopy and emergent tall trees



The forest floor includes a wide range of mosses, ferns, grasses, ground covers and leaf litter dropped from taller canopy plants. It is generally a shady and moist environment that provides the conditions needed for native seeds to germinate and grow. A wider range of forest floor, understorey and sub-canopy shrubs can be planted once there is a canopy of taller trees providing shelter and lower light levels.

Rimu growing in small light well.

### Tips for planting and restoring forest floor, understorey and sub-canopy species

Rimu naturally comes up through light pockets in the forest created when large trees fall over and tawa favours moist sites under a established canopy. Consequently, both these species struggle in an open environment. They need shelter and grow better on the edge of a stand of trees where they are protected from frost and strong drying winds. They also need reasonable soil that holds enough moisture over the summer season.

Tōtara and Northern rātā can be planted in open situations alongside the early-stage restoration plant species and tolerate more exposed, north-facing sites.

Kahikatea can be planted in open situations but needs a reasonable amount of soil moisture.

Pukatea needs a moist environment, shelter and protection from frosts.

If you have a closed canopy and a very shady environment, cut small light wells for emergent trees that need light, eg rimu. Make sure to maintain the light wells and do regular weed control in the area until the new seedling is well established and starting to emerge through the surrounding growth.

Emergent trees take up a lot of space in a forest, so can be planted at wider spacings, around 5 metres, depending on the site and the mix of species present.

## Plant list for canopy and emergent trees

### Enhancement planting - Canopy and emergent trees

Māori/ Common name	Botanical name	Life form	Plant preferences & tolerances				Habitat	Comments
			Soil moisture needs	Light levels	Frost tolerant	Wind tolerant		
Heketara	<i>Olearia rani</i> <i>var. colorata</i>	Small tree, up to 6m	Dry to Semi- moist	Semi-shade	✓ When mature	✓	Coastal to inland forests, dry hillsides	White flowers Aug to Nov attract bees.
Hīnau	<i>Elaeocarpus</i> <i>dentatus</i>	Canopy tree, 20m	Semi- moist	Semi-shade	✓ When mature		Hillsides in established canopy, fertile soil	Fleshy fruits attracts kererū, tūi, titapu. Flowers attract bees.
Horoeka/ lancewood	<i>Pseudopanax</i> <i>crassifolius</i>	Small tree to 8m	Semi moist	Semi shade to sun	✓	✓	Coastal to inland forest, hillsides	Two stages of growth, juvenile lance leaves to a round topped tree, attractive to birds.
Kahikatea / White pine	<i>Dacrycarpus</i> <i>dacrydioides</i>	Emergent, up to 50m	Moist to wet	Semi-shade	✓ When mature	✓	Valley floors and lower hillslopes	Fleshy fruit attracts and is dispersed by birds.
Kaikōmako	<i>Pennantia</i> <i>corymbosa</i>	Small tree, up to 8m	Semi- moist	Sun to semi-shade	✓ When mature	✓	Coastal to inland forests	Black fruit Jan to Apr attracts Korimako.
Kāmahi	<i>Weinmannia</i> <i>racemosa</i>	Canopy tree up to 25m	Semi- moist	Semi-shade	✓ When mature	✓	Well drained steep hillsides, sea level to montane	Flowers Dec to Jan attract birds and bees. Easily grown from seed.
Kohekohe	<i>Dysoxylum</i> <i>spectabile</i>	Canopy tree, 15m	Semi- moist	Semi-shade	✓ When mature	Sheltered	Coastal to inland hillsides	Large glossy leaves. Flowers and fruit attract birds in winter.
Maire/ Black maire	<i>Nestegis</i> <i>cunninghamii</i>	Canopy tree up to 20m	Moist to Semi moist	Semi shade	✓ When mature	Sheltered	Gully, plant within established canopy	Locally rare species. Fruit Dec to May attracts kererū.
Maire rauiki / White maire	<i>Nestegis</i> <i>lanceolata</i>	Canopy tree up to 20m	Semi- moist to dry	Semi-shade	✓ When mature	Sheltered	Hillsides among existing canopy	Red fruit attractive to birds, especially kererū. Easily grown from seed.
Maire tawake	<i>Syzygium</i> <i>maire</i>	Canopy tree up to 16m	Moist- wet	Sun to shade	✓ When mature	Sheltered	Swamp to very wet valley floors	Nationally threatened species. Susceptible to myrtle rust.
Mataī	<i>Prumnopytis</i> <i>taxifolia</i>	Emergent tree up to 20m	Semi- moist	Semi-shade	✓ When mature	Sheltered	Lowland valleys and hillslopes	Black fruit, attractive to birds.
Miro	<i>Prumnopytis</i> <i>ferruginea</i>	Emergent tree up to 25m	Semi- moist	Semi-shade	✓ When mature	Sheltered	Grow in a wide range of sites, valley floor to hilltops	Red plum-like fruit Nov to Apr, attractive to kererū.

+ use sparingly   ++ use commonly   +++ use plentifully   ✓ yes   ● categorised

## Plant list for canopy and emergent trees (cont.)

Enhancement planting - Canopy and emergent trees		Life form	Plant preferences & tolerances				Habitat	Comments
Māori/ Common name	Botanical name	Life form	Soil moisture needs	Light levels	Frost tolerant	Wind tolerant		
Nikau	<i>Rhopalostylis sapida</i>	Palm-like tree up to 15m	Semi-moist	Semi-shade	✓ When mature	Sheltered	Lowland valleys and gullies	Attracts birds and bees.
Pōkākā	<i>Elaeocarpus hookerianus</i>	Canopy tree to 15m	Dry to moist	Sun to semi shade	✓ When mature		Tolerates a wide range of conditions, dry hillsides	Unusual divaricating phase, flowers only occasionally, can be up to 8 years apart, locally rare.
Pukatea	<i>Laurelia novae-zealandiae</i>	Canopy tree up to 30m	Moist to wet	Semi-shade	✓ When mature	Sheltered	Valley floor and shaded gullies, deep moist soil	Prefers damp sites. Has buttress trunk.
Rātā/ Northern rātā	<i>Metrosideros robusta</i>	Emergent 25-40m	Dry to Semi-moist	Sun to semi-shade	✓ When mature		Hillsides, coastal to inland. Epiphytic as well as terrestrial	Attractive to possums, nationally threatened. Attracts bees Nov to Jan. Grows from fresh seed.
Rewarewa / NZ honeysuckle	<i>Knightia excelsa</i>	Emergent, up to 30m	Dry to Semi-moist	Semi-shade	✓ When mature	Sheltered	Dry well drained hillslopes	Fruits Oct to Jan, attracts nectar feeders and bees. Grown from fresh seed.
Raukawa	<i>Raukawa edgerleyi</i>	Tree up to 12m	Moist to Semi moist	Semi shade	✓ When mature	Sheltered	Inland hillslopes	Locally rare species. Susceptible to possum, goat, rat browsing.
Rimu	<i>Dacrydium cupressinum</i>	Emergent, 35-50m	Semi-moist to moist	Semi-shade	✓ When mature	Sheltered	Tolerates a range of conditions, preference for deep fertile soil, sheltered position	Fleshy fruit Mar to May attracts birds and bees.
Tawa	<i>Beilschmiedia tawa</i>	Canopy tree, up to 24m	Semi-moist	Shade	✓ When mature	Sheltered	Coastal to inland forest, hillsides and valleys	Purple plum-like fruit attracts kererū. Easily grown from fresh seed.
Titoki	<i>Alectryon excelsus</i>	Tree, up to 15m	Dry to semi-moist	Semi-shade	✓ When mature	Moderate	Coastal to lowland forest, valley floor to hillsides	Red fleshy fruit attracts birds and bees. Grown from fresh seed.
Toro	<i>Myrsine salicina</i>	Tree to 10m	Moist to semi moist	shade	✓ When mature	Sheltered	Lowland forests	Locally rare species, valley floors and moist hillsides.
Tōtara	<i>Podocarpus totara var. totara</i>	Emergent, 15-30m	Semi-moist to dry	Sun to semi-shade	✓ When mature	✓	Tolerates dry conditions, prefers fertile soil, lowland to hillslopes	Fruit takes a year to ripen, attract birds Apr/ May. Grown from fresh seed.
Tūrepo/ Milk tree	<i>Streblus heterophyllus</i>	Tree up to 12m	Dry to semi-moist	Sun to semi shade	✓ When mature	Sheltered	Coastal forest to inland	Rare species. Susceptible to possum, goat, rat browsing.

+ use sparingly   ++ use commonly   +++ use plentifully   ✓ yes   • categorised

# Ngā tipu kaupiki me ngā tipu pipiri

## Climbers and epiphytes

Kaihua and kōhia are commonly found throughout established and regenerating forest areas around Wellington but intervention is needed to broaden the distribution of some of the lesser known climbers. Most climbers like to be planted with their roots in the cool shade and require something to scramble on or climb up so they can grow into the canopy and get their tops into the sun. A small light well can be cut to encourage initial growth.

Epiphytes or perching plants are found growing on another plant but aren't parasitic. Epiphytes rely on the surrounding environment for moisture and nutrients, high up in a canopy tree they receive more light than on the forest floor.

Epiphytes provide habitat for insects, bats, frogs, geckos and birds and some epiphytes rely on the large nesting clumps of Astelias to grow such as tāwhiri karo.

Many species of epiphytic plants are difficult to grow and will arrive naturally over time. Hinau, rimu and many of the larger emergent trees all host epiphytes and climbers. Finding hollows in trees, rotting logs or rock crevices can provide places for these plants to grow but some species will also successfully grow on the forest floor.



Puawhānanga are often seen in early spring, flowering in the canopy



Tāwhiri karo "planted" into a tree hollow.



## Plant list for climbers and epiphytes

Enhancement forest planting - climbers and epiphytes		Planting site		Life form	Plant preferences & tolerances				Abundance
Māori/ Common name	Botanical name	Climber	Epiphyte	Life form	Soil moisture needs	Light levels	Frost tolerant	Wind tolerant	
Akapuka	<i>Griselinia lucida</i>		•	Epiphytic shrub or small tree	Dry to semi- moist	Semi shade to sun	Frost tender	Exposed	++
Kahakaha	<i>Astelia hastata</i>		•	Nest epiphyte	Dry to semi- moist	Semi shade	Frost tender	Moderate	+
Kaihua / NZ jasmine	<i>Parsonsia heterophylla</i>	•		Dense climber	Semi-moist	Semi- shade	✓	Moderate	+++
Kareao / Supplejack	<i>Ripogonum scandens</i>	•		Woody vine	Semi-moist	Shade	Frost tender	✓	++
Kiekie	<i>Freycinetia banksii</i>	•		Vigorous climber	Semi moist to moist	Semi shade	✓	✓	++
Kōhia / NZ passionfruit	<i>Passiflora tetranda</i>	•		Dense bushy climber	Semi-moist	Sun	✓	Moderate	+++
Kōwharawhara	<i>Astelia solandri</i>		•	Nest epiphyte	Dry to semi- moist	Semi shade	Frost tender	Moderate	+
Puawhānanga / Small white clematis	<i>Clematis forsteri</i>	•		Scrambling climber	Semi-moist	Sun	✓	Moderate	+
Puawhānanga / White clematis	<i>Clematis paniculata</i>	•		Woody vine up to 12m	Semi-moist	Semi- shade	✓	Moderate	+
Tātārāmoa / Bush lawyer	<i>Rubus cissoides</i>	•		Prickly, scrambling vine	Semi-moist	Semi- shade	✓	✓	+
Tāwhiri karo	<i>Pittosporum cornifolium</i>		•	Epiphytic shrub 2.5m	Semi moist	Semi shade	✓	Moderate	+

+ use sparingly   ++ use commonly   +++ use plentifully   ✓ yes   • categorised

# Kuputaka Glossary

Term	Meaning
<b>brackish</b>	Salty water which has higher salt levels than fresh water but lower levels than sea water.
<b>catchments</b>	The natural drainage area for rainfall.
<b>escarpment</b>	A steep slope or long cliff that forms as a result of faulting or erosion and separates two relatively level areas with different elevations.
<b>floodplain</b>	Area where floodwater periodically spreads to when a river or stream floods.
<b>intertidal zone</b>	Exposed at low tide and covered by shallow water at high tide.
<b>microsites</b>	Small pocket of the environment that has unique features, conditions or characteristics unlike those around it. For example this might be certain temperatures, humidity, light levels or nutrient availability.
<b>mycorrhizal fungal association</b>	Mycorrhizal fungi help plants.
<b>toe of the dune</b>	Part of the dune closest to the sea.
<b>vegetation sequence</b>	The progression of plants through an environment type. For example a coastal vegetation sequence starts with sand trapping plants at the sea, progresses to larger shrubs in the backdunes, then small trees until it becomes coastal forest further inland.
<b>subtidal zone</b>	Always underwater or submerged.

# Whakamāoritanga Translation

## New Zealand birds

Māori	English
<b>hihi</b>	stitchbird
<b>huia</b>	
<b>kākā</b>	
<b>kākāriki</b>	red crowned parakeet
<b>kāruhiruhi</b>	piebald shag
<b>kererū</b>	New Zealand woodpigeon
<b>kiwi</b>	
<b>kōkako</b>	
<b>korimako</b>	bellbird
<b>kororā</b>	little penguin
<b>piopio</b>	
<b>taranui</b>	Caspian tern
<b>tīeke</b>	saddleback
<b>tīkākā</b>	reef heron
<b>tītī</b>	muttonbird
<b>toutouwai</b>	North Island robin
<b>tūi</b>	
<b>tūturiwhatu</b>	banded dotterel
	banded rail
<b>weka</b>	woodhen

## New Zealand animals and other species

Māori	English
<b>īnanga</b>	white bait
<b>kōkopu</b>	giant kokopu
<b>kōkopu</b>	shortjaw kokopu
<b>kōura</b>	fresh water crayfish
<b>tuatara</b>	
<b>tuna</b>	longfin eel

## New Zealand plants

Māori	English	Māori	English	Māori	English
<b>akapuka</b>		<b>kōwhai</b>		<b>pūkio</b>	cutty grass
<b>akiraho</b>	golden akeake	<b>kōwharawhara</b>	perching lily	<b>putaputawētā</b>	marbleleaf
<b>hangehange</b>	NZ privet	<b>māakoako</b>	sea primrose	<b>ramarama</b>	
<b>harakeke</b>	flax	<b>māhoe</b>	whitey wood	<b>rangiora</b>	
<b>heketara</b>		<b>maire rauriki</b>	white maire	<b>rātā</b>	Northern rātā
<b>hinarepe</b>	sand tussock	<b>maire tawake</b>	swamp maire	<b>raukawa</b>	
<b>hīnau</b>		<b>mākaka</b>	salt marsh ribbonwood	<b>rauparaha</b>	shore bindweed
<b>horoeaka</b>	lancewood	<b>makomako</b>	wineberry	<b>raupō</b>	bullrush
<b>horokaka</b>	NZ iceplant	<b>mamaku</b>	black tree fern	<b>rautahi</b>	cutty grass
<b>horopito</b>	lowland horopito	<b>mānatu</b>	ribbonwood	<b>remuremu</b>	
<b>houhere</b>	lacebark	<b>mānuka</b>	tea tree	<b>rewarewa</b>	New Zealand honeysuckle
<b>Ti kōuka</b>	cabbage tree	<b>māpere</b>	razor sedge	<b>rimu</b>	red pine
<b>kahakaha</b>	perching lily	<b>māpou</b>	red matipou	<b>rōhutu</b>	
<b>kahikatea</b>	white pine	<b>matagouri</b>		<b>taramea</b>	speargrass
<b>kaihua</b>	NZ jasmine	<b>mataī</b>	black pine	<b>tarata</b>	lemonwood
<b>kakaha</b>	bush lily	<b>mikoikoi</b>	New Zealand iris	<b>tauhinu</b>	cottonwood
<b>kāmahi</b>		<b>mingimingi</b>		<b>taupata</b>	
<b>kamu</b>	hook grass	<b>miro</b>	brown pine	<b>tawa</b>	
<b>kanono</b>	large-leaved Coprosma	<b>ngaio</b>		<b>tāwhiri karo</b>	
<b>kānuka</b>		<b>nīkau</b>		<b>tītoki</b>	New Zealand ash
<b>kāpuka</b>	broadleaf	<b>oioi</b>	jointed wire rush	<b>toetoe</b>	
<b>kāpūngāwhā</b>	lake clubrush	<b>patē</b>	seven finger	<b>toro</b>	
<b>karamū</b>		<b>pinātoro</b>	New Zealand Daphne	<b>tororaro</b>	
<b>kawakawa</b>	peppertree	<b>pīngao</b>	golden sand sedge	<b>tōtara</b>	
<b>kiekie</b>		<b>poataniwha</b>		<b>tūrepo</b>	small-leaved milk tree
<b>kiokio</b>		<b>pōhuehue</b>	small leaved pohuehue	<b>tūrutu</b>	NZ blueberry
<b>kohekohe</b>	NZ mahogany	<b>pōkākā</b>		<b>upokotangata</b>	umbrella sedge
<b>kōhia</b>	NZ passionfruit	<b>ponga</b>	silver tree fern	<b>waiū atua</b>	shore spurge
<b>kōhūhū</b>	black matipo	<b>porokaiwhiri</b>	pigeonwood	<b>wharangi</b>	
<b>kōkihi</b>	NZ spinach	<b>puawānanga</b>	small white clematis	<b>wharariki</b>	Mountain flax
<b>koromiko</b>	hebe	<b>puawānanga</b>	white Clematis	<b>whauwhaupaku</b>	fivefinger
<b>kōtukutuku</b>	tree fuchsia	<b>pukatea</b>		<b>wīwī</b>	knobby clubrush

# He mōhiohio anō

## More information

### **Links**

Further information on how dune systems absorb the forces of the sea and coastal restoration  
[coastalrestorationtrust.org.nz](http://coastalrestorationtrust.org.nz)

Identifying and controlling weeds  
[weedbusters.org.nz](http://weedbusters.org.nz)

Identifying what animal pests are at your site  
[www.pestdetective.org.nz](http://www.pestdetective.org.nz)

Controlling animal pests  
[www.gw.govt.nz/pest-animals](http://www.gw.govt.nz/pest-animals)

Identifying native plants  
[www.nzpcn.org.nz](http://www.nzpcn.org.nz)

Planning riparian restoration on farms and open sites  
[www.dairynz.co.nz/environment/waterways/riparian-planner/](http://www.dairynz.co.nz/environment/waterways/riparian-planner/)

Identifying birds  
[nzbirdsonline.org.nz](http://nzbirdsonline.org.nz)

Taking note of bird numbers  
[ebird.org.nz](http://ebird.org.nz)

Explore and share your observations from the natural world  
[inaturalist.nz](http://inaturalist.nz)

This guide complements the Restoration Planting Techniques booklet

### **Contact**

Wellington City Council  
Park Rangers 04 499 4444





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**Absolutely Positively**  
**Wellington City Council**

Me Heke Ki Pōneke