

Little Waihi Catchment Vegetation Restoration Strategy

Restore the Little Waihi Estuary and its catchment ecosystem including the unique indigenous biodiversity that supports it.

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Prepared for:

Wai Kokopu Community Initiative

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1. Introduction

Re-Whenua has been engaged by Waikokopu to create an overall restoration strategy for the Little Waihi Catchment that includes sound principles, tactics and guidelines. A resource to be used by all seeking to restore the indigenous biodiversity in the area. Native vegetation types have been surveyed and workhorse species for practical revegetation identified for each ecological zone.

2. Principles

1. **Water & Land.**

Protect and restore healthy land and waterways, wetlands etc.

2. **Biodiversity.**

Protect and restore indigenous biodiversity on natural lands.

3. **Sustainable outcomes.**

Commit to long term sustainable outcomes and invest in intergenerational commitment required to achieve goals and the vision.

4. **Being pragmatic:**

1. Be sure to conduct a **Weed Risk Assessment** before retiring or planting any new land to prevent potentially worse or irreversible outcomes (it's so easy for planted land to be invaded and then become a headache and weed seed source)

2. **Efficiency:** Aim at efficient cost effective restoration and weed control methods. Being pragmatic early will save effort and prevent the need for more herbicides later. Dedication to completing the goal will ensure effort is not wasted.

Sometimes healing the land means taking medicine. Baking a cake means breaking an egg. Long term ecological recovery sometimes needs solid practical methods to ensure success.

3. Biodiversity Principles

3a. **Biosecurity**

Prevent the influx of new pests, weeds and diseases from outside the catchment e.g. Kauri root disease (*Phytophthora agathidicida*), Macho Fern (*Nephrolepis biserrata*). This is a fundamental principle because the consequences are either extremely expensive or impossible to reverse.

(NB Flagship species Māngea, as a relative of Avocado shares inherent vulnerability to Phytophthora species, thus prevention benefits both the natural heritage and economy of the Bay of Plenty.)

3b. **Protect indigenous biodiversity in native remnants.**

Protection of native vegetation from introduced mammals (deer, possums, pigs, goats, wallabies, stock) is fundamental to preserving the existing species diversity and natural seed

sources for restoration projects.

Protection from invasive weeds is essential to ensure regeneration, survival and the true NZ indigenous character of our heritage is maintained for future generations to experience. If neglected, we will be handing on dismal dinosaur forests to our descendants, much like our moa and huia inheritance.

The planned weed control strategy will address practical steps to succeed in this vital objective. Without it we stand to lose our unique NZ heritage as forests and wetlands become an unrecognisable sea of exotic weeds.

3c. Realistically assess weed threat and control strategy.

Conduct a weed risk assessment and strategic weed control plan before committing to retiring or planting significant areas of new land (over 2 hectares). This must address sources outside the project area and within dispersal distance (weed dispersal zone).

Do not proceed if the project will create a burden for future generations or defer until weed control permits. The proposed catchment wide weed control strategy will help provide a secure base for multiple revegetation projects within the catchment.

3d. Ecosourcing: Using native species originally present in the district.

Using native species that are or were once from this place ensures that restored native plantings will recreate and support the unique local natural character and biodiversity that was characteristic of the Tauranga, Otanewainuku and Te Teko Ecological Districts (Tauranga -Whakatane Plains, estuaries and hill country catchments).

Seeds for plantings should be obtained from this area to maintain local genetics .

3e. Ecositing: Restore natural composition (nature's local korowai)

Plants are put on appropriate habitats and at appropriate densities to ensure a natural outcome, mimicking nature to achieve a quality result.

Native plants create distinctive forest communities that reflect the climate and the topography and soil beneath. Examples are Pōhutukawa coastal cliff, Kahikatea -tī kōuka – Harakeke swamp forest and Kahikatea -titoki – tawa – pukatea flood terrace forest.

To achieve this, not only are correct species planted, but careful attention to plant quantities so that uncommon trees are not planted en masse, creating an artificial look for generations to come. Nature restoration, not just landscaping.

Example: Kahikatea planted abundantly at 3 to 10+m spacing on the plains, but at 1 per 5 to 20 hectares in carefully selected gully sites in hill country. By comparison, short lived shrub and cover species like flax and manuka can be planted at any practical density just to get a good weed resilient cover e.g. mixed species at 2m spacing.

3f. Educational, inspirational plantings: have an important advocacy role to capture and strengthen support.

These can often be treated like traditional landscaping subjects in amenity areas or marae/schools to promote and celebrate the special nature of Little Waihi Catchment.

Iconic plants such as Rimu, Mangeao, Puriri, Tī Kōuka, Nikau, Kahikatea, Kohekohe. Kawaka, Kawakawa, Kauri, Karaka, Mamaku, Pōhutukawa, Pohuehue and Oioi are all handsome advocates with great amenity value. Take care to not plant invasive natives e.g. Karo outside their natural climatic zone.

4. Restoration Tactics (for revegetation)

4.1 Competitive weeds:

Weeds that will eventually be shaded out by plantings are not a major concern and can simply be viewed as interim competition to be won over by planting, one off spraying or any other practical means. Examples: dense exotic grasses, Inkweed, blackberry. Competitive weeds do not need to be addressed in an Invasive Weed risk assessment.

Swards of exotic grass can help with weed control by minimising invasion of other weeds (e.g. pampas).

4.2 Invasive weeds:

Weeds that persist in native ecosystems and degrade the indigenous integrity (native character) or ecosystem functions (e.g. regeneration).

4.3 Identify a buffer zone around your project for defence. For stream dispersed weeds (e.g. tradescantia & glyceria) this will be anywhere upstream.

For bird dispersed seeds this will be 200m -500m (blackbird dispersed) to 5km (mynah dispersed) around your project. Weed sources should be controlled or eradicated within the buffer zone to protect the core area.

4.4 Control the disperser!

Mynah birds are easy to control at winter feedlots with Starlicide DRC1339 (flock of 600 reduced to 12 in 2 weeks in Northland). This is a very effective means of reducing the weed invasion risks, as mynahs are the principal long distance weed seed disperser.

4.5 Browsing mammals:

Following canopy species are highly susceptible to possums.:

Northern Rata, Mangeao, Rewarewa, Whauwhaupaku, kotukutuku and kohekohe. Wallabies, deer and goats also pose serious threats to all existing and regenerating forest types and should be controlled to ensure positive outcomes.

Establishing colonising species:

The primary goals of establishing first cover are two fold:

1. **to establish weed resilient cover** or canopy as early as possible to reduce ongoing costs and weed threats, put nature on your side.
2. **to create a habitat suitable for full enrichment** of biodiversity by stage 2 enrichment planting and natural regeneration to effectively restore a biodiverse ecosystem.

Establishing early canopy cover with workhorse species:

Good canopy cover is achieved successfully and early by focusing on using **Workhorse species** that do the job best for the habitat e.g. manuka, flax, karamu, mahoe.

Workhorse species are those that are the most dominant naturally occurring species in pioneer communities of a particular habitat. However, for practical purposes it is acceptable to use other species natural to the region that do the job given that their role and abundance is only a transitional phase in a long term project. Occasionally exotic species (e.g. as blackberry does in Northland) will perform the same pioneer function.

Locally natural workhorse species are listed for each habitat in this report.

Weed resilient species:

While no species is fully weed resilient, some offer better cover and resilience than others

or are easier to work amongst. e.g. those with a single stem that form a dense canopy quickly that can be walked underneath for weed seedling follow up (Kanuka, Pate, Tupakihi/tutu.) More open canopy species have poorer weed resilience e.g. mature Karamu, Mingimingi. Harakeke and other tussock forming plants create dense cover but are vulnerable to harbouring creeping weeds e.g. Tradescantia, pampas.

Access for sustained weed control:

This is an essential item that needs to be factored into planting projects.

Selective herbicides; a valuable restoration tool:

Restoration teams are conversant with a range of selective herbicides that are very useful in the selective control of some weeds in planting projects and native plant communities. This will be more fully covered in the weed control strategy. Examples of highly useful selective herbicides used in forest restoration are:

Haloxyfop: for pampas grass or monocots (grass like weeds) among broadleaf natives.

Triclopyr: for selective control of broadleaves among monocots e.g. Tradescantia and Agapanthus growing in harakeke and tī kōuka.

Providing light for future canopy species:

Heavy shading workhorse species (e.g. kawakawa, mahoe) will inhibit light demanding canopy species to establish e.g. Pōhutukawa, Kahikatea, so cluster planting of these canopy species or careful choice of more open canopy pioneers is required (harakeke, mingimingi). Closely spaced clusters of Kahikatea or Rewarewa are acceptable and can be left to thin naturally or by intervention at a later date.

Planting density:

Pioneer, or Workhorse species are generally blanket planted at moderately high density using low cost grades, typically 2 to 4m spacing using 1 to 10 species (around 1000/ha). The goal of workhorse species is to achieve low canopy cover in 5 to 10 years and kick start the native forest, enabling enrichment species to create a thriving ecosystem.

Enrichment species:

Within that matrix enrichment species can be added at planting year 1 to 10 or future high canopy species can be interplanted or planted in clusters for easier management, typically around 50/ha (10 – 100 or up to 1000 for Kahikatea stands). Usually high canopy species will be planted in a separate operation to blanket planting of pioneers to facilitate better placement and a more considered pattern to mimic nature. Planting densities of future high canopy and long lived canopy species will be determined by the projected future forest composition for that habitat and will vary wildly from habitat to habitat e.g. Kahikatea at 100 - 3000 per ha on flood plain and at 1-20 per ha on hill country gullies.

Direct seeding:

In some cases direct seeding of habitats with pioneers can be successful and large volumes of available seed make it practically viable. e.g. Flax, Karamū, Manuka, Tī Kōuka. Direct seeding is usually applicable for bare habitat e.g. after logging, or drain tailings.

Successful example: Direct seeding with manuka has been highly successful at Waipoua Forest. Direct seeding is cheap and if well planned is very rewarding to watch nature do the work for you. In the year 2000, at Waipoua 50 hectares was seeded by hand in one day on disced land using a 200 litre drumful of manuka seed (which cost a bit to collect and process). Kauri were later interplanted, but the full cover of broadleaf species and tree ferns all came free. Access tracks enable ongoing weed control, the highest priority.

Direct seeding of the canopy species Pōhutukawa and Kahikatea is potentially viable if the habitat is suitable.

Direct seeding for enrichment planting also has practical application e.g. Nikau, Kohekohe, Karaka, Porokaiwhiri under Kahikatea. Direct seeding of Karaka is easy but Karaka is seldom a co- dominant species so usually very low numbers are required to enrich a habitat. This requires trained restorers to ensure a natural result.

Bring neighbours on board:

Roadside privet and Honeysuckle, Ivy in Orchard hedge rows, Bangalow palms in gardens, all create a good opportunity for community participation in securing a healthy future for the Little Waihi Catchment. A full list of weeds and control tactics will appear in the proposed Weed control Strategy for the Little Waihi Catchment.

Special project milestones and planting of rare or iconic plants can create a good social occasion for sharing goals, roles and challenges with neighbours.

When natural enrichment of wetlands and forest under restoration starts to happen this is a key milestone e.g. Punui treeferns arriving or cluster plantings self seeding into young pioneer cover.

Community advocacy & engagement:

1. We'll Win the War on Weeds Campaigns:

Create locally relevant advocacy promotions to encourage action.

Suggestions:

Select a weed of the year for the community to focus on.

Spot the Tree Privet/ Ginger/Cotoneaster etc signs in months when they are in flower or fruit, to raise awareness.

Awards, recognition, rewards for first or outstanding weed eradication successes by business and private landholders.

Property weed free status recognition. (NZ Heritage tick).

2. Native Trees advocacy

Promote the iconic natives as part of the Little Waihi BOP plains heritage.

Suggestions:

- Kōkako Forest open days at Pongakawa Ecological Reserve.
- Find the biggest Mangeao competition (Avocado grower sponsor), propagate X,000 Mangeao & other natives over x years under Phytophthora free management).
- Kahikatea seed collection day at Kaituna Rd and/or White Pine Bush.
- Open day/barbecues at each of the major forest types of the catchment (including Kahikatea at Whakatane & Thornton's Kanuka & Weed Tsunami wake up call at Ōhope Pōhutukawa Scenic Reserve).
- Mangeao, aka "The Singing Tree," "Native Avocado"
- Nikau - reintroducing BOP Nikau onto the plain and valley floors to launch Aussie Bangalow Palm Free
- Catchment, celebrate kiwi heritage, propose a date for 100% removal. Visit the amazing Nikau palms at White Pine Bush, Whakatane. So magnificent!! A sight to behold.
- Endangered Goblin Dune Kanuka (Thornton Kanuka) - reintroduced at north and south ends of the coastal subdivision, Pukahina.
- Rongoā planting on tangata whenua land or schools: Kohekohe, Kawakawa, koromiko.
- Puriri planting to symbolise the goal of restoring kereru habitat.
- First major Kahikatea planting: a milestone.

- Transplant a biodiversity grove of ferns, shrubs, etc for future

Guiding Principles

Seed collecting (Ecosourcing):

Guiding principle for seed collection:

choose seed sources within the natural dispersal zone and broad climatic zone.

To define the revegetation goal:

Choose a natural native habitat on similar landform within the same bioclimatic zone as a benchmark, your textbook, to model your revegetation goal (type of forest, species, abundance).

5. Revegetation Guidelines

The Waihi Catchment is made up of three bioclimatic zones:

— Exposed coastal margin (cliffs, dunes)

● Coastal plains

● Lowland Hill country

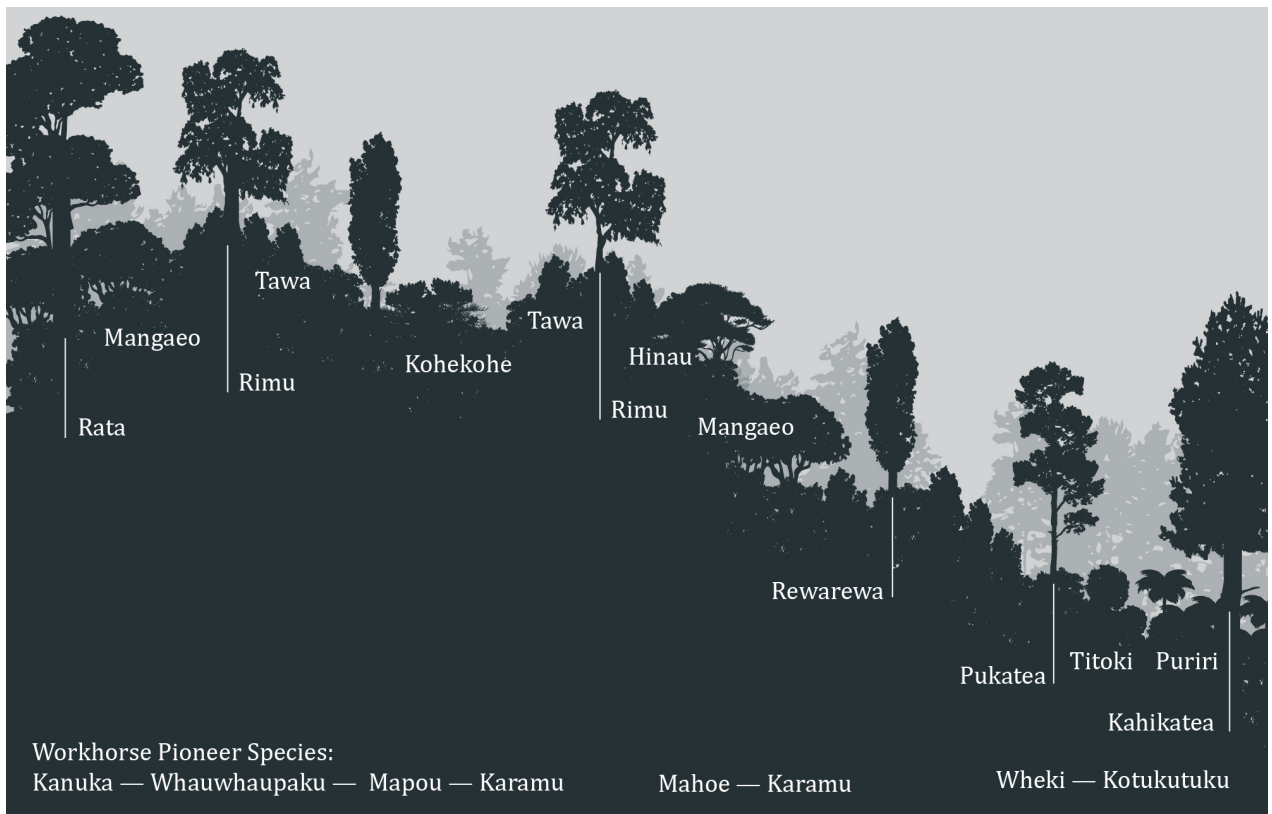


Original Vegetation Community Profile of Little Waihi Catchment

Lowland Hill Country:

Descriptions and are based on Pongakawa Ecological Reserve, old Rotoehu Forest records and forest remnants.

Rimu and rarely other podocarps (Miro, Matai, Kahikatea, Tōtara) with occasional large Rātā frequent **Rewarewa** and occasional Pukatea emergent over a canopy of **Tawa – Kohekohe - Mangeao**, Kamahi, scattered Hinau, Maire, Titoki and infrequent Puriri. Tanekaha occasionally occurred in clusters on spurs or steep ridges. Mangeao and Kohekohe are more abundant on upper slopes and tops. While Kamahi occurs on steeper slopes and ridges discrete stands can be found on old māori burn sites. Gullies consist of Mahoe, abundant Fuchsia, tree ferns (mamaku, ponga, wheki, punui), Rangiora, Kanono, Pigeonwood and Supplejack.





Site specifics of species:

- Puriri are confined to warm slopes and gully heads or fertile valley bottoms .
- Titoki are predominantly along deep free draining ash soils in valley bottoms or stream margins.
- Tānekaha are on spurs or steep ridges offering strong light for regeneration.
- Pukatea are on damper gully sites.
- Kāmahi are on steep eroded sites (bare ash), old burns or established on tree fern trunks.
- Mangeao occur on a wide range of sites but as for its cousin, the Avocado, it does not tolerate boggy conditions. Must have good drainage.
- Tōtara was not directly recorded although post splitting at Rotoehu and Central North Island patterns suggest its former presence as infrequent standing or fallen trees. Tōtara is likely to have been rarely present as infrequently scattered trees in the podocarp/broadleaf forest and also occasionally in deep ash near stream margins. Historic ash fall events can trigger regeneration of Totara , matai, Kahikatea and other light demanding species in podocarp/broadleaf forests.

The principal second growth pioneer species are:

Kanuka, Kamahi, Rewarewa, **Mapou**, **Karamu**, on ridges and tablelands;

Fuchsia, **Pate**, **Punui**, **Mamaku**, **Wheki** , **Mahoe** in gullies; **

Whauwhaupaku (5 finger), **Karamu**, **Mahoe**, **Kawakawa**, and infrequent Kōhūhū (*Pittosporum tenuifolium*) on mid slopes together with the ridge species.

Restoration Workhorse Species in the Hill country zone:

Use the 'bold' pioneer species above, together with Flax, Tī kōuka, Manuka and Tupakihi.

Valley floors in the Hill Country zone

Valley floors vary from narrow streamless gullies of deep free draining ash to floodplains with peat deposits.

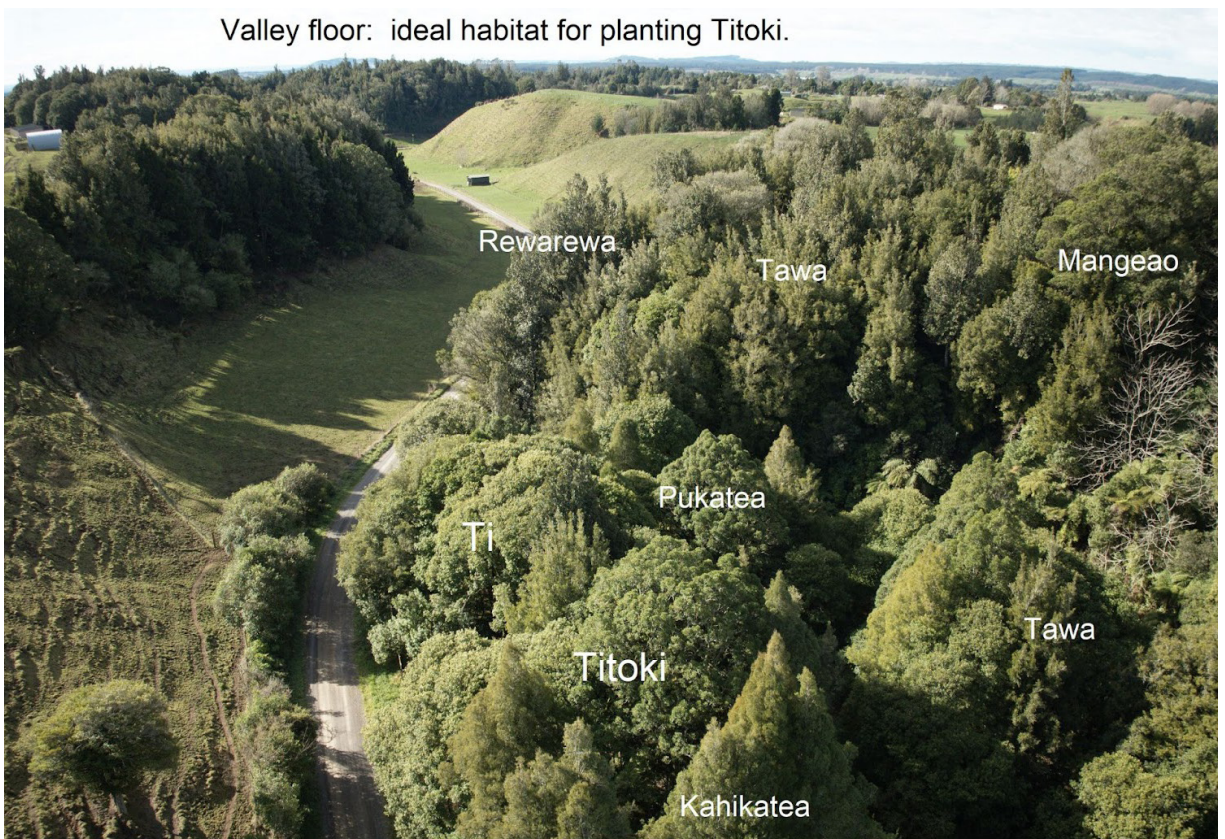
Narrower Valleys support Tawa and Titoki forest with scattered Mangeao and also Pukatea in wetter sites. For good workhorse species: refer to Hill country list for gullies. Nikau and tī kōuka are appropriate to add to all gully/valley systems. Very infrequent planting of Matai and Kahikatea is appropriate at 50 to 200m spacing down gullies.

Wider valleys:

- a) Broader valley floors can support Kohekohe, Titoki, tawa and Karaka on free draining ash deposits and stream margins with scattered Kahikatea.
- b) Wetter areas, especially with overlying peat, will be replaced by Kahikatea with Pukatea, Mahoe, Nikau, kiekie, flax.

Key Restoration Workhorse species for valleys are:

Flax, Tī kōuka, Mahoe, Karamu, Pate, Mamaku, Whēkī and Houhere (*Hoheria sexstylosa*).

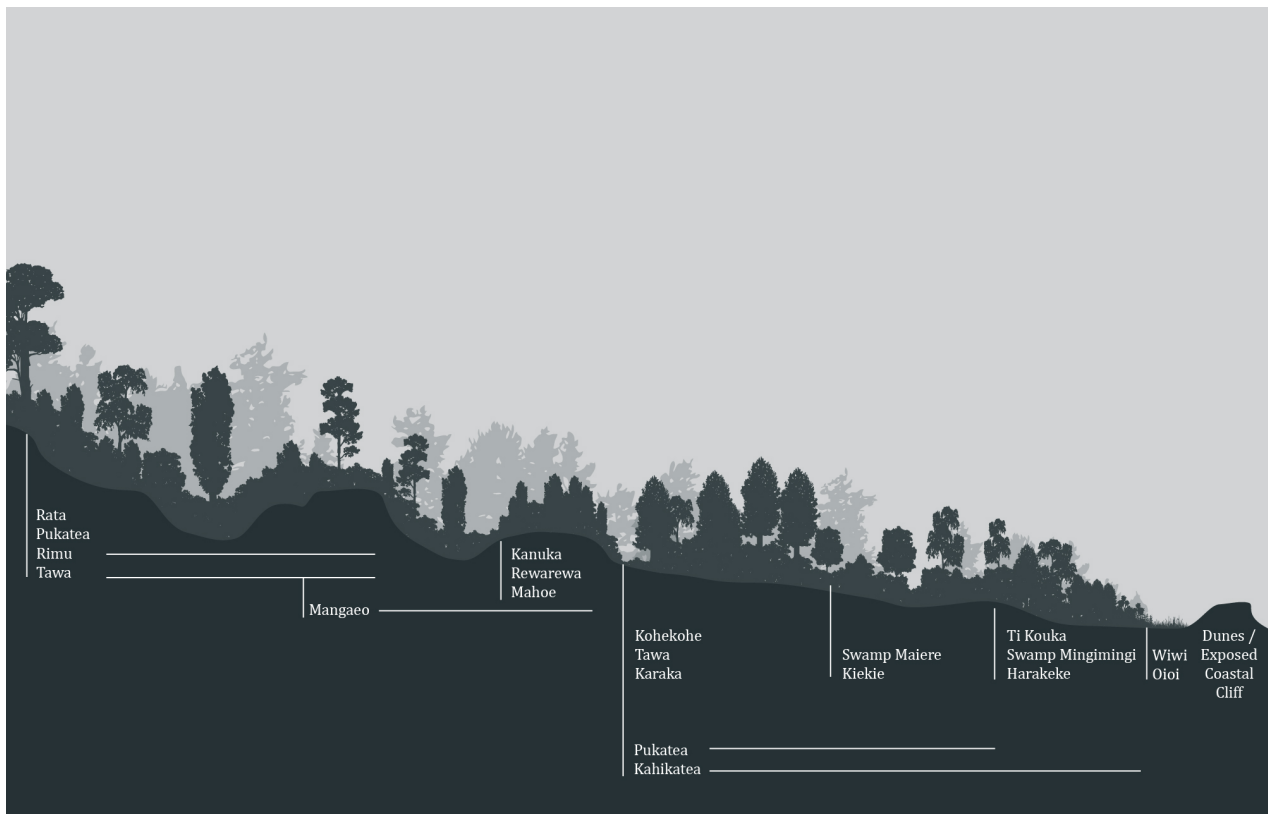


Coastal plains (From Coast to rail road approx.)

Original Forest:

Kahikatea is the flagship species of the flood plains and iconic species of the NZ dairy farms, yet nowhere in the North Island is there a single ecologically viable Kahikatea forest surviving. The small remnants are not typical. Original Kahikatea floodplain forests were a mosaic of broadleaf forests with huge Kahikatea; dense Kahikatea stands with high buttresses; cabbage tree swamps; Kieke and Swamp Maire glades, handsome buttress rooted Pukatea, flax lands and sphagnum or reed wetlands interspersed with meandering streams and ponds. Each region had its own distinct assemblage of native species, its own special character Kahikatea forest.

Prior to clearance, Kahikatea were one of the most important sources of fruit for māori, with basketfuls being collected on mats. Primarily Kahikatea, Karaka and Kieke but also Tawa, Kawakawa, Mangeao were the original natural orchards of the Bay of Plenty.



On terraces and flooded sites with good drainage large Kahikatea and Pukatea stood as scattered emergents over broadleaf canopies of Tawa, Titoki, Puriri, Kohekohe, Karaka, Nikau and Tree ferns.

On flood plains Kahikatea dominant forest grew with scattered Pukatea and Swamp Maire and Tī kōuka (Cabbage Tree), Pigeonwood, Mahoe and abundant kiekie and Toikiwi (*Gahnia xanthocarpa*). Meandering streams and wettest areas would break the Kahikatea canopy to expose stands of kiekie, Tī kōuka, Harakeke, Swamp Mingimingi and sedges. Kieke would be scrambling high up the Kahikatea trunks. Kahikatea festooned with epiphytes such as ferns, pūwharawhara and orchids. The kiekie glades were once natural orchards for prized tāwhara edible flowers and pātangatanga fruit produced by kiekie in winter and spring.

In the wettest swamp areas Cabbage tree, flax, Swamp Mingimingi (Coprosma propinqua and native sedges (wīwī and raupō) become more abundant in wetter, flood prone areas.

Restoration Workhorse species for the Kahikatea Flood plains:

Kahikatea

Harakeke (Flax)

Tī kōuka (Cabbage Tree)

+ Karamu, Mahoe on drained sites

+ Swamp Mingimingi, Raupō, Carex species, with Pūkio (Carex secta) on wetter sites.

Estuarine wetlands:

The Kahikatea flood plains communities meet the estuarine zone marked by Coastal Ribbonwood, Bachelor's Button and Oioi reed lands which extend to the domain of the Manawa (Mangrove).

The Highly valued estuarine habitats are in generally good condition, unlikely to require restoration apart from weed control. They are well described in other reports so are omitted here.

Whether Kowhai seeds carried by king tides ever grew along estuarine shores having colonised free draining sites on toe slopes of escarpments or shell banks is uncertain. It is likely in ancient times given the presence of Tōtara logs and free draining soils unearthed in Little Waihi Estuary drainage works.

Oioi is the iconic species of the Estuarine wetlands and is already being employed as a key landscape species in the BOP, particularly road interchanges. An alternative common name Piupiu plant draws attention to its naturally striped piupiu design and one of nature's original designs.

Coastal dunes:

The classic coastal dune communities with iconic plants such as pīngao, primarily need protection from weeds and rabbits and monitoring rather than active planting.

However there is opportunity to strengthen the population of the rare and endangered Thornton's Kanuka, (Kunzea toelkenii) by planting at the northern and southern ends of the housing development on the coastal dune system. Native only to the Bay of Plenty coastal dunes, this is an iconic local species to cherish and restore, a project to be proud of and to balance the even more important weed challenges to communities.

Coastal Cliff Forest:

**Pōhutukawa - Kohekohe/ Houpara -mahoe - kawakawa- Taupata forest
secondary = Kanuka -houpara - mahoe**

We think of coastal forest as Pōhutukawa, but here too, there is a mosaic of communities that reflects not so much the land beneath, as the exposure to coastal salt air in storms. So careful attention is required to the aspect of the land before planting, whether it faces north or east (Pōhutukawa) or whether it inclines south east or is in the lee of a headland. This pattern is clearly visible at Bledisloe Park.



Rare coastal forest remnant. Pohutukawa kohekohe mahoe, Bledisloe Park.

Pōhutukawa Forest on exposed Coastal cliffs:

Continuous canopy of Pōhutukawa over an understorey of houpara, karaka, Astelia, kawakawa and Taupata.

Main Workhorse species : Pōhutukawa, kawakawa, Taupata, Houpara, Coastal Karamu (C.macrocarpa).

Pōhutukawa-Broadleaf forest on Lee slope Coastal Cliffs:

Kohekohe -Puriri – Karaka - Mahoe -Houpara Coastal forest with occasional Pōhutukawa on exposed high points or old pa sites. Other species include Rangiora, Coastal Karamu (Coprosma macrocarpa).

Main Workhorse species:

Coastal Karamu, Karamu, Mahoe, Tī kōuka, carefully sited Pōhutukawa, and Puriri. Kohekohe is added after initial cover.

Spacing guideline:

Spacing is generally determined by the natural width of the species for colonising plants and shrubs. e.g. 2-3m for flax, manuka; 10m for Kahikatea, 20m Pōhutukawa.

For long lived canopy species and forest emergents, this is determined not just by the natural width of a mature tree, but by the natural abundance (trees per hectare or per km of stream) that they occur in original forest for the habitat you are planting in.

Both Kahikatea and Rewarewa are also pioneer species in their own right so can be planted very closely as occurs in nature after fire, ash showers or flooding.

6. Suitability of planting native species for long cycle silviculture

1. Rewarewa

Three features make Rewarewa suitable for silvicultural management for special purpose wood.

- i. It is a natural pioneer and early successional species in regenerating forest.
- ii. It has a narrow crown making high stocking rates, thinning and selective extraction with low impact very practical.
- iii It is a producer of quality honey providing a resource for nature and industry while the trees are growing.
- iv. The wood has a unique grain for high value end use such as exclusive cabinetry.

2. Mangeao lacks the first 3 qualities listed as Rewarewa's silvicultural assets, but it offers:

- i. A unique tonal wood for fine musical instrument production.
- ii. It lends itself to be grown together with Rewarewa, forming a main canopy, while Rewarewa can continue to mature into large specimens as emergents.

Other native species of BOP forests also have specialist or commodity production potential, just as Kahikatea and Flax did during the colonial era and additionally, kiekie, hinau, karaka, titoki and others did during the pre european era.

The fruit of Mangeao. while much smaller than Avocado is sweeter and finer in texture.

3. Kauri

Kauri is probably not natural to the Little Waihi catchment, with its southernmost limit being just a few kilometres north.

However, it is the most productive native tree for wood. It is not recommended as a part of re-establishing natural forest areas in this catchment but has a place for private landholders wishing to create a higher quality timber asset. Kauri does not contribute nectar sources for native birds or honey production.

4. Kahikatea

The special taintless quality of Kahikatea that made it famous for butter boxes must still offer specialist or boutique end uses. En route to creating a grand forest of tall cathedral Kahikatea, thinning edge trees will be a potentially viable option to provide a rewarding resource.



The late Hamilton Luthier, Ian Sweetman. Note the rare rewarewa grain Mangeo Violin hanging top left.

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1950s records of local hill country forest composition:

P J McKelvey 1957 national forest classification types relevant to hill country bordering the Maketu plains.

Type D2. KAMAHI, MANGEO, NORTHERN RATA, RIMU, TAWA. Hinau, rewarewa. Patetere (Mamaku) Plateau, Rotorua Lakes District, Kawhia. (Miro and pukatea locally prominent. Tawari sometimes present.)

Type D4. KAMAHI, KOHEKOHE, NORTHERN RATA, RIMU, TAWA. Hinau, pukatea, Rewarewa. Bay of Plenty, Kawhia. (Mangeao locally frequent.)

Type H4. HARD BEECH. Hall's totara, kamahi, miro, rewarewa, tawa. Bay of Plenty, Nth. Taranaki. (Rimu and tanekaha locally frequent.)

http://nzjf.org.nz/free_issues/NZJF07_4_1957/2646468A-1120-401E-BD7C-0F0C8FFC3A00.pdf 1957 PJ McKelvey

Excerpts from 1957 paper by R.K. Usmar on management of an exploited tawa forest that includes data on Rotoehu Forest composition.

http://www.nzjf.org.nz/free_issues/NZJF08_1_1959/D192C6CD-ECB9-471A-AEF5-10184070D544.pdf R.K. Usmar

“The northern species (puriri, tawari, and mangeao) and the southern species (kamahi) are near the limits of their respective geographic ranges, which partially explains their mixture and their frequent unthriftiness. The overall structure is that of a naturally occurring selection forest. The present forest structure is very variable, partly in consequence of the

different intensities of logging. It ranges from stands of high quality to worthless areas of either pioneer species, prolific since exploitation, or kamahi patches which are thought to be the results of ancient land clearing by the Maoris. Tawa is the main species, and is associated with frequent rewarewa throughout. Kohekohe is restricted to upper slopes and plateau sites, where in places it may form almost pure stands. Hinau, mangeao, pukatea, titoki, tawari, and large emergent rata are scattered throughout the forest. Remnant podocarps (tanekaha, rimu, and miro) as well as puriri are rare, the tanekaha appearing usually in clumps on spurs. Kahikatea and very rare matai occurred in the forest but none are known to exist now."

"Kamahi is the most abundant of the non-timber species, occurring mainly on spurs and ridges but frequently forming almost pure clumps with a small diameter range and a very sharp type boundary. Makomako, mahoe, rangiora, fuchsia, maire, mapou, and tree ferns are scattered throughout and readily invade gaps created during logging."

"Fifty acres of forest, creamed for podocarps and mangeao in 1936- 37, form the trial area. This area is a deeply dissected plateau with very good stocking of tawa and allied leaf trees on spurs and upper sidlings, and irregular stocking on lower slopes but containing little merchantable timber in the gently sloping valley bottoms. Stumps from the earlier logging are scattered throughout, the biggest stumps being in the valley bottoms where up to 30,000 bd. ft. per acre were removed."

Comment: The paper includes a reference to post splitting licences issued by NZForest Service which may imply standing or more likely fallen large totara as occurred in other Central North Island D class forests.

Forests are never uniform. The matrix of canopy species form wonder patterns. Plantings of future canopy plants should aim to mimic nature with random spacings and clusters.



Hill country second growth forest: Kanuka - Rewarewa - Mangeao



Possum control is important to maintain good forest health of Mangeao and Rewarewa. Rewarewa is a prolific source of high quality honey.

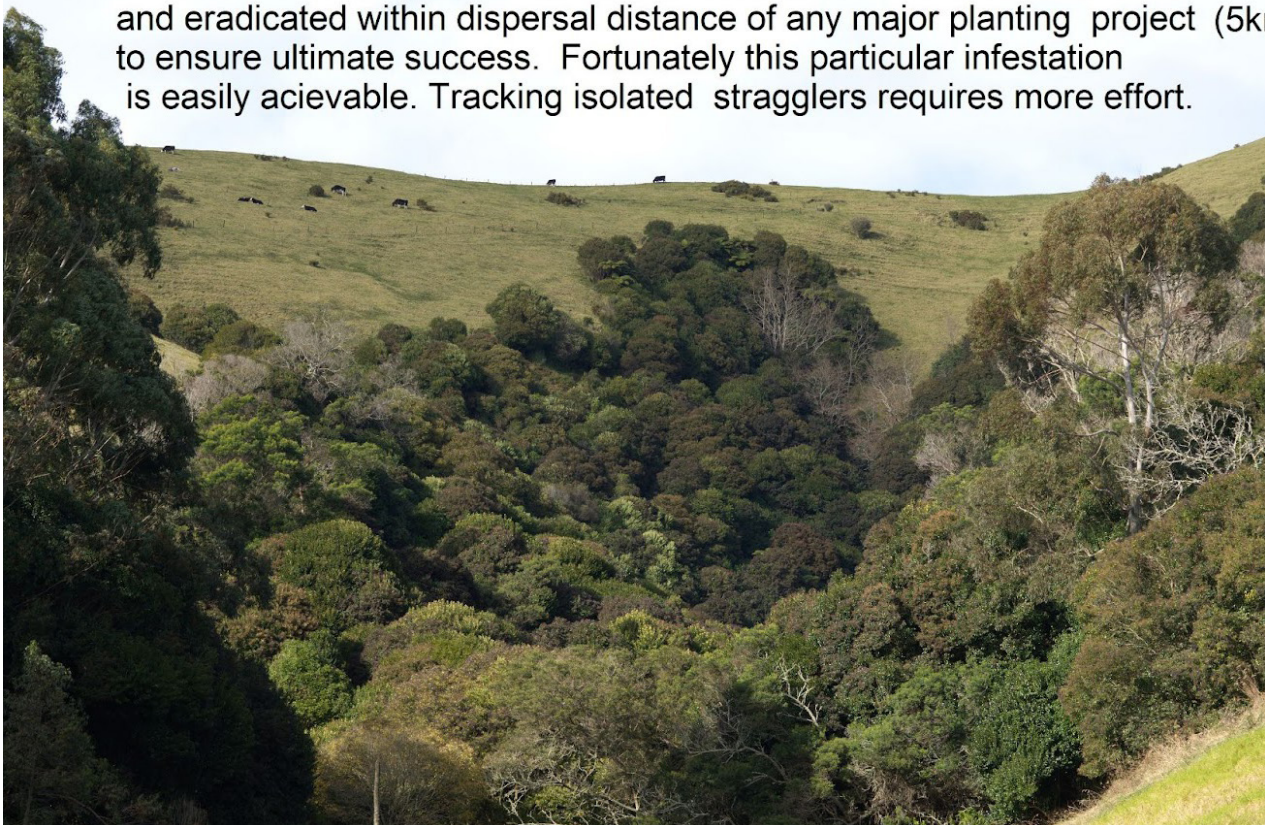
Mangeao die off: regrowth from inside the canopy is consistent with recovery from drought impacts. The same response is seen in Taraire in Northland. Possum browse can kill or predispose Mangeao to drought, but Mangeao die off has also been observed in habitats with sustained possum control.



Rewarewa grows well on slopes, ridges and tablelands and is well suited to plantation groves for unique cabinetry timber and honey production

Rewarewa grows well on slopes, ridges and tablelands and is well suited to plantation groves for cabinetry timber and honey production.

Tree Privet weed forest: Seed surces such as this must be controlled and eradicated within dispersal distance of any major planting project (5k to ensure ultimate success. Fortunately this particular infestation is easily acievable. Tracking isolated stragglers requires more effort.



Hill country goal: Tawa - Rewarewa - Mangeao forest
(can add Rimu on ridges and slopes, Pukatea in gullies, Titoki on alluvium)