

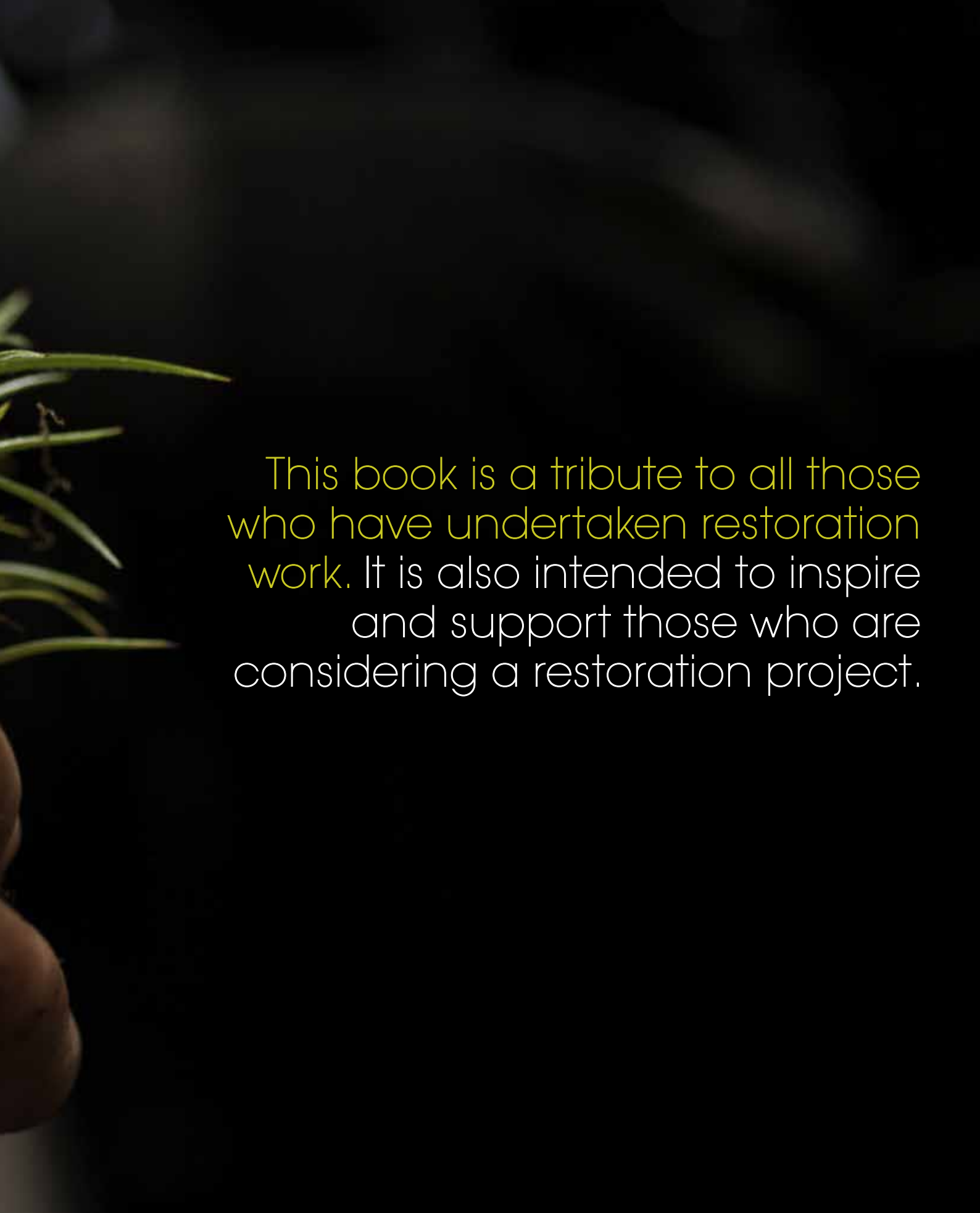


go wild

Guiding native restoration
in Tasman District

Written by Maggie Atkinson
& Michael North





This book is a tribute to all those who have undertaken restoration work. It is also intended to inspire and support those who are considering a restoration project.

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foreword

It is hard to believe now, but at one time, the great work of the nation was to get rid of the bush.

The land was useless in forest. What we needed was grass. Of course, it had happened before. The Polynesians wanted bracken or at least open space for various reasons. And in both cases, the fires got out of hand and spread beyond the horizon. So it turns out that two-thirds of the forest cover was removed, and much of the rest fragmented. It didn't stop there either. The coarse native grasses needed sweetening up, and the wetlands were impediments to settlement. At the same time, thousands of new species of plants and animals were getting started, deliberately or by accident, and these slipped quietly into the ecosystems that remained.

When I was a boy, the general philosophy was that native plants wouldn't grow. This was, of course, propaganda – a deliberate lie to discourage thoughts of conservation. The truth is that New Zealand plants are mostly hardy and versatile. With expanding awareness about naturalness, natives were being planted around the edges of forest, in places like carparks and recreation reserves. Any natives would do, as long as they were natives. Pohutukawa was native ... everywhere, and Northland pohutukawa was native in ... Taranaki. Furthermore, once the nursery trade caught on, many of the natives were selected mutations, dwarfs or colour variants. It was as if we were dealing with things rather than processes.

Since the Department of Conservation came into being a quarter-century ago, all this has changed. New Zealand now has an ecological advocate dedicated to species and ecosystem conservation and restoration, and also to community participation. As well as beautifying, we are also saving species from decline, expanding ecosystems into new territory

that were once the domain of the farm or quarry or seaside playground. Furthermore, we are using science to identify variation so that local restoration is based on local species and local forms of species according to habitat. "Ecosourcing" is the name of the game ... and the nurseries love it.

Today, restoration is the public face of conservation. There was a time when our energies went on protest. Now they go on trapping, weeding, planting and maintaining. Once there was no money for ecological restoration. Now it is funded by a range of trusts, national and local government sources. Once private landowners were enemies. Now they are facilitators. This is the democratisation of ecology.

But it still needs people. There are thousands of teams throughout the country, some weary perhaps and in need of young blood; some just getting going. All of them need up-to-date information about local ecology, cost- and labour-effective methods that work, places to seek money from. All need help, encouragement and a pat on the back.

All need *Go Wild*. This is a state-of-the-art contribution to an historic phase of New Zealand – the phase in which we start to put it back.

– Philip Simpson, Pohara

Botanist Philip Simpson was awarded the Loder Cup in 2009 for his contribution to conservation. He has also received the Creative New Zealand Michael King Writers' Fellowship.

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INTRODUCTION:

Why go native?

Our land, and the endemic life it supports, are unique – yet the plants and animals that belong here need our help to survive and flourish.

This book – the stories, the images and the information – is about hands-on caring, and knowing how to extend the native ‘wild’ that belongs in this land, particularly for plants and habitats in Tasman District.

Finding ways to initiate and sustain restorative efforts within the bigger picture of economic and social life is challenging. We need to know how, and to learn from those who have done it.

Throughout Tasman District numerous community groups, individuals and landowners are restoring wetlands, coastal fringes, forest remnants and river and stream margins, or running pest and weed control programmes. Their actions and experience can be powerfully inspiring and insightful.

As ecologist Philip Simpson says ‘Restoration is the logical extension of exploitation ... it is time to put things back.’ To do this we need relevant technical knowledge for our action to be enduring. Knowledge about how to do this is always expanding.

The importance of eco-sourcing is one such approach that has emerged and taken hold in the philosophy and practice of restoring the ‘wild’. Nursery owner Tim Le Gros knows only too well: ‘Locally sourced plants means that you have local adaptation – they will romp in growth compared with a non-

adapted one.’ And genetic makeup is of core concern in Philip Simpson’s story: ‘A Nelson totara is genetically different from a Northland or Southland one – it even looks different. The pattern of the landscape has a genetic basis to its ecology.’

Every remnant of lowland forest and wetland is the result of human decision, and now if threatened by pests, weeds and grazing stock, these remnants can be enhanced by another human decision – to help. Golden Bay resident Gerard Hindmarsh saved an extensive area of swamp destined for draining; Friends of Flora and Native Bird Recovery Richmond answer cries in the dark with pest control. At the end of the day, though, we are ‘fighting the energy of the sun’, as botanist Peter Williams says, so be aware there are often limits to weed or pest control.

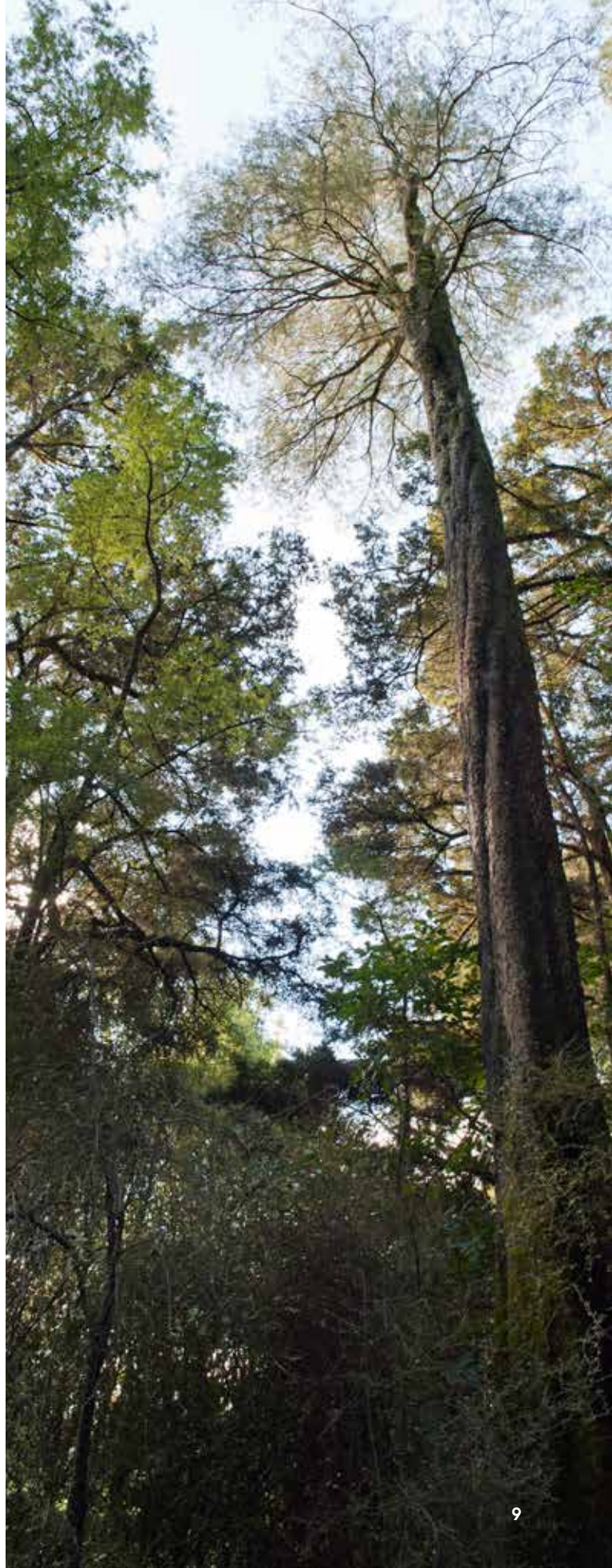
We may work alone or we may work collectively. How best we can work in common for restoration is discussed by Golden Bay activists Sue Brown, Kathy Hindmarsh, Michelle Riley and Jo-Anne Vaughan. They agree that networks, and good communication within those networks, lead to the most effective action on the ground, and they answer the question ‘Why do we feel compelled?’ by saying ‘it is wider than environmental ethics – it’s a way to live, being a net giver, putting more into life than you get out.’

The legacy we leave is a reflection of our identity with and connection to our land. Friends of Mapua Wetland are undertaking a freshwater wetland restoration that 'will be realised in 125 years'. The children of Ngatimoti School are learning how to 'give trees a chance', and expansive Mangarakau wetlands are protected in perpetuity due to collective vision and the sustained action of the Friends there.

A recurrent theme that comes through in the stories and images in *Go Wild* is the deep connection and love that built in the process of restoration work – described by weaver Hazel Walls as the 'ties that bind' when reflecting on harakeke weaving, and plants from a national collection finding a new home at Paynes Ford in Golden Bay. Finally, land-owner Nick Ward and son Jeremy share environmental ethics around building a sense of responsibility toward our indigenous plants and animals.

In the words of experienced conservationist Martin Conway, 'It is never too late to do something, and also, never give up on a project.'

Our 'wild' needs you
to go wild.







SECTION 01:

restoring

Big picture, long timeframe

MARTIN CONWAY



Martin Conway at Titoki Nursery, which he and wife Jo established. They have covenanted the lowland remnant forest in the background.

'My love of the bush goes back to childhood in the heart of Murchison,' says Martin Conway, his face lighting up. 'We roamed the forest, the rivers and hills, and were encouraged to do so. Our family had a background in Forest & Bird and I was signed up as a 10-year-old.'

Not surprisingly, when Martin and wife Jo moved to Nelson in 1980, they bought a piece of land in Waimea West, and 'one of the things that attracted us was the scattered fragments – a small remnant of lowland forest, mostly totara and titoki.' To them, this was a place embodying a story of the past, and with their help, that legacy would have a better future. Martin and Jo set about restoring a treasured patch of native ecosystem. This has involved, over the years, propagating huge numbers of

plants suitable for their site, alongside long-term management strategies to protect these efforts. A QEII covenant of this piece of bush has ensured its future.

A plant detective story emerged along the restoration journey as well. In 2001, Martin and friends ended up on a quest to source and propagate the locally rare narrow-leaved maire. Later, they realised they had rescued the species from possible extinction, with only four male plants and one female plant remaining. This was the first of the Rare Plants projects Martin started under the umbrella of the Tasman Environment Trust.

'Touring local remnants is like consulting a living guidebook for what grows where.'

Martin advises. 'Sadly, some species have completely gone. I would recommend this type of research to anyone starting out as it gives you a glimpse into the past, yet with an eye to the future and what you could achieve.'

Martin's work and his commitment to conservation requires a 'big picture' with a long timeframe. He was QEII National Trust



Above: Martin and friends sourced and propagated the rare narrow-leaved maire, pulling it back from the brink of local extinction.

Right: To Martin, this was a place "embodying a past" – remnant titoki and totara forest trees scattered among the Waimea landscape.



OUR STORIES: Big picture, long timeframe

co-ordinator for 10 years – ‘possibly one of the most rewarding jobs I’ve ever had’ – and now as a conservation planner, he works at local, regional and national level.

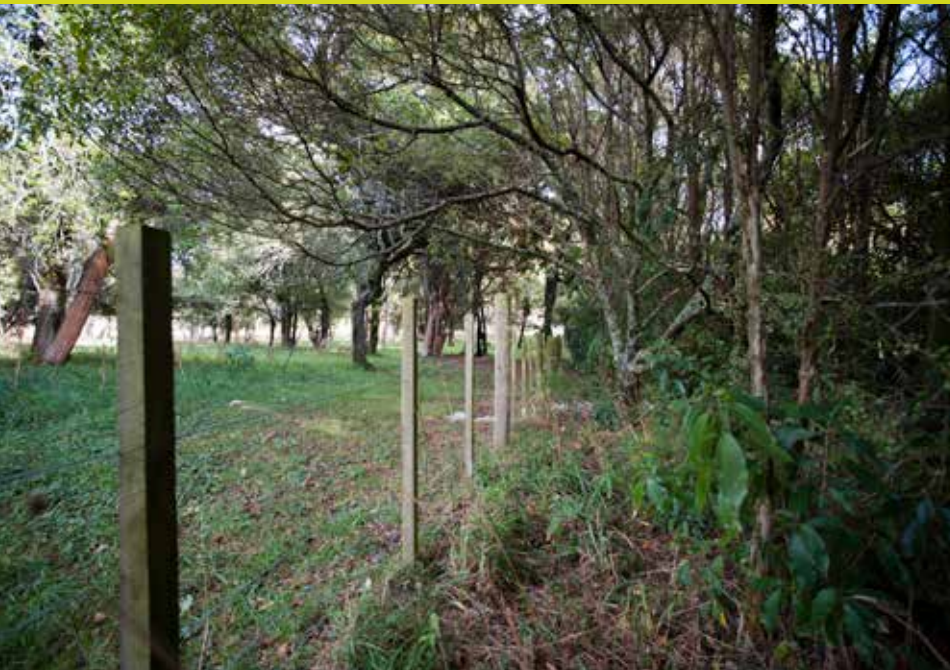
His advice to someone starting a restoration project is succinct:

- Choose the right species before you start. If you use the wrong species, in the wrong place, even with the right planting and loads of effort, you may not get any further ahead.
- Plan wisely. Start by concentrating on colonising species – big-leaved plants that grow rapidly and quickly block out the light for weeds. These colonising plants trigger the restoration process. Once they have taken hold, you can look at introducing secondary species like podocarps.
- Finally, to complete the community, you can return the rare species that would never be there without your help.

The goal, he says, is to mimic the plant community of old. Natural seeding and regeneration then take over and the land manages itself.

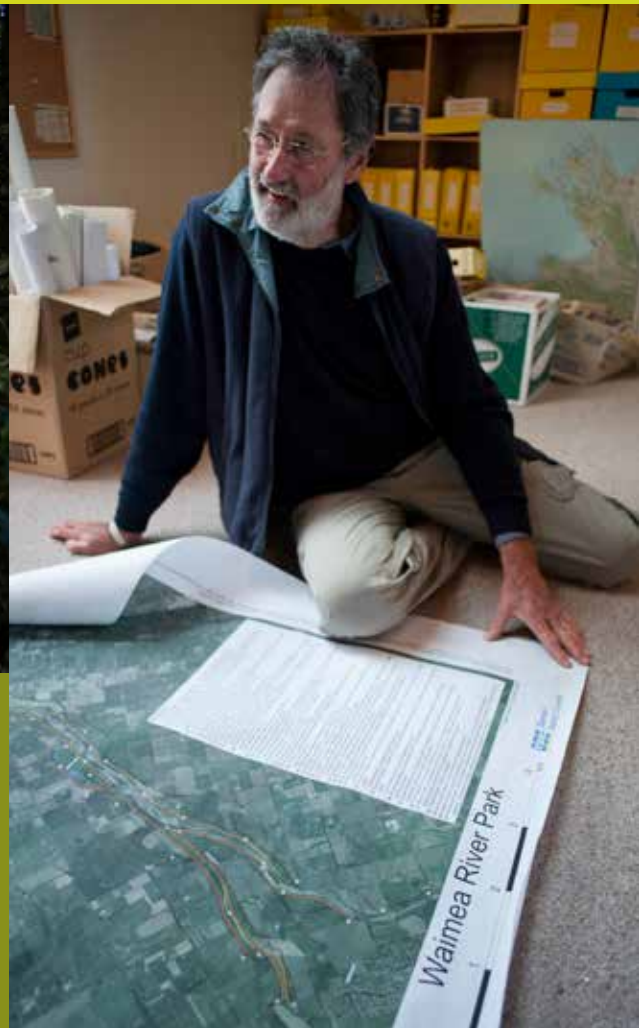
Looking out over their covenanted bush canopy to the Richmond Range, Martin reflects on the big picture. ‘Wetlands have emerged, forests appeared and these were the visions and hopes I held when I started. Back then it was more an act of faith. We were firing in the dark even 20 to 30 years ago – we’ve learned about restoration by trial and error.

These days, we can set out with some degree of certainty about how things will turn out. ‘It is never too late to do something, and also, never give up on a project.’



Above: A fence line clearly demarks differing growth potentials for native species either side of it.

Right: Martin Conway with his “big picture” concept plan for a Waimea River Park.



What is Restoration?

Restoration can be the creation of a new area of native habitat, or maintenance of an existing one. Putting nature back where all has been lost usually entails revegetating through planting, although natural recolonisation can also be encouraged. On the other hand, a native area that already exists will need ongoing management if it is to survive as a functioning ecosystem because of the perennial threat of exotic animal and plant pests. What approach you take depends on what is already there, and what vision you have for what might be. Initial restoration often includes both approaches, with active management of an existing area augmented by buffer or corridor plantings.

This Section 1 'Restoring' is about revegetation. Section 2 'Invaders' deals with the pest plants and animals.

Developing a Revegetation Plan

Resources

Revegetation projects require your time and at least some financial expense, as well as basic skills and equipment. It is useful to consider your goals and what is needed to reach them at the outset. Are your expectations realistic? Consider the following:

Time: How much time can you as an individual or group put into the project and for how long?

Skills: Do you have the necessary skills and tools for such things as fencing, weed and pest control, and planting?

Funds: How big is your budget and where can funding be sought to assist your restoration project?

Your site - things to consider

Every site is different, and what you can achieve depends on the characteristics of the site as much as what resources you can bring to it. Some things to consider are:

Size: Larger sites can generally maintain a greater diversity of species.

Shape: Sites that are square or circular will be cheaper to fence than narrow sites of the same area and they will be less affected by edge effects (such as wind and water stress that are usually harsher toward exposed margins).

Topography and climate: Understanding the characteristics of your site is your best guide to plant selection, based on such things as frost, drainage, soil fertility, aspect and light. Avoid putting plants where they won't survive.

Access: Good access makes fencing, planting and pest control easier and allows you to share your area with visitors.

Weeds and pests: Sites with fewer pests or weeds will provide the best return for effort. Which pests and weeds are an issue and how will you deal with them?

Fencing: Good fences are invaluable. Stock, wild goats, pigs and deer can decimate native vegetation.

Diversity: A site with a range of topography, soil and moisture conditions will allow for the development of a greater range of vegetation types and sequences between them.

Buffering: Natural areas can buffer each other. For example, if restoring a wetland, consider recreating the original forest margin to it, thus buffering it from run-off and 'edge effects'.

Connectivity: Small isolated areas have far less ecological resilience than larger areas that are connected. Consider creating native corridors between natural areas as a project, or linking up new plantings to existing native vegetation, such as along streams and gullies.

* 'Site' refers to the restoration area or native area in question rather than to micro-sites of uniform habitat.

Approach

Revegetation efforts range from a low-key approach informed by quiet observation, through to one of intensive management.

Methods include:

- Encouraging native plants to regenerate naturally, for example by grubbing weeds around a forest or tree margin so that forest plants can germinate, or seedlings be released in the sheltered open ground you have created.
- Planting fast-growing 'pioneer' natives to shade out weeds quickly, followed by more sensitive and slower-growing species that need the shelter provided by the pioneers.
- Planting sensitive slow-growing species (such as podocarps) from the start by placing them in conditions that suit them – such as a forest glade, or with the use of shade cloth in open ground.
- Using some bird-attractive, non-weedy, fast-growing exotic plants to bring in bird-borne native seed – encouraging revegetation nature's way.

Maintenance is critical to any revegetation project.

Initial maintenance often takes up more time and effort than the planting itself because of the impacts of weeds and pest animals, and drought. Aftercare may include:

- Mulches or weed-mats to suppress weeds
- Manual control of weeds by cutting and grubbing around plantings
- Spray control of weeds around plantings
- Rabbit or hare repellent painted on planted trees and shrubs
- Fences and individual plant protectors
- Shooting pests in rural areas
- Traps and poison bait stations.

Prepare a planting map

It will help to have a map or plan of the area to work from: This could be based on an aerial photograph. Tasman District Council has moderate-quality aerial photographic coverage for the whole of Tasman District and high-quality coverage of much of the lowland areas. Alternatively, Google Earth and Top of the South Maps (www.topofthesouthmaps.co.nz) may give a sufficiently detailed image.

Divide your area into zones: These could be spatial, reflecting the different topography, aspects, soils and degree of wetness – and hence vegetation communities that are suitable for planting. A map could also show the timing of the various restoration activities.



A planting map records features and zones of planting once decisions have been made for restoration work.

Monitoring

Taking photographs to track visual changes in the vegetation and landscape is one of the most effective ways to record restoration progress. It is often difficult to remember how things looked at the start of a project and how much has changed. The most useful way to do this is to put in permanent photopoints – such as posts in the ground – to give you the same view as it develops over time. Posts are driven in to a suitable camera height, with photos taken in fixed directions. Photo angle can be determined with a compass, or marked on the post with arrows. More elevated or set-back locations are particularly useful so that foreground vegetation does not obscure the view as it grows up.



Recording change and activities in a restoration project can be both useful and rewarding. Photos such as these of Mapua Wetland are taken from the same position on Karaka Ridge looking towards Kotare Pond – above in 2008, lower in 2009.

Photos: Friends of Mapua Wetland

To plant or not to plant?

Natural regeneration may be sufficient at a site to preclude the need for replanting, particularly around the margins of existing native areas or pockets within them. Regeneration can be encouraged by judicious weeding in such areas, allowing native seeds to germinate or existing native seedlings to survive.

Older stands of gorse can support native regeneration without replanting by acting as shelter and by excluding browsing animals. If you have a nurse crop such as gorse, you can let natural regeneration take its course, provided there are seed sources nearby. Much depends on your patience! Such a process can be speeded up by creating light-wells around existing native seedlings or with supplementary plantings, as gorse can dominate an area for some time, particularly in dry areas. It can also support and protect weeds such as old man's beard, making control of such weeds problematic.

Why plan?

Looking at restoration opportunities means thinking in biodiversity terms about what is left, where it is, who owns it (Crown or private) and what state it is in ... and, more importantly, strategic opportunities for restoration within that. This is the Upper Takaka Valley, but thinking strategically applies, no matter what slice of landscape we look at.

It's time to put things back

PHILIP SIMPSON



Philip Simpson looks down the Upper Takaka Valley out to Tasman Bay, both home turf and representative of the whole landscape perspective so prevalent in his thinking.

Philip Simpson has spent a lifetime devoted to native plants, much of it as a botanist out and about in 'our land of little landscapes', as the diverse landforms, soil types and biota of Aotearoa New Zealand have been called.

Philip has been 'walking the land' in various ways (field botany, surveying, consultant botanist for rare plant regeneration) and 'talking the land' by passing on his knowledge in literature. The creative, unique way he combines both has made Philip a treasured national figure – he was awarded the prestigious Loder Cup in 2009 for his contribution to conservation.

'Talking the land' – always with an underpinning conservation theme – has taken diverse literary forms, from consultancy reporting for restoration plans, to detailed overviews of biodiversity at local, regional and national scales for

government agencies, to the award-winning books *Dancing Leaves*, about cabbage trees, and *New Zealand's Iron-Hearted Trees*, about pohutukawa and rata – books that meld historical, cultural and scientific perspectives about their subjects, and raise issues about their future well-being.

Fortunately for Tasman District, Philip's roots run deep here – he grew up in Golden Bay and now lives there. Being local means his personal and professional 'spade' has been at work in a biodiversity overview of Tasman District, and restoration opportunities in the Takaka Catchment.

Given this, he naturally thinks in biodiversity terms about what is left, where it is, who owns it (Crown or private) and what state it is in. Philip sees the parts, the sum of the parts, and more importantly, strategic opportunities for restoration.

'Wetlands have tended to be flavour of the month,' he says, 'but lowland forests are an opportunity we must not lose sight of ... There is great potential to link up plantings along the riverbanks, along the creeks – mountains-to-the-sea



Above: Regionally distinct genetic makeup in our native plant material, and its continuation, is of core concern to Philip. The foliage and growth habit of this kowhai on Takaka Hill is adapted for this place alone.

Right: David Harwood and Philip Simpson discuss the totara forest remnant on the Harwood family property in Upper Takaka. Knowledge exchanges such as these are invaluable in restoration work.



OUR STORIES: It's time to put things back

opportunities. Think of whitebait and the many different connected ecosystems needed for their breeding and passage to the sea ... not isolated bits.

'Along waterways is the best bet without impacting on the economic viability of the community.'

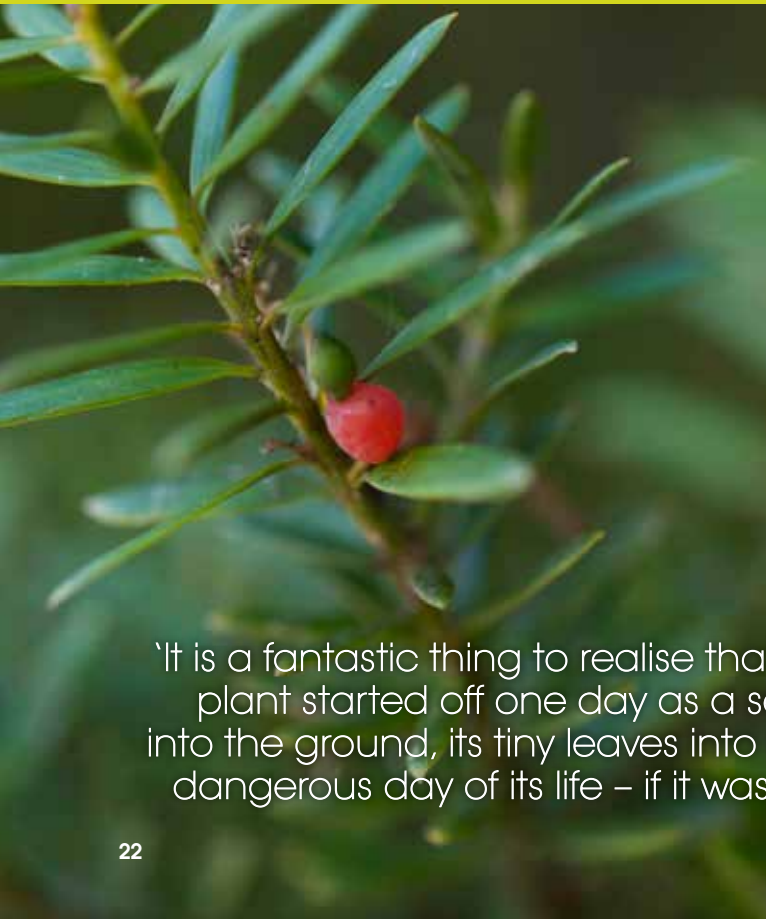
The genetic makeup of plants is a core concern for Philip.

'A Nelson totara is genetically different from a Northland or Southland one – it even looks different. The pattern of the landscape has a genetic basis to its ecology.' So it follows that, when planning restoration work, 'We have got to try and match the ecological reality of any particular site with the genetic reality of the species most adapted to be there ... If we don't, we are seriously compromising the success of the work, and the future genetic potential of what lives in that place.'

For Philip, cultural issues about identity are involved: 'We need a sense of pride and ownership in our genetic systems.' He uses a sporting analogy to explain his thinking about the politics of

plant selection: 'We can all be proud to be New Zealanders but we can also be proud to be regional New Zealanders ... I mean, the Makos beat Auckland in rugby. That's a sporting example of the same thing. In the same way we are proud of the Makos, we can be proud of the totara and titoki that grow here in this district – Aucklanders have their pohutukawa.'

To Philip 'restoration is the logical extension of exploitation'. The IUCN (International Union for the Conservation of Nature) has it right; businesses that use natural resources to make money need to put something back. As Philip says: 'We all want tui to come back. No-one hates tui ... It's time to put things back.'



'It is a fantastic thing to realise that the seed is the genetic carrier. Every plant started off one day as a seed that grew and poked its little root into the ground, its tiny leaves into the air. It didn't realise it was the most dangerous day of its life – if it was not adapted for that site, it's all over.'

– Philip Simpson

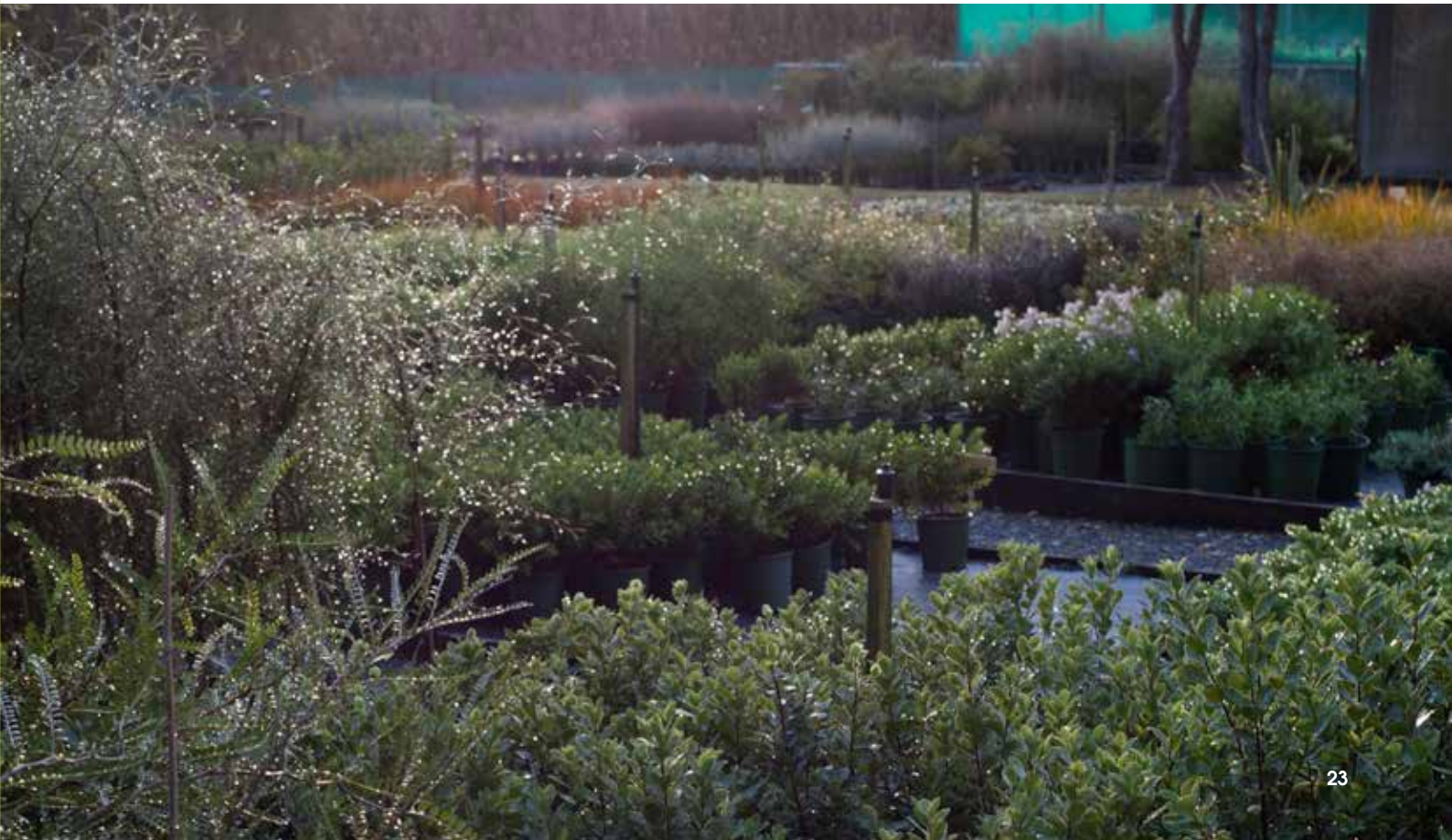
Which plants are native to your area?

Tasman District Council, in conjunction with the Department of Conservation, has compiled detailed plant species lists for revegetation in most of the more settled parts of the district. The district has been divided into ecosystem zones that relate to the prevailing landform, geology and climate. Each of these ecosystems support their own unique assemblage of plants. To find which ecosystem your site is located in, and to obtain your relevant planting list, go to the Council website

www.tasman.govt.nz under Home > Environment > Land > Biodiversity > Restoration Planting Lists or directly at

www.tasman.govt.nz/environment/land/biodiversity/restoration-planting-lists

Later in this *Go Wild* guide, there are much more simplified lists of species to plant that are common to all these parts of the district. These are designed to get you started, rather than to replace the detailed lists described above.





Current and previous page:

Native plants are adapted for a particular habitat and ecosystem. Whether native plants are grown in nurseries or at home, it is sound propagation practice when those being used in a restoration project can be tracked in lineage to a source nearby, or within the district.



Sourcing plants

Plants are genetically predisposed to do well where they evolved, and by sourcing plants from within the district, the genetic diversity and particular character of a locality is maintained. This is termed 'eco-sourcing' and is a fundamental principle of restoration planting.

Avoid native plant species that do not naturally belong to the district. North Island lacebark species (such as *Hoheria populnea* and *H. sextylosa*) are often included in native restoration plantings, but they do not naturally occur here and are highly invasive. North Island kowhai is another such species – it hybridises with the locally occurring South Island kowhai. Another is kanuka – there may be up to eleven sub-species of kanuka in New Zealand, so you want to get the right one.

Nurseries

Be careful to get true native varieties of each species, not garden varieties and hybrids that have been especially bred for appearance. Generalist 'garden centres' often carry only these types of plants, and so a nursery specialising in eco-sourcing may need to be found.

A list of native plant nurseries in Tasman District that eco-source their plants is provided in the Reference section at the back of this book. Pre-order or buy early to get what you want, as plants rapidly sell out in autumn. For bigger projects, getting plants contract-grown at a nursery may be the only certain way to secure the required numbers.

Consider whether plants of any one species at the nursery were sourced from just one parent tree or from numerous trees. The latter gives greater genetic diversity.

Growing your own

It is not hard to grow your own revegetation plants. With many hardy pioneering species, simply sow seeds in pots or trays and keep them moist over winter. They should germinate in the late winter/spring. These can then be potted on in late spring and kept moist and semi-shaded. However, if you want reliable germination, it is better to break dormancy in a refrigerator. Required refrigeration time varies with the species. For flaxes, sedges and tussock grasses, plants can be divided up in winter and potted on for the season. Many species can be grown from cuttings, but quite a few need a hotbed (that provides a bottom-heated growing medium) to strike successfully, and rooting hormone is always recommended. Individuals of some species are either male or female, so take cuttings of leading shoots from a range of individual plants to ensure that both sexes are propagated.

The References section lists useful publications on this subject.

Larger numbers of plants call for a shade house with timer irrigation. It need not be large or expensive to set up, and it could save thousands of dollars in the long run when compared to the cost of purchasing plants.

You can also save a lot of money if you have a ready source of manure, river sand and topsoil for potting mix. However, repeated weeding is required to run a nursery this way. If you choose to use commercial potting mix, the results can be disappointing unless you get the mix right. Ask a commercial potting mix supplier to sell you the mix that they prepare for commercial native nurseries.

OUR STORIES

Behind every plant is a story

TIM LE GROS

Sunrise over the Richmond Range
illuminates groups of different native
plants destined for a wider landscape.

Backlit by early morning light, the patchwork of species of young plants at Titoki Nursery is both beautiful and inspiring – particularly if you know that these plants are destined to fit into a much wider landscape pattern.

Behind every plant is a story, which owner Tim Le Gros knows well.

Tim has a strong attachment to New Zealand landscapes and studied ecology at Otago University. 'I wanted to do something for people and the environment – and things fell into place, literally, when I met Martin and Jo Conway, the original owners of Titoki Nursery. I had no idea it would lead to my owning Titoki Nursery.'

Getting to know about native vegetation and restoration began on a family block in the Moutere Hills. 'In my early 20s I set about creating a wetland there. I learnt from experience and fell in love with them at the same time.'

Nowadays, Tim finds that 'people commonly pop into the nursery because they too have a specific project or habitat they wish to restore.' At Titoki Nursery, 'we take an ecological approach to their projects, which includes identifying where their site is, its soil type, explaining how locally sourced plants means that you have local adaptation – they will romp in growth compared with a non-adapted one – and how to stage a revegetation project.'

Tim is proud that during the lifetime of Titoki Nursery an ideal group of locally sourced plants suited for restoration work has been developed. 'Colonising open country or bare ground requires plants like pittosporum, cabbage trees, kanuka, karamu and harakeke to get a headstart, then the secondary species, trees such as kahikatea, beech, titoki, totara and matai,



Above: Flax seeds collected from Pakawau await propagation.



Right: Tim Le Gros pushes fresh Coprosma fruits through a nursery sieve to harvest seed for propagation.

OUR STORIES: Behind every plant is a story

can follow ... They like to emerge with their friends about them, amongst side shelter in other words.'

Tim is heartened by the wealth of projects in diverse landscapes within the district.

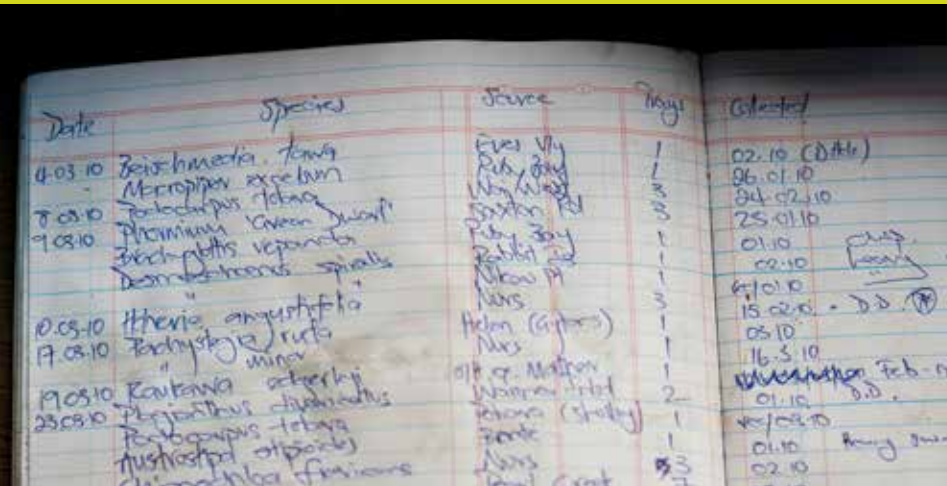
'I've seen initiatives vary from start-ups on open Moutere farmland, to community groups doing wetland revegetation work on vast scales, to remediation work in gravel extraction pits, to establishing populations of plants in private, Crown and council-owned dune systems throughout the district, eco-sourcing seed from a limited local population at Farewell Spit. Collectively this is very, very encouraging.'

The nursery also plays an integral role in collecting and propagating species for the Rare Plants project of Tasman Environmental Trust. Tim not only applies specialist propagation knowledge in helping rare species to recover, but finds his knowledge continually extended at the coalface – for example, a mine site restoration involving a group of plants found only amongst the dolomite belt of Mt Burnett in Golden

Bay. In this case, the mining licence was in part dependant on Titoki Nursery being able to propagate the nationally endangered, range-restricted rare plants from that site.

Tim enjoys recalling that in the handing-over phase of the business, Martin told customers he was 'sunset and I was sunrise'. And this seems a fitting metaphor – light and plants go hand in hand, and a significant number of plants absorbed into restoration projects about the district owe their life to hands working in this nursery. And this has been achieved, Tim says, 'from the start-up vision and purpose for the nursery way back in 1985 when eco-sourcing probably wasn't a term that existed then.'

'It gives you such a buzz doing something you love with a focus on conservation that makes a difference to our habitat, and all that this encompasses.'



Above: An exercise book records seed type, date, and source location.

Left: A sea of nikau seedlings sourced from Westhaven Inlet.

Right: Tim Le Gros (left), the present owner of Titoki Nursery, and original owner Martin Conway.

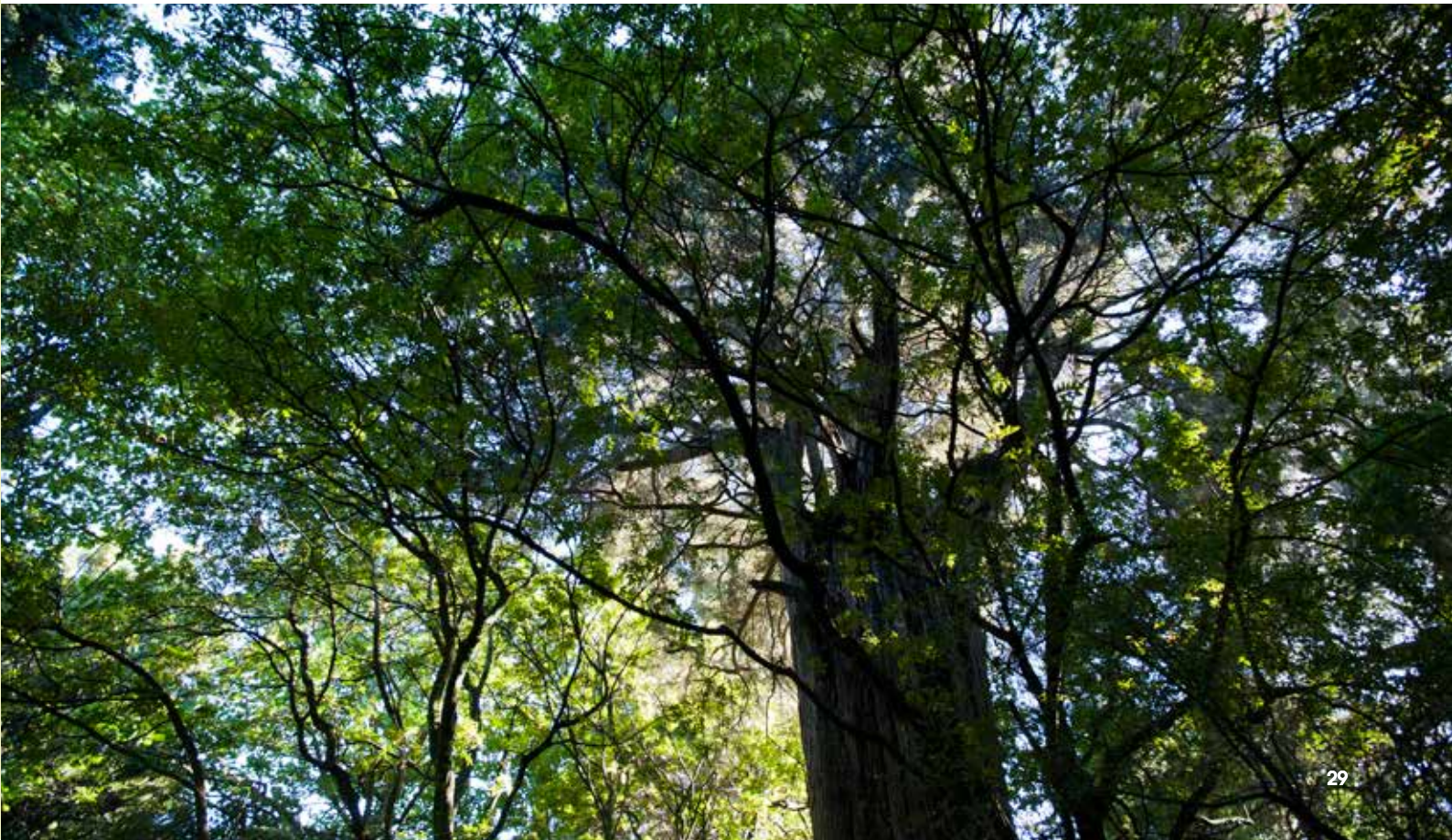


Choosing plants

Establishing 'pioneer' plants

The need for planting hardy 'pioneer' species to start restoration depends on what sort of vegetation you are creating, and how naturally sheltered the site is. Conditions in wetlands are so favourable that successional planting, starting with pioneers, is not required. In contrast, where shrubs and trees are to be planted in open free-draining ground, you should use hardy, fast-growing pioneer species at the beginning, and introduce more vulnerable species later. In such open situations, miro, matai and rimu, for example, would normally only be planted once a shelter of hardy species has reached a reasonable density and at least a metre in height. When this stage has been reached, the less hardy species can be inter-planted, with a thinning of the pioneer planting to allow for their growth. This process mimics the natural one of plant succession, eventually resulting in high forest of beech, podocarp, or mixed broadleaved trees.

Native pioneer forest-creating trees include karamu, kohuhu, tarata/lemonwood, manuka and kanuka, and, near the coast, akiraho, ngaio and akeake. Poroporo is by far the fastest-growing of the native woody plants on good non-droughty soils, and can provide a dense canopy within six months, shading out all grass beneath it. Being short-lived, it should be quickly interplanted with more delicate species. Little work has been done with this species as a pioneer, but it might prove to be very useful and is worth trialling in this way.



Exotic trees such as tree lucerne, alder and some smaller eucalypt species can be good nurse trees because of the quick open shelter they provide if planted at sufficiently low densities. Tree lucerne is short-lived and may be left to naturally die out. Otherwise, consider how you are going to remove the exotic shelter species when the time comes without destroying the native plants around them.

With intensive management on favourable sites, it is possible to plant sensitive species early if they are well cared for with watering, mulching and, if necessary, some artificial shading. For forest areas, plant five to ten 'final canopy' species (beech and tougher podocarps, for example) for every 100 hardy pioneer plants. If too many final canopy species are used, more years of weed maintenance will be required as they are slower-growing and take a long while to shade out the weeds.

Slope, aspect & moisture

Each plant species should be matched to its preferred site conditions. For example, for forest restoration plantings mahoe tends to grow well in gullies, whilst kanuka and kohuhu have wider tolerances and also do well on dry slopes. In coastal/near-coastal areas, akeake, akiraho and ngaio are all drought-hardy plants of dry ground. Manuka copes with both wet and dry situations. Check out the plants in your locality to get ideas for the different parts of your site, and refer to the Tasman District Council planting lists, which give helpful details on what species to plant where.

With revegetation there is a lot of learning as you go, so start where plants grow more easily, and begin with a small area. For example, moist, gentle slopes are easier to revegetate than droughty, steep, north-facing ones, so if you have the option, start with a part of your site where success is more likely. There is nothing like the encouragement of a good beginning to provide inspiration to see a project through. Lessons can be hard if you take on a large and difficult site in one go.

Plant sizes

The cheapest plants are root-trainer grown. More expensive but bigger and more drought-hardy are planter-bag (PB) grown plants. PB2 or 3 are suitable revegetation sizes. The size you choose will depend upon the budget, site conditions and the scale of the project. Drought-prone hillsides may prove too severe for root-trainer grown trees in the first summer, unless they are watered when necessary. Root-trainer grown trees can be grown on for a further year in planter bags before planting. This may seem like extra work, but it saves you the work later of so much watering and releasing of choking weeds, as the plants are larger and less prone to drought (and frost).

Numbers required depend on planting spacing. These range from 1 x 1m to 2 x 2m spacing for revegetation. Wetland areas could be planted at 1.5-2m spacing, moderately dry sites at 1.5m spacing, and very dry sites, or where there is a need for rapid weed shading, at 1m spacing. When calculating plant numbers, allow for setbacks of 1-2m from the edge.

For instance, if there is a 20 x 30m to be planted, there will be a planting area of 18m x 28m = 504m² if you allow for a 1m setback on each side. This equates to 12 plants (18 ÷ 1.5) along one side and c18 plants (28 ÷ 1.5) plants along the other, which requires 216 plants (12 x 18).

In many cases, the shape to be planted is not square and it is easier to use the planting area. If the actual planting area is 504m², dividing this by 2.25m² (1.5 x 1.5m spacing), we get 224 plants.




Healthy native plants destined for a place they belong in the wider landscape of Tasman District. Success rates in getting plants established in restoration projects is influenced by choosing the right size for planting out, along with matching the species to preferred site conditions.

OUR STORIES

Weaving the ties that bind

HAZEL WALLS



Hazel Walls has woven native plant fibres into 'hundreds of kete, with many gifted to whanau ... the kete have travelled far and wide to places like France & New York'.

The Pa Harakeke, or flax plantation, at Paynes Ford Scenic Reserve in Golden Bay has 'roots' to places and people far away, and long departed. Following the story back connects to a significant national ethnobotanical collection, and a national celebration.

Hazel Walls, a weaver of harakeke, is an important strand in the local story. She has lived in Tasman District for much of her life, and in Golden Bay since the early 1980s. She has a deep knowledge, respect and love of harakeke. 'It is a wonderful plant, purely endemic ... before humans could move it about the world it only grew in Aotearoa. Maori discovered its uses, its uniqueness – and now we find it all over the world.'

Hazel began a new journey in the 1960s, when her young son gifted her a small harakeke mat he made at school. 'I found it very beautiful, and wondered if I could make one too.' Since then, predominantly self-taught, she has produced 'hundreds of kete, with many gifted to whanau ... The kete have travelled far and wide to places like France, New York...

... I think it's a connection, having a little of the whenua of Aotearoa, for people living in a different environment.'

Hazel has also shared her skills and knowledge, through different paths, with many people in the wider community of Tasman District.

The year 1990 was the 150th anniversary of the signing of Aotearoa/New Zealand's founding document, the Treaty of Waitangi, and the Government sought to 'celebrate where we had got to as a nation, in a way that was relevant to both signatory partners.' A 150th Anniversary Commission called for appropriate projects to fund.

'This seemed a tall order, until someone in our family suggested harakeke. It had a huge influence on enabling Maori to live in this land, then later played a role for European pioneers,' says Hazel.

Their project was selected. It involved bringing some of the nationally significant Rene Orchiston Pa Harakeke collection



Above: Kete woven by Hazel Walls since the early 1980s represent a considerable body of knowledge.

Below: The thin red edge line of a harakeke blade is a quality of note to a weaver.





south for weaving purposes – as Hazel explains, ‘the Golden Bay harakeke is coarse, a milling strain’. The project entailed travelling north to collect the plants and receive the tikanga that accompanied them, the subsequent planting of the harakeke at Onetahua Marae and Paynes Ford, and later organising a weaving hui led by nationally recognised weaving teacher Tungia Baker in the Pohara Hall.

Te Awhi Rito Hou (‘to support the heart of harakeke to take root’) weaving group, still active at Onetahua Marae today, had its origin in the 150th project.

‘Mana whenua iwi moved in to support Hazel’s journey because, through her family’s efforts, she brought the harakeke back; she lit the fire again – ahi kaa’, says Cherie Byrne, mana whenua and Te Awhi Rito Hou weaver.

She thinks the harakeke project brought back knowledge that had been severed locally. Cherie and many others are very grateful.

Today, the young son who made the mat, Simon Walls, has a role working with cultural resources at the DoC’s Golden Bay office. ‘I love looking after taonga’. Simon and partner Kathy are maata waka at Onetahua Marae and actively involved in Te Awhi Rito Hou.

‘The original purpose was for the Paynes Ford ‘parent’ collection to grow and the young ones in turn to go far and wide, sustaining the tikanga that brought them to the south. We’ve divided and divided and divided. Now weavers have their own plants, and in turn been able to pass these on. The original intention has been fulfilled. It is so heartening to have seen this happen in the last 20 years.’

So a small mat led to a connection with a treasured national harakeke collection. ‘The ties that bind’ comes to mind for Hazel as she reflects on this inspiring journey ‘to support the heart of harakeke to take root’.



Top (left): The bluffs at the DoC Paynes Ford Scenic Reserve rise above the tips of the 1990 Project Pa Harakeke, sourced from the Rene Orchiston collection.

Left: Harakeke in the collection are known and named individually – the names carved into wooden pegs are messengers of knowledge and connection.

Her hands have woven my kete

CHERIE BYRNE

Cherie Byrne, Te Awahi Rito Hou weaver, treasures the kete her grandmother Ngawati Mitchell made in about 1967 for her son Maui Te Morehu Mitchell: 'She was a great weaver, and I love feeling that her hands have woven my kete.'

Ngawati Mitchell was in her late 80s at the time. The harakeke was sourced from Anatori on the West Coast.

The kete is a takitahi design (over one, under one), with a traditional whiri (plaited) top and bottom finish. It was made to hold Maui's netmaking gear.



Above: A strong working kete with traditional whiri top plait.

Top (right): Cherie Byrne with a portrait of her grandmother Ngawati Mitchell and the kete she wove.

Right: A net woven by Maui Mitchell. His mother Ngawati Mitchell made the kete for his net-making gear.

Preparing the site

Banish competitors

Grass and annual weeds are highly competitive with newly established plants and will slow their growth considerably, if not completely smother them. Use either a spade or herbicide to clear grass where each plant is to be dug in. There is no need to blanket spray grassland; a 1m² diameter circle is all that is needed, spraying in an S-shaped pattern to avoid overlap and excessive use of chemical. Native plants are very sensitive to herbicides so spray well before you plant.

Small to medium-sized areas of ground can be covered in sheets of black plastic, or biodegradable wool carpet (beware of synthetic backings) to exclude light once any woody weeds have been cut to the ground. This should be in place for at least 10 months before lifting and planting, and probably at least two years for such plants as wandering willy to be killed. It depends upon the weed species and whether water is successfully excluded or not. Heavy black builder's grade plastic sheeting will last for up to five seasons and has proven very effective for smaller areas, but must be well secured against wind. However, you are left with a lot of plastic to dispose of.

Make weeds work for you

In some circumstances, natives can be planted in amongst woody weeds such as gorse. Lines and glades can be cut with a heavy-duty scrubcutter, chainsaw or by hand. Stumps can be herbicide treated or subsequent coppice growth can be sprayed or cut back each year. The surrounding weeds act as a sheltering nurse crop.

Natives will subsequently shade out nurse-crop species like gorse or broom, but not blackberry nor other more shade-tolerant species such as sycamore and hawthorn.



Left: Planting into tall fescue requires spraying of this aggressive tussocky grass. Planter sleeves are used to hasten growth and keep subsequent herbicide sprays off the plants. Stakes are used to support and help relocate the plants. Weed matting has also been used here.

Planting

Nature is not uniform. Clumps of three to five of the same species and clusters of more tight plantings and odd gaps make for a more interesting mosaic compared with having everything evenly distributed. Placing stakes or bamboo canes in the ground to indicate planting spots can be useful in arranging layouts and avoiding rows of trees. For random plantings, scatter a handful of stones, then plant where they land.

Other than in wet areas, plants should be bedded in slightly below the ground level on flattish land, and below ground level on slopes - which requires a deeper hole to be dug out. These depressions will collect rain, and will make it possible to water plants effectively without water running off. This is particularly critical on steep, sunny faces. It also means the roots are deeper in the ground in the vulnerable first year.

On hill slopes in drier areas, it is wise to plant so that the initial spoil dug from the hole is piled up as a lip on the downward side. The plant is placed into the hole, with the topsoil just uphill of the hole then spaded in around the plant, crumbling by hand as necessary. This means the plant starts to grow into good soil instead of the often poor subsoil, and the spade cut leaves a sloping face above the plant to direct water down into the planting area. The lip serves to hold rainwater and any irrigation water applied in a drought that would otherwise run rapidly off.

In low-fertility sites such as on the Moutere Gravels, Separation Point granites and pakihi soils, a small amount of slow-release fertiliser mixed in the bottom of the hole may help with establishment.

If the ground is open and grassy and not spot-sprayed, you can peel back the turf to create a depression for digging the hole, or use the upturned sod as mulch around the plant once it is in.

Diagram.
Top to bottom:

Slope planting requires a depression, angled slope-cut above, and a down-slope rim to catch water.

Level ground planting should be set below ground level to catch water - unless the site is wet.

When planting ensure the root zone is not set above soil level.

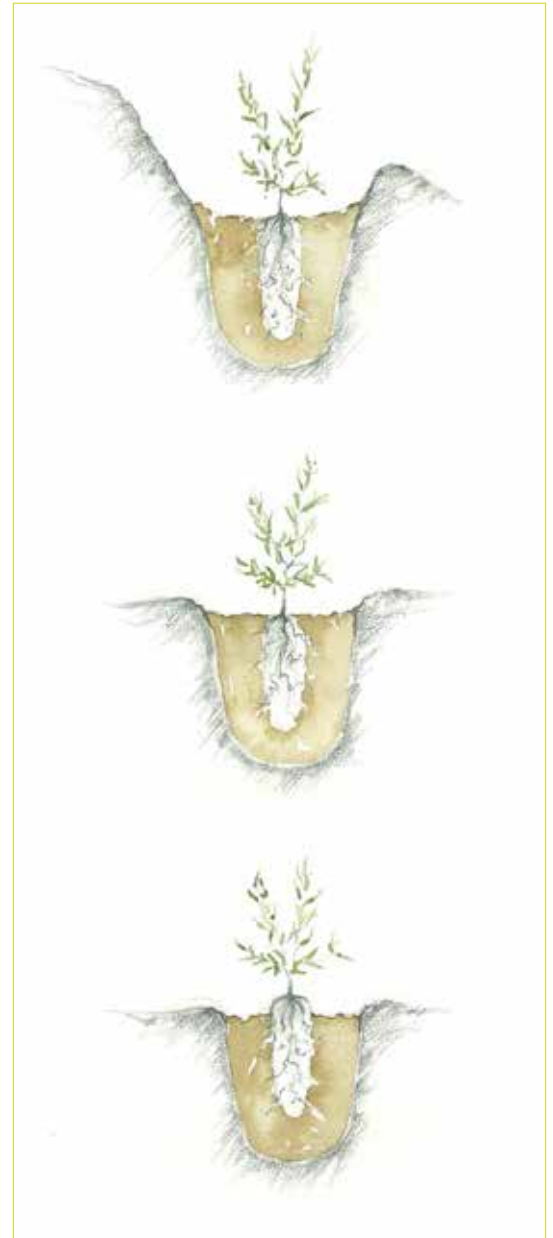


Illustration: Maggie Atkinson

The planting process

1. Soak

Soak the root ball in water until no bubbles emerge.

2. Dig the hole

Dig a hole bigger and deeper than the root ball so that the roots are surrounded by worked up backfill, which is easy for initial root growth. For planter-bag grown trees, turn the plant upside down and ease the bag off by pulling its bottom end.

3. Prepare roots

Unwrap any roots that have spiralled in their container, or are tangled and matted, and cut them off. If they are short enough, spread them out in the base of the hole. Note that manuka or kanuka must not have their roots disturbed, nor tree lucerne if this is being used as a nurse crop.

4. Plant

Place the plant into worked soil at the bottom of the hole. Consolidate crumbled backfill soil around roots, avoiding air pockets.

5. Press the earth

Press the earth firmly down around the root ball.

Note: If conditions are dry, then an initial watering is important. If the site is wet there is no need to pre-soak nor to set the plant deeper than ground level.

Staking and Protecting

Weed growth after planting may conceal the native plants and make maintenance a real problem as it becomes hard to relocate them. For this reason staking is often undertaken. Stakes also serve to support plants if they are tied to them, and provide a solid structure to attach plant protector sleeves if they are used. The sleeves not only shelter plants but they help prevent them from being pulled down by choking weeds, and keep pukeko, rabbits and hares at bay. Conditions within the sleeves are warmer with less air movement, and can result in faster growth. They also act as spray-guards if weed spraying is undertaken.

When to plant

Autumn is usually the ideal time, after the first rains of the season. The ground is still warm and plants will continue growing into the winter, enabling the plants to cope better with the following summer's drought. However, if the site gets heavy frosts in winter, wait until late winter/early spring to avoid them getting burnt off or killed.

Maintenance

Weeds

Control weeds around new plants for the first year or two. Small root-trainer grown plants can get completely smothered. Releasing (weeding) around new plants provides mulch that can be placed around the plants. Grubbing weeds out is best but mowing with a weedeater is often adequate. Take care to avoid damaging the stems of seedlings. Releasing may not be absolutely necessary, but the plants will grow more slowly and there will be greater losses. Keep an eye on any invasive weeds making a comeback, and deal with them quickly.

Mulching around plants prevents or greatly reduces weed growth and retains soil moisture. Although it may stop light rain from penetrating, the overall effect is beneficial. The use of mulch can be avoided if you are prepared to water during the first summer's long dry spells, otherwise it is advisable. The cheapest materials and the easiest to apply are bark chip and pulverised wood fibre. Newspaper can be used for small numbers of plants but it must be secured against the wind. Straw or hay is good but may also tend to blow away.

Weed-mats that fit around individual plants are popular but expensive. They allow water through whilst suppressing weed growth. Weed-cloth is also available to cover large areas, with planting done through holes cut in the cloth. Both synthetic and natural products are available. Synthetic materials can end up littering the site as they slowly break up under sunlight.

If you favour spraying for weed control, restrict it to a small circle around the plant and use a spray guard to avoid killing the native plants, taking considerable care to avoid drift.

Water

It can be easy to over-water your plants. Minimising watering will result in roots growing where moisture naturally occurs, deeper down. Watering is critical only when plants are stressed – for instance, with dull or drooping leaves. Generally, watering may only be needed in the first year of establishment.

Right: Old Mans Beard needs constant vigilance to prevent its rampant invasion of a native species or patch of bush. Much hard work can be lost without ongoing maintenance.



OUR STORIES

Bringing back the birdsong

NATIVE BIRD RECOVERY
RICHMOND (NBRR)

A morepork perched near the track in Jimmy Lee Creek Reserve – one of the 'phenomenal bird studies' by a photographer in the NBRR group.

In a suburban house in a cul-de-sac near Jimmy Lee Creek Reserve in Richmond, there is a work space devoted to the business of looking after native birds. It is one of many scattered about Richmond.

Immaculate record-keeping charts the work and progress of a devoted band of men and women volunteers who formed in 2005 and call themselves Native Bird Recovery Richmond.

Scientific method lies behind the data on charts and in tables. Through actions like banding birds (Department of Conservation-approved), counts of birds at feeding stations, and a strategic approach to their intensive predator trapping, the group is adding to local knowledge about how to build native bird numbers.

‘Without proof you really have no idea – and the proof that you are helping the birds is very satisfying,’ says Neil Page. ‘If we don’t do things to help them they won’t be there in future.’

Neil planted kowhai and other native trees to attract native birds when he came to a bare section 25 years ago. He explains that ‘being aware of the species to plant, where the food comes from (like fruit or flower) and what time of year it is available is all part of what we need to know to provide food sources for the birds.’

‘Birds have two requirements: a continual supply of food and a safe place to nest.’

The group’s trapping programme is precise, highly effective and inspirational – more than 2200 pest animals have been trapped in six years.

A continual food source for the increasing Richmond foothills birdlife is paramount, so group-members make and dispatch feeding stations. These also give much pleasure for anyone watching the birds come and go.

‘We know that when the frequency of birds such as tui visiting the feeding stations falls back, it means the increase of another food source like the native kowhai trees in flower,’ says Neil.

Within the group are many forms of expertise, including a photographer who specialises in beautiful studies of the birds that alight at feeding stations. ‘Look at these phenomenal bird studies. Look at the detail of this tui, and look, you can see one of our bands in this shot.’ Neil’s pride on behalf of the whole group is well-deserved.

Planting the right native trees in the urban landscape helps the birds, and by doing so contributes to the greater aims of the NBRR group as well.



Above: Vices used for making predator traps hang on the wall in Neil Page’s workshop.



Right: Neil Page checks traps in Jimmy Lee Creek Reserve, Richmond foothills.

Attracting birds

Having native birds return to an area that has been replanted is very gratifying. Birds will carry native seeds with them and so help re-establish native vegetation (as well as weeds!). This goes for exotic birds as much as native species – blackbirds and starlings in particular will carry native seeds to your site. You can attract birds more quickly by establishing plants that provide food at an early stage. These can be native or exotic.

Quick-flowering and fruiting plants – native to Tasman

- Flax species – harakeke and wharariki (spring/early summer nectar)
- Coprosma species (winter fruit), particularly kanono/large-leaved coprosma, karamu and shining coprosma
- Mahoe/whiteywood (summer fruit)
- Kawakawa (summer fruit) – a favourite of kereru/native pigeon; plant only in shade
- Wineberry (summer fruit)
- Kanuka and manuka (insects)
- South Island kowhai (spring nectar and foliage) – particularly attractive to pigeon, tui and bellbird
- Poroporo (fruits within six months)
- Five-finger (mid-winter nectar) – needs semi-shade
- Fuchsia (late-winter to spring nectar, summer fruit) – needs shelter and moisture

The Department of Conservation website, www.doc.govt.nz, provides a table of New Zealand-wide native trees and shrubs that attract native birds under Home > Conservation > Native animals > Birds > Tree planting for native birds.

Other native species are slower to flower but can provide crucial winter nectar for tui and bellbird. Red rata vine is very unusual in being a Tasman District native that provides early winter nectar. Kohekohe also provides midwinter nectar but is slow to flower. It is a frost-tender native to the Tasman area, being known at Puponga and Pepin Island. Black beech and red beech can provide honeydew year-round once they have become older and are host to scale insect, but wasps will compete for it.

Slow-growing natives that produce abundant summer nectar for birds include the rata trees and vines – southern rata, northern rata (native to Golden Bay only), and the white rata vines *Metrosideros diffusa*, *M. perforata*, and *M. colensoi*.

Nectar bearing plants – exotic to Tasman

Although not part of a native restoration project as such, the following exotic (to Tasman) plants are useful in bringing birds to your property and any native seeds they might carry. This list is an introduction to some better-known bird-attracting plants that are not problem weeds. Autumn/winter/early spring nectar providers are particularly attractive to honeyeaters (tui and korimako/bellbird), when there is little nectar available from native plants. Many members of the Proteaceae, Myrtaceae and Rutaceae families provide nectar for birds. Avoid planting the bird-attractive karo (a North Island native) in coastal areas, as it can become a troublesome weed. Cook Strait kowhai and North Island kowhai will hybridise with South Island kowhai, so are best avoided unless far from possible cross-pollination by birds. Cherry species that provide nectar (such as *Prunus campanulata* and *P. acolade*) can also be highly invasive of native areas and should not be planted for birds.

- Tree lucerne/Tagasaste – has winter nectar and foliage and is very quick to attract birds, especially kereru and tui (and korimako/bellbird if bush is close)
- Eucalyptus species (nectar) – particularly winter-flowering ones such as yellow gum, red ironbark, heart-leaved silver gum, swamp gum and Tasmanian blue gum. The autumn flowering gum known as tuart fills a nectar gap when few other species listed here are in flower
- Banksia species – particularly *Banksia integrifolia* (all-year nectar) and *B. ericifolia*
- Bottlebrush species (winter to spring nectar)
- Paperbark species (summer nectar)
- Red hot poker species (winter nectar)
- Chinese lantern species (winter to summer nectar)
- Brazilian coral tree (summer nectar) – to 8m
- Pineapple sage (autumn nectar) – particularly favoured by bellbird in autumn when few other nectar-bearing plants are available

Right: There are two native flaxes available locally: the larger harakeke/swamp flax (*Phormium tenax*) and wharariki/mountain flax (*Phormium cookianum*). Mountain flax flowers earlier and is in great demand by honeyeaters, such as korimako/bellbird, when few other nectar sources are available.

Photo: Andrew Walmsley



- Flame tree (summer nectar) – to 20m
- Chilean fire bush (spring/early summer nectar) – to 3m
- Flowering quince (early spring nectar)
- Pohutukawa, rewarewa (summer nectar) and puriri (spring nectar) are all frost-tender North Island species that may grow in warm sheltered areas
- Grevillea species – many species from shrubs to tall trees (winter to summer nectar); grow well on poor clay banks with the best being the larger flowered and statured species and varieties
- Waratah species (spring nectar)
- Camellia species (winter nectar) particularly single-flowered varieties
- Plum and apple species (blossom and buds) – devoured by kereru in spring
- Kaka beak (spring nectar)
- Aloe species (autumn/winter nectar)
- Cook Strait kowhai (winter nectar) – a shrub
- North Island kowhai (spring nectar)

Exotic trees are in general faster growing than natives, and can provide good shelter and food for birds in a few years. Tree lucerne/ Tagasaste is particularly favoured by kereru/native pigeon as foliage food and they will visit them as early as two years after planting. Kereru carry many native seeds so it is good to attract them. Don't overdo the tree lucerne as a nurse crop for natives as they can be quite root-competitive. Later thinning of tree lucerne provides excellent firewood.

Some exotics that are attractive to birds for their berries, such as cotoneaster, rowan and elder, can become serious ecological weeds and should be avoided.



Left: Students at Ngatimoti School at the entrance to the stream restoration project near the school. (Left to right) Hinemoana Markham-Nicklin, Anita Reiter, Irene Post, Oscar Hadley, Luke Sandford.

Stream restoration

Waterways are the one habitat that always remains in modified areas (albeit often degraded), linking the hills to the sea. They offer a corridor through the landscape for wildlife and can be the defining landscape feature of lowland areas. They are often the only wild feature left in such landscapes, with their ability to flood, at times uncontrollably. They draw people to them for recreation and their banks can provide the only public access through privately-owned landscapes.

Last refuge

Riparian (stream) margins can support a huge array of animal and plant species. Quite a number of plant species only occur naturally along streamsides, and for other plants, this habitat has become the last refuge after the surrounding land has been cleared.

Shading waterways

Stream margins have a crucial role to play in shading waterways. Sunlight heats up the water, especially in summer, and excessive heat can kill a stream. Native fish species cannot survive in waters over 25°C and most aquatic invertebrates suffer in waters over 20°C. Below 18°C is ideal. High sunlight also causes rampant algal and weed growth, especially if the water is enriched by run-off. Shading effectively minimises this growth, reducing or eliminating the need to clean out the stream or drain. If you have a stream through your property, it would be worth seeing just how warm it gets in summer, and whether there is a need to create shade.

Supporting fish

Up to half the diet of many native fish consists of terrestrial insects that fall into the stream, and streamside plants provide food and habitat for these insects.

Overhanging plants and their roots, and branches that drop into the stream, provide critical refuges for fish and also provide nutrients. Streamside vegetation, particularly riparian wetland vegetation, also provides spawning sites for native fish when high flows occur in autumn.

Native plants protect stream banks

Cabbage tree/ti kouka, lowland ribbonwood/manatu, lemonwood/tarata, kohuhu and tutu have the best bank-retaining root systems, due to their spread, mass or depth of roots.

None do the job as well as willow species, but willows can be fraught with management problems, as they readily grow across or fall into the water, causing flood problems. They also break off and root elsewhere, thus spreading themselves. Pussy willow and grey willow are particularly invasive due to their large quantities of wind-blown seed.

Culverts

Culverts are the biggest in-stream obstacle to a healthy, functioning stream if they prevent the passage of native fish. There are hundreds of culverts through Tasman District that block fish movements because of poor design. The floor of the culvert must be set below the stream bed level to avoid vertical drops at the downstream end, as this can create a free-falling waterfall that blocks fish passage. If this is not possible, then a 'fish ladder' of rocks sloping up to the culvert lip will enable fish to make their way up. Tasman District Council have published a very useful guide on native fish and how to create or modify culverts to allow for fish passage (see References section).

What to plant where

Near the stream edge itself, put low-growing plants that yield to floods such as sedges (sluggish streams), toetoe and swamp flax. Bear in mind that swamp flax can grow large and potentially block stream flows. How far up the bank from the normal flow level you should plant depends on the nature and size of the stream and the steepness of the banks. A little further back or up the bank, plant woody shrubs and small trees like koromiko, tutu, *Hebe stenophylla*, ti kouka/cabbage tree, karamu and manuka.

Keep big trees to the back of the planting. These might include kowhai and narrow-leaved lacebark and lowland ribbonwood (riparian/alluvial specialists) and other hardy pioneers like lowland totara, kanuka, tarata/lemonwood and kohuhu.

Riparian planting list

Below is a simple starting list for planting up the margins of streams that flow through lowland valleys and flats. It highlights the hardiest and most characteristic streamside plants. However, many more species than this could be planted, particularly away from the immediate stream margin. For detailed planting lists for your area and environmental preferences of plants refer to the Tasman District Council website (see References). First-stage (pioneer) plants are the initial ones to get in the ground. When they have established some shelter, the second stage plants can be planted.

Plant name		1st stage	2nd stage
Shorter plants (along stream margins)			
Harakeke/swamp flax	<i>Phormium tenax</i>	✓✓	
Hebe species	<i>Hebe gracillima</i>	✓	
Hebe species	<i>Hebe stenophylla</i>	✓	
Koromiko	<i>Hebe stricta</i>	✓	
Pukio (a tussock sedge)	<i>Carex virgata</i>	✓✓	
Purei (a tussock sedge)	<i>Carex secta</i>	✓	
Rautahi (a swarding sedge)	<i>Carex geminata</i>	✓✓	
Toitoti/toetoe	<i>Cortaderia toetoe</i>	✓✓	
Small to medium trees			
Horoeka/lancewood	<i>Pseudopanax crassifolius</i>		✓
Kaikomako	<i>Pennantia corymbosa</i>		✓
Karamu	<i>Coprosma robusta</i>	✓✓	
Kohuhu	<i>Pittosporum tenuifolium</i>	✓✓	
Kotukutuku/fuchsia	<i>Fuchsia excorticata</i>		✓
Mahoe	<i>Melicytus ramiflorus</i>		✓
Makomako/wineberry	<i>Aristotelia serrata</i>		✓
Manuka	<i>Leptospermum scoparium</i>	✓✓	
Mapou	<i>Myrsine australis</i>		✓
Rohutu	<i>Lophomyrtus obcordata</i>		✓
Ti kouka/cabbage tree	<i>Cordyline australis</i>	✓✓	
Tutu (toxic to stock)	<i>Coriaria arborea</i>	✓✓	
Medium to tall trees			
Houhere/narrow-leaved lacebark*	<i>Hoheria angustifolia</i>	✓✓	
Kanuka	<i>Kunzea ericoides</i>	✓	
Lowland totara	<i>Podocarpus totara</i>	✓	
Manatu/lowland ribbonwood	<i>Plagianthus regius</i>	✓✓	
South Island kowhai	<i>Sophora microphylla</i>	✓✓	
Tarata/lemonwood	<i>Pittosporum eugenioides</i>	✓	
Tawhai/silver beech	<i>Nothofagus menziesii</i>		✓
Tawhairauriki/black beech	<i>Nothofagus solandri</i>		✓

✓✓ Double tick signifies main plantings

* Check the Tasman District Council planting list for your area www.tasman.govt.nz/link/planting-lists

Learning to give trees a chance

NGATIMOTI SCHOOL



High above the Motueka Valley Ngatimoti School teacher Steve Dunn talks with students: Kim Maclean, Josh Stock, Bryn Boyes (obscured), Amy Harrison and Hannah Beech before visiting a nearby property and covenanted remnant forest.

Ngatimoti is a rural Enviroschool. From their school grounds, the children (5-12 years old) look over a treed pastoral landscape leading to the Motueka River. As an Enviroschool, the students learn about environmental stewardship in ways that extend into the community and landscape – and expand their personal horizons.

Speaking with Principal Ali Turner, you sense how wide this potential horizon is when she illuminates what Enviroschool can encompass: 'So much of who you are, the place you stand, and the connections you may make in the future come from our relationship with the broader biophysical and cultural environment.'

The school has established initiatives such as riparian plantings, stream health monitoring and setting up a Trees for Survival unit. How do the students feel about being involved in things like this? A mixture of ethics – 'I feel responsible', 'Making our place in the world better' – and enjoyment – 'It's fun because you learn new things', 'It's good being in the fresh air', 'Hanging out with other kids', 'It's a job to do that's fun' – and finally involvement – 'It's interesting watching them grow', 'It's cool finding creatures in the stream', 'Learning about life cycles' and 'Caring for plants – seeing the changes, watching things grow'.

Some initiatives have also gone in new directions. Students and teachers have visited local landowners and their covenanted lowland forest remnants and picnicked under big old native trees – using this as a platform to appreciate and talk about the forest. Students commented that they enjoyed being 'cool in the shade', and a 'relaxing place to be', but also that the big trees 'make me feel special'.

Ngatimoti has also been visited by a local group called Tree Walkers, who encourage celebration such as singing and dancing about the presence of trees in our lives – they sing 'Give trees a chance' to the John Lennon lyric 'Give peace a chance' – 'something we all really enjoy,' says Ali.

What do the students think about when they plant trees after the Tree Walkers have visited?



Above: Local group Tree Walkers visits the school to encourage awareness and celebrate the presence of trees in our lives.

Below: Ngatimoti School "adopted" a section of the stream near the school - students weed the pa harakeke amongst the school plantings.





'I think the Tree Walkers are good people.'

'I like making sure the animals like the birds and insects get homes.'

'The tree will grow up like me.'

and, 'When I grow up, I could come back to visit these trees.'

As Ali points out, the experience for students is multilayered: 'There is learning around growing, planting and maintaining native plantings, but maybe a plant dies and you have to change tack. Then that's about problem-solving and developing the ways we cope with unexpected things ... and that is about building resilience.' The rural students know 'the good things take time' and are 'not in a great rush to see progress when they plant a tree. It's not like, 'I've planted my tree, now where is it to play in?''

Growing up close to the natural world is a privilege, one that many adult New Zealanders can look back on and know it played a significant role in their development; in forming their grounded sense of identity. The mindsets of these caregivers at Ngatimoti School indicate that the future is in good hands:

'Trees help us breathe.'

'We have to care for the environment.'

'Give trees love and care.'

'Teach others how to harvest seeds and take cuttings.'

'Planting trees is easy.'

'They are beautiful.'

Top: Bryn Boyes stands at the base of a mature matai tree in the covenanted forest the school visits at Ngatimoti.

Middle left: Hannah Beech is enchanted with the canopy of giant native forest trees.

Middle right: The future care of our wild is in the hands of the next generation.

Left: Josh Stock delights in being in the bush.

Forest restoration

When people first arrived in the Tasman area, it was almost entirely covered in luxuriant forest – other than for the swamps and alpine tops. Today, many of the higher hills are still forest-clad but the lowlands have been decimated, with only sparsely scattered remnants surviving. These are mostly small bush blocks that provide important information on what plants to use to restore and recreate areas of lowland forest. Isolated forest stands are vulnerable to a range of threats and many are in decline due to:

- Stock browsing and trampling vegetation
- Wind causing drying out and wind-throw
- Weeds that suppress regeneration or smother mature trees
- Weed trees that have seeded from nearby gardens and farms that can come to dominate the bush
- Pest animals that devastate bird populations, consume seeds, and/or browse native plants
- The effects of surrounding land use such as drainage and spraying
- Adjoining subdivisions, resulting in the loss of scrub corridors between bush blocks, and the introduction of cats and invasive garden weeds that escape or are dumped
- Loss of species as extinction rates are higher among small populations.

Smaller bush blocks lack the ecological resilience to handle these threats and usually cannot survive without help. Small bush blocks respond well to relatively small management inputs. Pests, weeds and fencing have been discussed earlier. Some of the other issues and what you can do about them follow below.

Edge effects

Bush remnants often have an artificially abrupt edge bordering farmland or urban areas. These edges are much more exposed to wind and light than the interior of the forest. However, wind will penetrate and dry out the interior, changing the environment significantly. This is known as the 'edge effect', and it may penetrate 50-100m or more into a forest fragment. Most fragments are totally affected by wind penetrating the edges due to their small size. Grazed remnants are very susceptible to the edge effects as stock open up the margins. Ferns and perching plants are particularly impacted by the drying-out of forest interiors. If the margins are of dense vegetation, then this edge effect is lessened, especially if the structure of the vegetation deflects the wind.

Sealing the gaps

To reduce edge effects in small bush areas, the forest edge should be sealed from wind and light.

- Fence the bush and control marginal weeds – this may be enough to allow natural regeneration of seedlings to build up a buffer of shrubs and small trees. Place the fence a few metres outside the bush edge to make room for a buffer to grow.
- Plant around the edges with hardy colonising natives, using appropriate local species. Lemonwood, kohuhu, karamu, kanuka, manuka and cabbage tree are ubiquitous. More coastal sites could also be protected with akeake, ngaio and akiraho. Harakeke/swamp flax and toetoe would be useful for damp sites, deflecting the wind.
- Reduce the amount of edge around bush remnants by planting up areas between fingers of bush with natives. This could also make fencing easier and cheaper by creating a more regular shape to fence.

Planting an exotic timber or shelter crop around or on the windward side of the bush block will 'seal' the margins. However, if these are harvested in a clear-fell operation, this is often followed by severe wind-throw and die-back of the native forest along the exposed edge. Selective harvesting of the exotic trees avoids this problem but it may be better to avoid exotics as you can't anticipate what a future landowner might do.

Connecting forest remnants

If a forest remnant is close to other natural areas, consider how links can be made between them. In areas that are mainly farmed, it can be difficult for some birds and insects to move between natural areas to feed and breed. Plants can remain isolated and subject to local extinction. The more links that are created across the landscape, the healthier the native ecosystems will become.

Some ways of achieving this are:

- Establishing wildlife corridors between existing bush areas and any wetlands or streams on the property. Ideally, these links would be of native plants, but any vegetation can help animals move between sites. When using exotics, look for species that are good for birds and are not weedy. It may be possible to design shelterbelt layouts to link natural areas, or reduce the gaps between them.
- Establishing links between natural areas on your land and those on neighbouring properties. Contact the wider community to discuss creating better links between natural areas.
- Designing shelterbelts or other farm plantings using native plants. Harakeke/flax provides valuable nectar supplies for birds such as tui. Hardy species that cope well in the open include cabbage tree, lowland totara, kowhai, kanuka and kohuhu.

Illustration: Maggie Atkinson

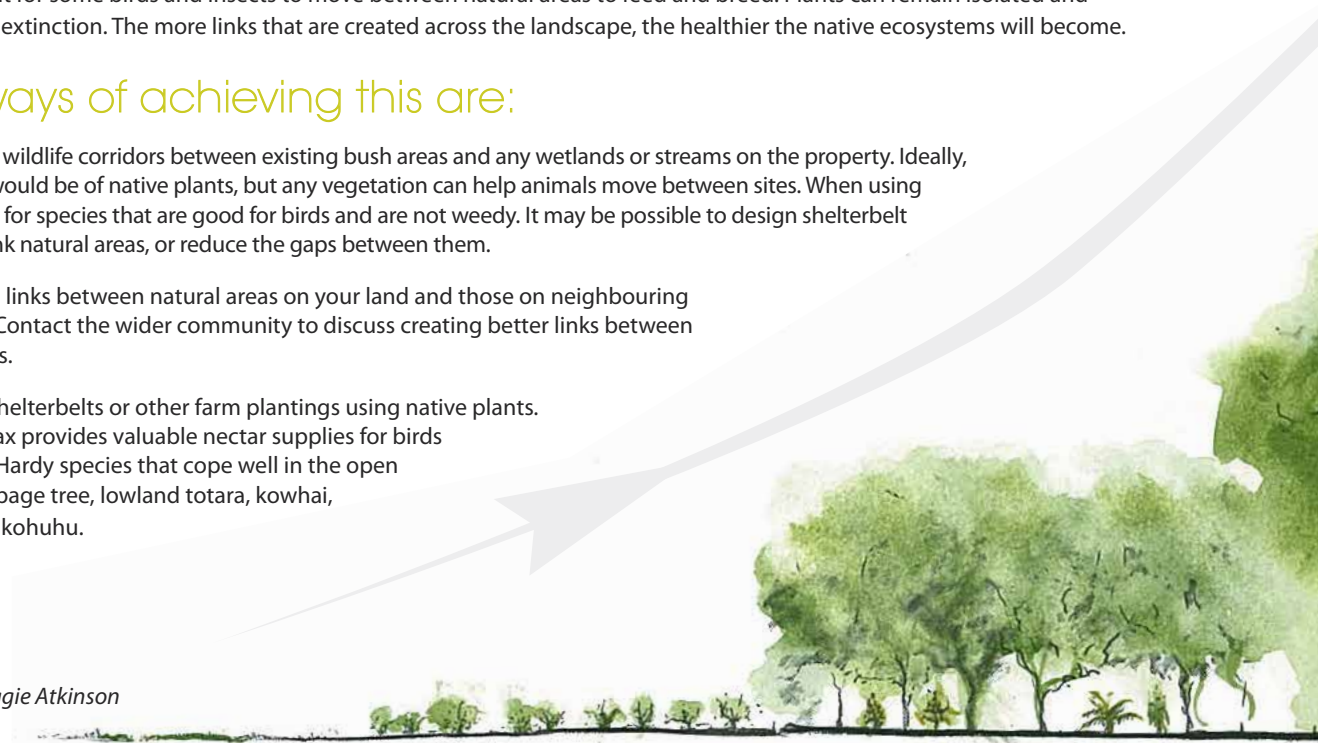


Diagram.

Edge Effect:

The drying and windthrow effects of air movement at forest sites can be ameliorated with marginal plantings that partially deflect wind up and over the main canopy.



Forest planting list

The following planting list highlights the 30 hardiest and/or the most characteristic trees needed to plant around forest margins, make forest corridors, or to start from scratch and create a new forest area, anywhere within Tasman District lowlands. For more detailed planting lists and environmental preferences of plants for your area, refer to the restoration lists on the Tasman District Council website (see References section).

Plant name	1 st or 2 nd Stage	Coastal Flats	Coastal Hill	Lowland Flats	Lowland Hill
Akeake	<i>Dodonaea viscosa</i>	1	✓	✓	*
Akiraho	<i>Olearia paniculata</i>	1	*	✓	*
Houhere/narrow-leaved lacebark	<i>Hoheria angustifolia</i>	1	*		* ✓
Kanuka	<i>Kunzea ericoides</i>	1	✓	✓	✓ ✓
Karamu	<i>Coprosma robusta</i>	1	✓	✓	✓ ✓
Kohuhu	<i>Pittosporum tenuifolium</i>	1	✓	✓	✓ ✓
Lowland totara	<i>Podocarpus totara</i>	1	✓	✓	✓ ✓
Manatu/lowland ribbonwood	<i>Plagianthus regius</i>	1	✓		✓
Manuka	<i>Leptospermum scoparium</i>	1	✓	✓	✓ ✓
Ngaio	<i>Myoporum laetum</i>	1	✓	✓	* *
South Island kowhai	<i>Sophora microphylla</i>	1	✓	*	✓ *
Tarata/lemonwood	<i>Pittosporum eugenioides</i>	1	✓	✓	✓ ✓
Ti kouka/cabbage tree	<i>Cordyline australis</i>	1	✓	*	✓ *
Tutu (poisonous to stock)	<i>Coriaria arborea</i>	1	✓	✓	✓ ✓
Horoeka/lancewood	<i>Pseudopanax crassifolius</i>	2	✓	✓	✓ ✓
Hututawhai/hard beech	<i>Nothofagus truncata</i>	2		✓	✓
Kahikatea	<i>Dacrycarpus dacrydioides</i>	2	✓	*	✓ ✓
Kaikomako	<i>Pennantia corymbosa</i>	2	✓	✓	✓ ✓
Kapuka/broadleaf	<i>Griselinia littoralis</i>	2		✓	✓
Mahoe/whiteywood	<i>Melicytus ramiflorus</i>	2	✓	✓	✓ ✓
Makomako/wineberry	<i>Aristotelia serrata</i>	2	✓	✓	✓ ✓
Mapou	<i>Myrsine australis</i>	2	✓	✓	✓ ✓
Matai	<i>Prumnopitys taxifolia</i>	2	✓	✓	✓ ✓
Miro	<i>Stachypitys ferruginea</i>	2	✓	✓	✓ ✓
Puka	<i>Griselinia lucida</i>	2	✓	✓	* *
Rimu	<i>Dacrydium cupressinum</i>	2	*	✓	✓ ✓
Tawhai/silver beech	<i>Nothofagus menziesii</i>	2	*	*	✓ ✓
Tawhairaunui/red beech	<i>Nothofagus fusca</i>	2			* *
Tawhairauriki/black beech	<i>Nothofagus solandri</i>	2	*	✓	✓ ✓
Whauwhaupaku/fivefinger	<i>Pseudopanax arboreus</i>	2	✓	✓	✓ ✓

* Check the Tasman District Council planting list for your area www.tasman.govt.nz/link/planting-lists

Scrub and shrublands

Scrub is short dense vegetation made up of shrubs, ferns and young trees. The term 'shrublands' is used where the vegetation is more open. Naturally occurring scrub and shrublands in Tasman District are confined to wind-blown coasts, frost flats, flood margins of rivers and streams, wetlands and sub-alpine areas. Extensive induced native scrub has also formed in the region after forest areas were burnt, or farmland abandoned, for example the pakihi manuka scrublands of parts of Golden Bay. Most widespread perhaps are areas of mixed native and weedy scrublands of kanuka, mahoe, five-finger, gorse and barberry that are reverting slowly to native forest.

Scrub has historically been dismissed as useless wasteland waiting to be cleared. However, such areas are often of great value because they:

- Are the natural starting point for native forest regeneration, providing a nursery for taller forest plants
- Support a diverse range of plants and animals, particularly the natural scrublands of coast, wetland and sub-alpine areas
- Provide habitat for light-demanding plant species and species of disturbed sites that cannot survive within tall forest
- Hold soil together in hill country, preventing slips and minimising erosion
- Buffer other natural areas such as forests and wetlands
- Act as wildlife corridors between other natural areas
- Provide useful products such as manuka honey and essential oils
- Add diversity to the landscape
- Remove CO₂ from the atmosphere where they are reverting to forest, which helps to mitigate climate change.

Scrub as a nursery for forest

In lowland areas of Tasman District, much of the scrub on private land away from the coast occurs on slopes dominated by kanuka, gorse, broom, hawthorn or barberry. These may form important habitats, particularly where there is little fully native vegetation in the area, or where they are the only link between natural areas. Such scrublands revert to native forest given time, the shade of the native trees eventually killing the exotic vegetation. This process can be hastened by creating light wells or open corridors in the scrub and planting native trees into them. This is a quicker way of getting native forest back than clearing the scrub and planting natives from scratch. But you may need to cut areas within broom scrub as it is so root-competitive. Bracken can also be very restricting to young plants.

Working in a common cause

SUE BROWN, KATHY HINDMARSH,
MICHELLE RILEY & JO-ANNE VAUGHAN



'It's wider than environmental ethics
– it's a way to live, being a net giver,
putting more into life than you get out.'

The breadth of organisations and award-winning projects that Golden Bay's Sue Brown, Kathy Hindmarsh, Michelle Riley and Jo-Anne Vaughan are involved in is deeply impressive: Federated Farmers, Rural Women, Forest & Bird, Keep Golden Bay Beautiful, Weedbusters, Streamcare, Friends Of Mangarakau, Onekaka Mountains-to-Sea and the Aorere Catchment Project.

Why do they feel compelled? 'It's wider than environmental ethics – it's a way to live, being a net giver, putting more into life than you get out,' says one.

There is consensus among the four about motivation:

'Something disturbs you and you just have to do something.'

'A lot of us work better in a group.'

'Project ownership needs to be local because it is part of them, and it's going to be in perpetuity.'

Gathered together in Collingwood, the women swap affirmations: 'I so admire your sustained action out there

planting – so much growth that is visible to us locals as we drive by. I am only talking about it.'

'Well, I am so proud of what you are doing politically – all that lobbying on the national stage.'

'Having someone arrive at our farm and say 'we have got some free plants and we will do the work for you' was simply amazing.'

Amid laughter, they agree that talkfests and action on the ground are both needed.

As mothers or grandmothers, these women share Playcentre backgrounds, and it has shaped many of the basic people skills they share. Like embracing biculturalism, learning together, accepting that everyone is important, and 'layering', or finding ways for new people to belong in the group.

Creating 'safe' ways to meet and build good dialogue are pivotal: 'It can be terribly hard to have your beliefs challenged.'

'We need to be able to ask the 'dumb questions'.'

And 'starting with good food certainly loosens everyone up.'



Above: Robyn Jones stands on the bank of Dall Creek in Golden Bay, surrounded by native plants that she, and others, grew in the nursery in Collingwood, and planted out as part of the award-winning Aorere StreamCare project.

Photo: John Gilardi, 2009

Right: Sue Brown (front), Michelle Riley, Kathy Hindmarsh and Jo-Anne Vaughan (rear) visit the Onekaka Mountains-to-Sea Project Golden Bay.



OUR STORIES: Working in a common cause

Cross-boundary organisations like Keep Golden Bay Beautiful and Landcare Trust can provide neutral forums allowing different views to converge, and they furnish support – both crucial to helping projects stay alive.

These four women agree that working collaboratively is a good thing, which 'inevitably means talking around contested values' and learning to 'view a problem and move it forward by taking time to talk and listen, express emotion and get beyond that, reaching a consensus which does not mean everyone has the same view – rather, all views have been expressed.'

'It's a huge failure to go to court – the winners are the lawyers, not the environment.'

People respond to respectful approaches: 'I have worked with people in planning and policy and science arenas who have really spurred communities on.'

Sitting down, talking about matters, sharing information, building trust, helping new people to learn, solving problems and working collaboratively are all key factors in good process.

Patience, as they say, is a virtue: 'Don't try and push the work or the issue too hard,' accepting that everyone does the best they can with the resources they have. Mistakes happen,

expectations can be different, and progress often feels like 'two steps forward, one back.'

Working co-operatively, 'people can't all give equally at the same time, so focus on individual strengths and look for emergent leadership.'

Walking to their cars at day's end, discussing future landscapes, the weave of ideas and creative opportunities continue to flow effortlessly between the four. Networks, and good communication within those networks, lead to the most effective action on the ground, they agree. Where there is goodwill there is a way; where there is leadership, a way emerges.

Watch their Golden Bay space.



Above: Aorere StreamCare is an award-winning project that works with landowners to plant natives species along riparian margins on private land. Here, many local hands make light work along MacKay Creek in Golden Bay.
Photo: John Gilardi 2010

Left: Site of the Onekaka Mountains-to-Sea Project Golden Bay.

Coastal restoration

Coastal habitats are diverse within Tasman District and include cliff-top and headland shrublands, steep salt-spray herbfields, sand dune tussocklands and shrublands, saltmarsh, brackish wetlands, and coastal-slope forest and scrub. The climate and geology also vary considerably, from sheltered Tasman Bay in the east, across to the windswept north-west coast, further compounding the variety of ecosystems. There are coastal conglomerates, limestones, fragile Separation Point granites and Moutere gravels, all of which form headlands and cliffs, and each supporting quite unique vegetation communities. Dune and estuary margin restoration are expanded upon below.

Dunes

Dune systems occur sporadically around the coastline of Tasman Bay, Golden Bay and the north-west coast, and most spectacularly at Farewell Spit. Most of them have been inundated with exotic marram grass that has out-competed the native dune-stabilising plants.

Vegetation is important in the formation and stabilising of coastal sand dunes. Residential development, recreational activities, farming practices, and sand removal have all contributed to the modification of dunelands. The vegetation has been damaged or destroyed, leading to dune instability and wind erosion. The introduced marram was planted in the past to try and stabilise these areas, from where it spread around the coast to other dunes. It is now recognised that native dune plants provide the best protection.

Community groups are already involved in dune restoration in Tasman District. Usually, this entails the removal of weeds such as marram grass, gorse and lupin and then replanting with native species. Marram is the biggest issue and can only be dealt with by spraying.

Wind-blown sand is initially held in place by foredune plants such as pingao and spinifex. Behind this, a backdune area is created that may include an earlier foredune and damp hollows, with a different mix of native plant species planted.

Much experience has been gained locally and anyone contemplating such a project should contact Golden Bay Coastcare or Nelson City Council Parks and Reserves staff. A dune restoration handbook will shortly be available from the Dune Restoration Trust of NZ (www.dunestrust.org.nz) that should provide you with all the necessary information. In the meantime, a range of technical bulletins have been produced (for purchase) and are available from Scion (www.scionresearch.com) under Home> Publications> Science Publications> Research Reports> Environmental Science.

Right: Knowing what plant species to select, and where to get plant material, is critically important with restoration endeavours – Deb Hoseley selects Oi Oi (*Apodasmia similis*) and *Juncus maritimus* for use in restoring estuarine habitat Gorge Creek, Ruataniwha estuary.
Photo: John Gilardi, 2006



Dunes planting list

The table below lists the key species that give the basic structure to dune vegetation. For detailed planting lists and environmental preferences of plants for your area, refer to the Tasman District Council website (see References section).

Plant name		Foredune	Backdune	Damp/Wet Backdune
Pingao	<i>Desmoschoenus spiralis</i>	✓✓		
Spinifex	<i>Spinifex sericeus</i>	✓✓		
Sand tussock	<i>Austrofestuca littoralis</i>	✓		
Knobby clubrush	<i>Ficinia nodosa</i>	✓	✓✓	
Wharariki/coastal or mountain flax	<i>Phormium cookianum</i>		✓✓	
Pohuehue	<i>Muehlenbeckia complexa</i>		✓✓	
Sand coprosma	<i>Coprosma acerosa</i>		✓✓	
Taupata	<i>Coprosma repens</i>		✓✓	
Bootstrap sedge	<i>Carex testacea</i>		✓	
Tauhinu	<i>Ozothamnus leptophylla</i>		✓	
Ngaio	<i>Myoporum laetum</i>		✓	
Akeake	<i>Dodonaea viscosa</i>		✓	
South Island toitoi/toetoe	<i>Cortaderia toetoe</i>			✓
Ti kouka/cabbage tree	<i>Cordyline australis</i>			✓
Umbrella sedge	<i>Cyperus ustulatus</i>			✓
Harakeke/swamp flax	<i>Phormium tenax</i>			✓
Mingimingi	<i>Coprosma propinqua</i>			✓
Manuka	<i>Leptospermum scoparium</i>			✓

✓✓ Double tick signifies main plantings

* Ngaio plants can sprawl widely so use sparingly

Saltmarsh and brackish wetlands

Saltmarshes occur in the intertidal and above-tide zones within estuaries. Saltmarshes are distributed throughout the coastline of Tasman District, forming particularly large areas within the larger estuaries. Extensive areas have been infilled, lost to roads and farming, or otherwise degraded, for instance by four-wheel-drive vehicles. Once-extensive saltmarsh ribbonwood shrublands have been very heavily depleted.

Brackish wetlands tend to form at the head of estuaries, where freshwater mixes with saltwater near river and stream mouths. They often merge into freshwater wetlands inland. These areas make fertile pasture when drained and consequently most areas have been destroyed.

Estuarine margin planting list

The table below lists the key species that give the basic structure to the vegetation. Upper margins are usually dominated by saltmarsh ribbonwood scrub that merges into either oioi or sea rush beds. The other species listed below tend to be much more restricted. Where to plant brackish water species is problematic as each species has its own particular requirements and these are not always obvious. By planting them in a range of situations across the freshwater to saltwater gradient, plant survival will determine the final vegetation patterns that emerge. To assist in determining best locations for plants, look around the locality to see where these species naturally grow.

In the longer term, sea level rise poses a daunting threat to saltmarshes. Such areas are doomed if they adjoin low-lying landward margins that are defended against sea level rise, where no allowance is made for a managed retreat of the coast.

Unfortunately at this time, there is no saltmarsh restoration handbook for New Zealand.

If planting around stream and river mouths, consideration needs to be given to inanga (the main whitebait species) spawning sites. Very few of them have been fully documented in Tasman. Spawning occurs in autumn in fine vegetation at and around the saltwater wedge at high-water springs. Where native plants have been lost, they often favour exotic grasses and herbs such as tall fescue, Yorkshire fog, creeping bent, lotus and creeping buttercup in which to lay eggs, so determine whether this is the case if you are considering replacing with native species. Of the native plants raupo, umbrella sedge and native rushes have been cited as being used for spawning. Blackberry and willows are a serious threat to spawning sites. NIWA have produced a useful guide to restoring inanga spawning sites in "A Guide to Restoring Inanga Habitat" see:

http://censeam.niwa.co.nz/__data/assets/pdf_file/0019/45451/st50.pdf

The planting list below is not the full restoration list for restoring estuary margins. For detailed planting lists and environmental preferences of estuarine plants for your area, refer to the Tasman District Council website (see References section).

Plant name		Upper Estuary (Upper Intertidal)	Upper Estuary Fringe (High Water Mark)	Brackish Water (Where Freshwater Mixes)
Sea rush	<i>Juncus kraussii</i>	✓✓	✓	
Knobby clubrush	<i>Ficinia nodosa</i>		✓	
Estuary tussock**	<i>Austrostipa stipoides</i>		✓✓	
Three square	<i>Schoenoplectus pungens</i>			✓
Saltmarsh ribbonwood	<i>Plagianthus divaricatus</i>	✓	✓✓	
Oioi	<i>Apodasmia similis</i>	✓✓	✓	✓✓
Purua grass	<i>Bolboschoenus caldwellii</i>			✓
Kapungawha/lake clubrush	<i>Schoenoplectus tabernaemontani</i>			✓*
Raupo	<i>Typha australis</i>			✓*
Umbrella sedge	<i>Cyperus ustulatus</i>		✓	


✓✓ double tick signifies main plantings

* where freshwater influence dominates

** Waimea and Moutere Inlets and Farewell Spit only

Stay together, learn the flowers, go light

FRIENDS OF MANGARAKAU



Evening light on the Mangarakau landscape puts time and space into an ecological perspective – the bounding hills to the south of Whanganui Inlet, the old weather-worn kahikatea canopies and life-rich wetlands are all interconnected. *Photo: John Gilardi, 2006*

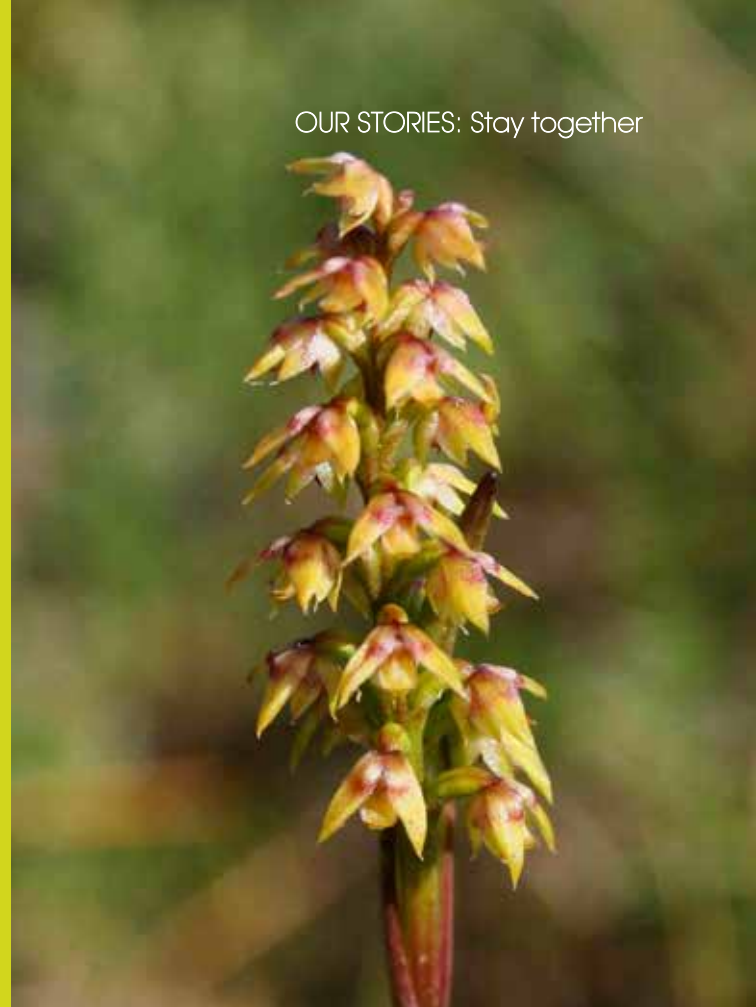
Mangarakau Swamp evokes a sense of the primeval with its deep, watery, once-was-forest peat and sedimental ooze lying on ancient rock. And although deforested, 'something has survived in its silences', as Geoff Park has suggested of the landscape this wetland is integral with, Whanganui Inlet.

Vast wetlands extend over 400 hectares – the largest remaining freshwater wetland in the Nelson-Marlborough region. 'The lie of the land at Mangarakau is such that the swamp has been able to resist every attempt to drain it,' says *The Visitors' Guide to Mangarakau Swamp*, adding that 'you have to admire its tenacity'.

Empowered action saw the creation and protection of Mangarakau Swamp Reserve, a highly significant tract of wetland habitat. Members of Golden Bay Forest & Bird envisaged an extended wetland, and gained the support of NZ Native Forest Restoration, who strategically bought parcels of private land bordering the extensive swamplands already held within the DoC estate. The Reserve is protected by QEII covenant, and 'the wetland is being actively restored towards its original natural state, including establishing the forest and safe habitats for wetland animals and birds.'

The Friends of Mangarakau is a separate body intimately involved with the swamp's well-being and management. Jo-Anne Vaughan, of Forest & Bird, has an integral part to play – 'an inspiring and driving force' – in the day-to-day activities at the wetland. To Jo-Anne, the Friends are just that – 'a really good team of friends who work well together'. They were established in 2003 and now have well in excess of 200 members.

Managing and restoring a wetland of this size in such a remote part of Tasman District requires big-picture planning to enable people to work effectively, understand and enjoy the place – including visitors. This has meant providing facilities such as a network of tracks, telling the story of the wetland in a comprehensive display in the old Community Hall on-site, and developing a Field Centre for daytime and overnight use.



Above: A rare native orchid within the Tasman District, *Corunastylis pumila* can be found growing on the track sides and dry pakahi mounds in Mangarakau Swamp. Photo: John Gilardi, 2009

Below (from left): Friends of Mangarakau workers Penny Griffith, Robyn Jones, Murray Gavin, Jo-Anne Vaughan, Edith Shaw, John Gilardi, Dorothy Barden and David Morgan at the original site of the Prouse and Saunders sawmill. Photo: John Gilardi, 2009



OUR STORIES: Stay together



Above: The blue veined flowers of one of the native wetland orchids make a stunning sight to stumble upon in the Swamp environs – as captured in the Field Centre hut book, a living treasure itself. *Photos: John Gilardi*

Below: Local resident Rod Tomlinson carved the entrance sign. *Photo: John Gilardi, 2008*



Described by a national wetlands expert as 'one of the most visually enchanting wetlands in New Zealand,' Mangarakau is a special place to be. People come to carry out tasks such as vegetation planting and release work, track and building maintenance, and predator trap-lines – one notable volunteer lives nearby and puts in huge hours each week at the swamp.

Salisbury School students from Richmond have adopted Mangarakau Swamp and come out two or three times a year. Ask them about weta-motels – fortunately they are out in the reserve, not in the Field Centre. They built them and know exactly what weta need to feel safe and 'housed'.

Friends members come from all over New Zealand to be here, and stay in the Field Centre.

The swamp's remoteness means that its guardians are very committed. Scientific, philosophical and ethical strands weave through the stories about what fuels people's conviction. The restoration ecologist involved with Mangarakau, John Gilardi, finds inspiration in a poem by Gary Snyder:

For the Children

*The rising hills, the slopes,
of statistics
lie before us.
the steep climb
of everything, going up
up, as we all
go down.*

*In the next century
or the one beyond that,
they say,
are valleys, pastures,
we can meet there in peace
if we make it.*

*To climb these coming crests
one word to you, to
you and your children:*

*stay together,
learn the flowers,
go light!*

And that is exactly what you can do at Mangarakau Swamp, a place protected in perpetuity by the tenacity, hard work and collective vision of many people and organisations.

Wetland restoration

Tasman District was once richly endowed with lowland freshwater wetlands, particularly swamps dominated by raupo and harakeke, and swamp forest dominated by kahikatea. They covered large areas of lowland flats, especially around the lower reaches of the major rivers. Today less than 5% of these areas survive today, with the greatest losses in lowland Golden Bay, Motueka and Waimea areas. These remnants are usually small and weed-prone. Other surviving lowland freshwater wetland areas include natural ponds and lakes, bogs in mountain valleys in the south of the District, gully wetlands on the more coastal Moutere Gravels, and pakihi where formerly forests stood.

The brochure 'Good Practice Guide to Managing Wetlands in Tasman District' is available from Council. It not only describes how to enhance your wetland in more detail, but also gives an overview of Tasman District's richly varied wetland heritage.

Why are wetlands important?

Many wetland bird and fish species are struggling to survive because of the lack of habitat and the fragmented and unconnected nature of the wetland remnants. These include such shy birds as Australasian bittern, South Island fernbird, banded rail, spotless crake and marsh crake, and the mudfish. Many wetland plants have been lost or nearly lost from the District for the same reason. All remaining areas should be retained and restored, and new wetland areas created.

Wetlands are critically important for biodiversity, buffering of river flows and filtering contaminants from the land. They can be important storage areas, holding water during floods, and reducing flooding risks by releasing water more slowly over a longer period of time. They provide a water supply during dry summer months and help to recharge groundwater aquifers. Wetlands can reduce contaminants and improve water quality in our lakes and rivers. Bacteria living in the damp soil of wetlands can absorb and break down about 90% of nitrogen from run-off from adjoining land. Wetland plants trap waterborne sediment, reducing silt build-up in streams and rivers.

Wetland restoration & creation

Most lowland freshwater wetlands in need of restoration are raupo or harakeke/flax-dominated swamps. Blackberry, Himalayan honeysuckle, gorse and a range of willow species are usually the major weed threats to these swamps.

The creation of new wetlands is also important, as so much has been lost. Boggy paddock areas can be returned to swamp forest of sedges and kahikatea. Shallow wetlands can be created through excavation or damming, although it takes some skill to create the right water levels for varied wetland vegetation to result. Earthworks to create open water within existing wetlands must be avoided, as open water is far less ecologically important than retaining the wetland vegetation that might be destroyed in the process.

Ponds and lakes

Many artificial wetlands take the form of ponds or lakes. In such instances, shallow margins with gently sloping banks are needed for marginal wetland vegetation to flourish, with a deep centre to prevent vegetation filling in all the open water. Shade from marginal native trees is also important to help reduce overheating. A water body with steep sides falling to deep water cannot develop the wide margins of wetland vegetation that are so important to the wildlife of ponds and lakes. Another consideration is that if there is little water through-flow, open water bodies can become over-enriched by duck excrement, creating 'pea soup' algal blooms. However, ponds constructed in-line with the stream (i.e. stream flows in one end and out at the bottom) can boost stream water temperature. For this reason off-line ponds (which get filled and discharge only in high stream flows) are recommended in most situations unless the pond can be shaded. Advice from a wetland specialist might be warranted for such a project. In most cases, earthworks require a resource consent.



Left: StreamCare volunteers work at establishing eco-sourced plants along a fenced-off farm drainage ditch at MacKay Creek, Rockville in Golden Bay.

Photo: John Gilardi, 2009

Freshwater wetland planting list

The revegetation list below is for swamps and pond/lake margins. These are the key species to give the basic structure to the vegetation. For detailed planting lists for your area refer to the Tasman District Council website (see References section).

Plant name		Wetland Core	Wetland Toward Margins	Water <0.5m Deep	Lake/Pond Edge
A sedge	<i>Baumea rubiginosa</i>		✓		
Blue wiwi	<i>Juncus sarophorus</i>		✓		✓
Harakeke/swamp flax	<i>Phormium tenax</i>	✓✓	✓		✓
Kiokio fern	<i>Blechnum novae-zelandiae</i>	✓✓	✓		✓
Kuta (Golden Bay only)	<i>Eleocharis sphacelata</i>			✓	
Pukio (a tussock sedge)	<i>Carex virgata</i>	✓	✓✓		✓
Purei (a tussock sedge)	<i>Carex secta</i>	✓✓	✓		✓
Raupo	<i>Typha australis</i>	✓✓		✓✓	
Rautahi (a swarding sedge)	<i>Carex geminata</i>	✓	✓✓		✓
South Island toitoi/toetoe	<i>Cortaderia toetoe</i>	✓	✓		✓
Tall swamp rush	<i>Juncus pallidus</i>		✓		✓
Wiwi	<i>Juncus australis</i>		✓		✓
Shrubs and Trees					
Kahikatea	<i>Dacrycarpus dacrydioides</i>		✓		✓
Karamu	<i>Coprosma robusta</i>		✓✓		✓
Korimiko	<i>Hebe salicifolia</i>		✓		
Manuka	<i>Leptospermum scoparium</i>		✓✓		✓
Mikimiki	<i>Coprosma propinqua</i>		✓		✓
Swamp coprosma	<i>Coprosma tenuicaulis</i>	✓✓	✓		
Ti kouka/cabbage tree	<i>Cordyline australis</i>	✓	✓✓		

✓✓ double tick signifies main plantings

Right: A riparian margin of raupo, Lake Otuhie, NW Tasman.
Photo: Lindsay Vaughan



Groves of life

FRIENDS OF MAPUA WETLAND



Vast numbers of protection sleeves denote the extent of new plantings at Kotare Pond, Mapua Wetland.

Photo: Friends of Mapua Wetland, 2006

Open a Friends of Mapua Wetland newsletter and you realise that their vision to create a lowland wetland forest will be realised 125 years in the future.

What they have already achieved – relatively speaking, in a tiny segment of time within the scheme of our local landscape history – is hugely significant. Retired journalist and Nelson Mail editor David Mitchell writes newsletter stories about the project that are deeply embedded in local knowledge and history.

David, wife Judy, and other members of the Beere and Mitchell families spearheaded the creation of a regeneration vision in 2004. Work began the following year. To ensure future connection and viability for the project, the Friends of Mapua Wetland Incorporated Society was formed in 2006. It now has about 40 family and individual members.

'It's a way for us as family members and landowners to share the vision and ensure that interested members of the local community could have longterm input and involvement alongside the kahikatea slowly coming to maturity in 125 years time,' says David. 'After all, this lowland kahikatea forest is going to grow side by side with houses, people and urban development. We have considered this and ways to work within an urban context.'

David cites Geoff Park's Nga Uruora – ecology and history in a New Zealand landscape as 'one of the most important books on my shelf'. Nga Uruora is a milestone in our understanding of landscape ecology in Aotearoa New Zealand. It talks of the damage we have done ecologically to our land, and the natural features now under threat that are at the core of our perception of ourselves as New Zealanders. This inspired David and others to want to recreate the values of the landscape that was here when the first settlers arrived.



Above: Early morning mist and light on the plantings at Mapua Wetland, suggestive of what was once named Korepo Wetland.
Photo: Friends of Mapua Wetland, 2008



Right: David Mitchell with planting flags.
Photo: Friends of Mapua Wetland, 2010

OUR STORIES: Groves of life

The Korepo wetland forest (now called Seaton Valley Swamp) once grew extensively on 320ha of peaty soils overlaying Moutere gravels north of Mapua, and was one of the biggest lowland kahikatea/pukatea forests in Tasman Bay before it was cleared. David explains that 'if you scan the local area, that part of Mapua is missing. 'Mapua' in Maori means the fruitful, bountiful phase of the kahikatea tree. The Friends of Mapua Wetland project vision is bringing some of that landscape story back to this place.'

'Nothing happens in a vacuum. We were inspired by the vision of Bernard Wells when he donated 5ha of his land to become Aranui Park for the purpose of preservation of NZ native forest ... We wanted to also create a community asset, and owe a debt of gratitude to wetland ecologist John Preece for his vision of a creative use for the swampy paddock adjoining Aranui Park.'

Among many initiatives, the Friends have set up an educational programme with Mapua School to work alongside the education curriculum by weaving various activities and aims together within a historical context. Examples include Tane's Ark, a planting project in Aranui Park, and a Showing the Way initiative for Conservation Week in 2008, when the schoolchildren took community leaders and showed them how to plant a tree.

The Mapua nga uruora (groves of life) and kahikatea of the future are in good hands.



Top (from left): Judy Mitchell, Ness Beare, Jo Heatherbell, Claire Garrett and Karole Turner relax after a planting session at Mapua Wetland. *Photo: Friends of Mapua Wetland, 2007*

Above: Black beech flowering on Beech Ridge. *Photo: Friends of Mapua Wetland, 2008*

Below: Kotare pond, Mapua Wetland, surrounded by native plantings, bordered by pastoral lands and on the edge of Mapua village.

Opposite page: Sunlight casts long shadows from towering kahikatea onto water in Faulkners Bush, Wakefield. This small remnant, one of few in the district, is a still-functioning kahikatea swamp forest, with springs and small watercourses keeping this habitat alive.







Photo: Michael North



SECTION 02:

invaders

Fighting weeds is fighting the energy of the sun

PETER WILLIAMS

Blackberry – an invasive species growing rampantly at the edge of a covenanted forest remnant in the Moutere Valley, Tasman District.

In the course of his working life as a botanist for Landcare Research, Peter Williams has developed specialist knowledge about the processes of vegetation succession, particularly about the interaction of weeds and native flora and fauna species.

He has written papers for publications, produced numerous reports for organisations such as local authorities and DoC, plus addressed many audiences – in short, reached out far and wide to anyone interested in understanding the role that weeds play, and in restricting their impact on biodiversity in Aotearoa New Zealand.

People need to 'be a bit of an ecologist – which in layperson's terms is someone who knows about the interaction of plants and animals in their environment.' Applying an ecological perspective to revegetation work means trying to develop an understanding about the plant/weed and the role and influence it will have on the overall vegetation structure and succession you are trying to create.

If you have a lot of weeds 'you simply have to have priorities and this also requires taking cognisance of time – thinking along the lines of, if I do nothing, in five years what will happen?'

During his working life Peter has seen huge change in both our urban and rural environments, particularly the presence and effects of invasive weeds. He has also witnessed the burgeoning efforts being put in locally, regionally and nationally to counteract this.

'When I see a party of people actually doing something – say DoC workers climbing down bluffs or a community group hand-weeding on their hands and knees 'gardening' a coastal patch in what is effectively our collective common space – I find that really inspiring and am personally very grateful to them for their efforts.

'Restoration could require an unlimited amount of time so in terms of whatever you are doing, developing the art of the possible with regards to weed control is vitally important. At the end of day, you are simply fighting the energy of the sun – how much energy do you have compared with the sun?'



Above: Convolvulus is one of the more widespread vine species in Tasman District that can rapidly reduce a plant or group into a doomed tangle if unchecked.

Below: Peter Williams of Landcare Research Nelson has specialist knowledge about the interaction of native and invasive weed species.



Weeds

Any plant not native to the locality is by definition a weed, but only certain species pose a serious problem to the health of existing natural areas and in getting new plants established. Weeds compete with native plants for light, space, moisture and nutrients.

Weeds are difficult to eliminate due to seed banks in the soil and constant reinvasion from bird and wind-borne seed.

Whether weed control is needed depends on the nature of the project site (whether it is a revegetation area or an existing natural area), the types of weeds present, and the timeframe.

Getting weeds under control at the early stages of a restoration project is a priority for some people, but others have not sought to control weeds heavily where they can actually be useful. For example, gorse can act as a nurse for native establishment, allowing the emerging native trees to shade them out in time.

Controlling weeds in existing natural areas

Weed control can be expensive and time-consuming, so step back, assess and prioritise your weed problem. At the least, try to prevent the most threatening weeds from seeding if you cannot eliminate them initially. If an open area is being cleared of weed growth, try to replace the weeds with natives as soon as possible before the next generation of weeds takes over.

Vines

Even where a dense vegetation cover exists, certain weed vines can readily colonise and smother natives. Old man's beard, banana passionfruit, Japanese honeysuckle and convulvulus are some of the more widespread vine species that can transform a native forest/scrub area into a collapsing tangle in time. Their presence poses a severe threat to an existing natural area.

Shade-tolerant weeds

Some weeds are a problem not so much with plant establishment, but in how they can transform an existing native ecosystem into one with a major exotic component. Certain woody weeds are very shade-tolerant and will come up in the darkest native forest. Ash, sycamore, yew, holly, rowan and North Island lacebark species can all successfully invade native forest and grow up into the canopy or understorey.

Other ground-smothering weeds are also very shade-tolerant, although they can grow well in the open. Wandering willy, periwinkle, stinking iris, aluminium plant, Selaginella and Montbretia can invade a shady forest floor, eliminating native cover. If these species are present at a revegetation site, try to eliminate them.

Weeds in wetlands and native shrublands

In wetlands, coastal shrublands and frost flat shrublands, where the final native cover is open low vegetation, competitive weeds must be continually eliminated to retain native character. In such situations the native vegetation does not generally grow tall or dense enough to shade weeds out or prevent them establishing.

Assessing your weed situation

Before starting a weeding onslaught, begin by assessing the problem and learning about the weed invasion process to plan a strategic course of action. Draw up a map of the site detailing the important weed areas. This should assist you in deciding where to begin. All sites are different, but the following example may help in deciding what weeds to start on, using the table of weediness scores in the Appendix.

Example of a Forest Weed Assessment Prioritisation							
	a	b	a x b	a ÷ b		Score as required after previous years work	
Species	Weediness Score (see appendix)	Current abundance at site	Site threat ranking score	Site weeding action score	Priority Year 1	Priority Year 2	Priority Year 3
Banana passionfruit	27	low (1)	27	27	1		
Wandering willy	25	low (1)	25	25	2		
Periwinkle	22	low (1)	22	22	3		
Ivy	25	mod-low (2)	50	12.5	4		
Barberry	26	moderate (3)	78	8.7	5		
Old man's beard	33	high (5)	165	6.7	6		
Jerusalem cherry	19	moderate (3)	57	6.3	7		

Scoring: high=5, moderate=3, low=1

This table ranks the weeds present at a site by taking into account their 'weediness' (an index of potential impact) and current abundance at the site. A simple calculation of a x b might seem the best way to give each species a ranking score. In the above example, old man's beard scores 165, well ahead of any other – as would be expected because it represents the most alarming weed situation. However, this fails to emphasise the importance of nipping a highly invasive and highly damaging weed in the bud if it has only just arrived – as in banana passionfruit in the above example. The calculation a/b emphasises this fact and scores banana passionfruit as the highest priority for this reason. This makes sense as this weed can be dealt with relatively easily due to its low occurrence, before launching into the old man's beard that is festooning the site.

The above approach is simplistic as it takes no account of what ecological values might be immediately threatened by weeds in one part of the site, or which weeds might be shaded out eventually by natural native regeneration. It is still a useful exercise in highlighting general priorities.

Where a weed such as old man's beard is so heavily entrenched, it can seem an overwhelming prospect deciding where to start. One initial strategy with vines is to stop them setting seed by simply cutting the aerial stems, and then to go on to eliminate them

from lightly infested parts of the site (which are the easiest to clear), working in to the strongholds. Pulling weeds back to their strongholds to start with is an important general strategy as this leaves the weeds 'contained' to these areas. Further, starting the work in the lightly infested areas is smart as the work required now is so much less than if these areas were left until later.

Other considerations to take into account are:

- Whether reinvasion from nearby is an issue
- How easy it is to actually control a particular weed
- Whether the initial weed impacts (at least in a forest setting) are on canopy destruction or forest floor destruction
- Whether the weed in question is light-demanding or can penetrate into forest shade

These could all be factored into the calculation of ranking. A further point is that the weediness scores are not on a linear scale, and it might be more realistic to use 'a2' rather than 'a' in the calculations to emphasise this.

A very useful publication on understanding weed ecology and control (now out of print but worth tracking down) is 'Ecology and Management of Invasive Weeds' PA Williams (1997) Conservation Sciences publication no. 7, Department of Conservation, Wellington.



Above: Weedbusters at work! Students employ creative methods and have fun removing every trace of the invasive *convolvulus* from native plants in the streamside planting project at Ngatimoti School.

Weeds in restoration plantings

Weeds almost always have to be dealt with during the early years of revegetation. Many projects use one-year-old root-trainer grown plants (being the cheapest) whose low height means they are readily overtopped by weeds for the first year or two.

Open-ground herbs and grasses

Rank grasses such as tall fescue, Yorkshire fog and cocksfoot grass, and herbs such as the nightshade species, bristly oxtongue, cleavers, fumitory, creeping buttercup, and dock species can come up rapidly around new plantings in open situations and can smother them or crowd them out. These require knocking back before planting, and ongoing control for one or two years until the emerging native cover begins to stand above them.

Woody weeds

Species such as gorse, broom, blackberry, barberry, willow species, and Himalayan honeysuckle may require control over a longer period. Where wetland or shrubland is being restored, the native plantings may never shade them out and these weeds must be eliminated.

For forest restoration, these weed species might compete with native plants for years, as some of them can be faster-growing than the quickest pioneering natives. Alternatively, if managed appropriately, these weeds can provide shelter to native tree plantings, which subsequently grow and shade them out. This is only mimicking nature – many of New Zealand's secondary forests emerged by themselves through gorse-clad hillsides.

Any exotic vines that seed into such plantings must be eliminated as they are unlikely to be shaded out by the native plants.

Identifying invasive weeds

- The New Zealand Plant Conservation Network gives detailed descriptions of weed species under www.nzpcn.org.nz/exotic_plant_life_and_weeds/index.asp
- Weedbusters (www.weedbusters.org.nz) also provide less detailed weed descriptions under Home>Weed Info>Weed Search
- The Tasman District Council leaflet 'Pests – Everyone's Responsibility' has photographs of the significant weeds that have yet to establish widely within the District, and landowner responsibilities towards them. The Tasman/Nelson Regional Pest Management Strategy (available via the Tasman District Council website) also illustrates and describes the most important weeds in the region and any landowner responsibilities.

Control methods

Each problem weed species has particular characteristics that make it amenable to certain control methods.

Herbicides

Herbicides can be used as a foliar spray, wiped on foliage, as a stump treatment, or applied to holes drilled in trunks. Perhaps the first question to ask yourself is, do you want to use herbicides? They save a lot of time over other methods, especially when used over a larger scale and, if properly applied, are extremely effective. Most restoration projects use herbicides and many would not have been possible otherwise. However, they can be damaging to the environment – and the operator as well – and some people choose never to use them.

Problems that may arise include:

- Water tables and waterways can become polluted. Persistent herbicides might get into wetlands and potable aquifers.
- Spray can drift onto your neighbour's property. If they produce organically certified food, this could be serious.
- The native plants that you are trying to save may also be killed by the herbicide. Podocarp trees are particularly vulnerable.
- The serious health implications of tiny concentrations of certain herbicides in the body, especially for unborn children, are only just beginning to be appreciated.

Basic principles about herbicide use include:

- Correct timing of application determines whether herbicides are effective. Many weeds are most susceptible when growing their fastest.
- Sunny weather is ideal as it is when plants are most biologically active. Avoid moist conditions, or pending rain.
- Deciduous plants like willows and hawthorn are best stump or trunk-treated in late summer when they are drawing down sap.
- To reduce run-off, some herbicides come in a gel form that can be applied to cut stumps. You can mix your own gel herbicide using wallpaper paste.
- Use the least persistent and least toxic herbicides.
- The recommended protective gear should be worn at all times.
- Use herbicides at the most dilute concentration that is effective, the minimum quantity needed, and well-targeted.

Training in herbicide use is advisable. A 'Growsafe' certificate covers the safe use of herbicides. See www.growsafe.co.nz

The webpage <http://extoxnet.orst.edu/pips/ghindex.html> gives a good profile of the dangers of particular herbicide chemicals and formulations. The Pesticide Action Network also has a search page for herbicide toxicity, www.pesticideinfo.org/Search_Chemicals.jsp

A huge amount of experience has been gained on which herbicides to use on individual weed species. The best information is on the Weedbusters website, where they also provide more general information on techniques (see References). Tasman District Council has produced a brochure on the treatment of pest vines and this contains detailed herbicide mixes. The brochure is available on the website. Search under 'pests & weeds'.

Timing of herbicide application can be critical. The Weedbusters webpages detail this information for particular weeds. One question often raised is, how long before planting can spot-spraying be done? At least six weeks is recommended for glyphosate-based herbicides. Other more persistent herbicides may need much longer.

Manual weeding

Manual weeding can be effective with some invasive weeds, if the scale of the infestation is not too large. Find out which weeds sprout away again from their roots and which do not. For example, instead of stump-treating old man's beard or banana passionfruit with herbicide, the vines can be easily grubbed out with various combinations of sharpened spade, grubber, loppers and secateurs, as you prefer. Cut below the root crown – the bulge between the roots and the stem. This will kill the vines mentioned, as well as gorse and broom, but not weeds like blackberry, buddleia and wandering willy, which can sprout from their roots. Cutting radiata pine, Douglas fir, and most other conifers below any needle growth will kill them.

Mechanical weeding

Effective weed control prior to planting can be achieved by an initial mowing/slashing using a scrubcutter, tractor or digger-mounted mulcher/mower. This allows for easy access and facilitates follow-up control with herbicides or by hand. The mulch created can be put around any new plantings.

Ring-barking

Unwanted trees and shrubs can be ring-barked and left standing to die over a summer season. They could be left to provide shelter for subsequent plantings, and to provide dead standing wood habitat for insects and fungi. Obviously, the risk of damage to plantings when the trees fall has to be borne in mind, as well as the possibility of tree falls across access routes, and any danger to people. Some tree species can bridge over the lost bark, so cut a few centimetres into the wood if you are not sure. A number of deciduous trees can re-sprout below the cut, and the application of herbicide to the cut may also be needed.

Use of animals

Fencing a site so it can be grazed before planting can be effective in knocking back weeds. This would be most cost-effective where the fence is required anyway to keep grazing animals off the site once it is planted. This method is best for areas that are weedy and with few existing native values, such as abandoned pasture reverting to blackberry, gorse or broom. Sheep, cattle and especially goats all eat or trample blackberry, but work with a brush-cutter would also be required for sheep and cattle. Goats are the only effective animal on gorse control, with initial brush-cutting to ground level required. Stock relish old man's beard and banana passionfruit, and will eliminate them so long as the vines are low-growing or have been cut down to their stumps, so that stock can reach the regrowth.

OUR STORIES

Saving a swamp

GERARD HINDMARSH



Gerard Hindmarsh in prime fern bird habitat – his covenanted 1.4 hectare swamp at Tukurua, Golden Bay.

Cleverly secreted in a bowl of tufted rushes and surrounded by dense tanglefern: the finely woven nest of a fernbird ...

What a find! Graeme whispered excitedly: 'Hardly anyone gets to see a fernbird nest ... There's just not many left around here because all the coastal swamps in Golden Bay have been drained. Yours is one of the last.'

'...I gazed at the little eggs for the last time, unable to conjure up in my mind anything but the image of the bright orange 12-tonne Hitachi digger that I had booked to drain my swamp, and which was scheduled to start early next morning ...

I picked up the phone ...
'Colin, sorry to wake you, mate – I'm cancelling your digger.'

(from Swamp Fever)



Top (right): Getting down and dirty. Often up to his thighs in muddy sediment, Gerard worked long hours constructing a meandering boardwalk across the swamp.

Middle (right): Healthy new growth on the first kahikatea planted soon after it was decided to save the wetland.

Right: Adult banded kokopu, one of six native fish species whose juveniles are collectively called whitebait, now gather in the lowest pool of the swamp – just one of the rewards of extensive restoration efforts.



Pests

Introduced mammals, marsupials and insects have a huge impact on our natural ecosystems. These pests cause devastation in all habitats: forests, shrublands and tussocklands, wetlands, alpine herbfields, coast and riverbeds. Regular control of animal pests is essential in fully protecting and restoring a natural area. The damage they cause includes:

- Eating or damaging native plants, radically changing the makeup of our forests, leaving only unpalatable species
- Eating the seeds of many plants, preventing natural regeneration
- Eating seedlings, preventing regeneration and opening up the understorey to weed invasion
- Killing native birds (including eggs and chicks), reptiles and invertebrates
- Destroying nest sites and depleting food sources for native birds
- Affecting hundreds of native insects, species (in the case of wasps).

Regular control of animal pests is essential in protecting a natural area and needs to be scheduled into an ongoing work programme.

Pest trapping

It is worth considering what you are hoping to achieve from pest control, whether you have the necessary information, and if your goals are realistic:

- Which pests need controlling? This very much depends on the situation. To directly favour native forest birds, for example, possums, stoats and rats are usually the key species to focus on. For longer-term native forest bird recovery, forest condition is important, in which case pigs, goats and deer may need targeting. River-nesting birds suffer heavily from cat and hedgehog nest predation as well as from stoats. Pests also interact with each other. For example, targeting stoats alone can backfire as the rat population may increase.
- Is the primary aim to help the vegetation, breeding birds, or the ecosystem? This will affect the timing of control and which species you target.
- How can a long-term programme be maintained year on year, particularly if it involves weekly checks?

Contrary to popular belief, not every dead pest is a gain. Destroying only a small proportion of the pests may be costly and achieve little. Pest numbers must be held at very low levels.

The layout of traps or bait stations is important, to make them most efficient and cost-effective. Ideally, traps should be spread throughout a site, but particularly along routes that pests favour, such as stream margins, tracks and ridgelines. This may not be possible in difficult terrain, where traps may have to be laid out along a route that is easily patrolled, which may result in poor trap coverage of parts of the site. However with small sites, significant gains can be made just with boundary trapping. A range of traps targeting different species can be laid out along the same route to make checking traps easier.

The NPCA (National Possum Control Agencies) publishes very useful downloadable booklets about 'best practice' control methods for all vertebrate pests, not just possums. They contain huge amounts of information and are highly recommended.

See <http://npca.org.nz/index.php/publications/a-best-practice>

The Culprits

The impacts of introduced mammalian predators on native birds has been estimated at more than 25 million eggs and chicks destroyed nationally each year, according to estimates made by Landcare Research. It is a wonder we have any native birds left at all. For full ecological restoration of any natural area, pest control is a must. The key ecological pest species in Tasman are covered below. For information on traps and baits for these species, go to the References Section.

Possums

Possums have been filmed eating eggs, chicks and nesting adult birds of a wide range of species. They eat an estimated 21,000 tonnes of vegetation every night in New Zealand and they can spread bovine Tb. Research has shown that possum and rat numbers must be reduced to less than 5% of the original uncontrolled population to have much effect on bird nesting success, and ideally numbers should be reduced to 1%. Timing is critical, with control targeted for the period before and up to fledgling of nestlings. It is best begun from late winter, as possums are hungrier than in spring and more likely to be attracted to traps or poisoned bait, and the initial knock-down in numbers is higher.

Leg-hold traps are cruel, and though not yet illegal, are not recommended. Cage traps are effective but require initial pre-feeding and checking daily. You are also left with a live animal to deal with. A number of effective tree-mounted or post-mounted kill traps are available commercially and do not require daily checking, although fairly regular visits make the task more pleasant. Apple makes good bait when supplemented with a strong lure such as aniseed, clove oil, or vanilla or almond essence. Alternatively, slices of apple can be shaken in a container of flour and cinnamon. Traps should be set 100m apart. For small areas where reinvasion is heavy, 50m intervals might be needed.

Poison bait stations are an alternative to traps and require only irregular checks unless infestations are heavy. A range of bait stations and poisons are available, and can be chosen to kill rodents at the same time. Bait shyness can occur through repeated use of the same poison year after year.

Anticoagulants such as brodifacoum (part of the 'Talon' formulation) are moderately persistent, and can cause secondary poisoning through carcass scavenging by harriers and stoats. Pigs will also scavenge, rendering their meat unsafe for eating. Other poisons such as cholecalciferol (as a paste or pellets) work in different ways and are not known to persist, with a low risk of secondary poisoning of non-target animals. Animals generally die after one feed of cholecalciferol, so it is more efficient than brodifacoum.

Cyanide paste is very effective on possums, but bait shyness can readily occur if a sub-lethal dose is taken. Cyanide is also available as a station- or bag-dispensed encapsulated pellet ('Feratox'). A cyanide licence is required.

Night shooting around forest-pasture margins can also be a good way to get numbers down and especially to kill bait-shy or trap-shy adults.

A self-resetting gas-powered trap has also just been released that will potentially revolutionise possum control.

Rats

Rats have a massive effect on our ecosystems by feeding on seeds and invertebrates, and in the case of ship rats by consuming bird's eggs and chicks. No pest control effort to help forest birdlife will succeed well without ship rat control. Weta are very vulnerable to rodent predation.

Control using bait stations, as described above for possums (they will take the same bait), is highly effective at 50m spacing. Note that morepork can succumb if preying repeatedly on rats and mice carrying a sub-lethal anticoagulant dose. Rat control with conventional snap traps can be effective on a small scale but is too onerous to undertake across large areas. These should also be set at 50m intervals and rebaited regularly, as mice often take the bait without springing the traps (although there is one model that prevents mouse interference). Peanut butter mixed with rolled oats works well. Other baits include cheese, nuts and white chocolate. Conventional wooden traps with metal springs are prone to rot and rust. Plunging them (with plastic treadle removed) into warmed tar emulsion (such as mulseal) and greasing the metal parts extends their life considerably without the odour putting off rats.

Mice

No mouse control programme has been designed that is effective for mainland New Zealand, where rapid reinvasion is a constant factor. If control is attempted, it should be done in conjunction with rat control. Mice rarely set off rat traps but do remove the bait, effectively taking the trap out of use. Rats, however, will set off mice traps and become trap-shy, so the traps should be set within a small tunnel to exclude them.

Stoats, weasels and ferrets

Stoats attack the nests of hole-nesting species such as kaka, mohua/yellowhead and parakeet species, ground-nesting birds such as karearea/native falcon, kiwi and whio/blue duck, and waders and terns on riverbeds and foreshores. They also prey on nests of all small forest birds. Contrary to popular belief, they do less damage to open-nesting arboreal forest birds than possums and rats. The main nest predators of tui, korimako/bellbird, kereru/pigeon, miromiro/tomtit and piwakawaka/fantail appear to be possums and rats, not stoats.

Stoats and rats should be targeted together however, in forest ecosystems at least, as the removal of one may influence the numbers or behaviour of the other such that little gains in bird nesting success are made. Stoat and rat population dynamics are also very different in beech forest when compared to non-beech forest. To understand these dynamics, see Innes et. al in 'Feathers to Fur' detailed in the Bibliography.

Mustelids (stoats, ferrets and weasels) can be difficult to trap and are highly mobile, making their control at small sites particularly difficult due to constant reinvasion. Traps are designed to be set within a box or tunnel using lures such as fresh hen eggs or salted meat of rabbit or hare. More effective is the use of pieces of fresh rabbit or hare skin as these do not rot quickly and give off an 'authentic' odour. Designer lures have just become available but their efficacy in all situations is still being tested. Traps should be set at 100m intervals, along ridges, tracks and stream banks for greatest effect. For large sites or difficult terrain, much wider spacing may still be reasonably effective.

Secondary poisoning from carcass scavenging of poisoned possums, rats or mice can also be effective at controlling mustelids.

Direct poisoning of stoats has recently become possible with a licence. A self-resetting gas-powered trap has also just been released that will potentially revolutionise stoat control.

Cats

Feral cats are the least-known major predator in our ecosystems as they are rarely seen and difficult to trap. Cage traps are the easiest way to catch feral cats, but this leaves you with having to deal with them humanely. A number of kill traps are also available. Trapping is most effective in winter, cats being notoriously difficult to catch in summer. Baiting with tinned fish or sardine cat food is effective.

Hedgehogs

Often overlooked as a predator, hedgehogs can devastate the nests of riverbed and shore-nesting birds, and eat native skinks and many ground invertebrates, such as weta. Traps should be set in an open-ended tunnel (if no weka are present) and baited with an egg or dried cat food. A slice of fruit such as apple can also be used to lure them but it requires replacing more regularly. Place traps at 100m intervals.

Rabbits and hares

In the lowlands, hares and rabbits do most damage around regenerating bush margins where they browse on native seedlings. They can mow down new plantings. It is easier to repel them than to control them, although evening shooting can be effective. Commercial repellent is available, but just as effective is a homemade repellent made of acrylic paint and egg (two eggs mixed into a half-litre tin of paint will go suitably rotten and lasts for years in the tin – allow to go smelly before applying). This is painted onto parts of the stem and branches and generally splashed around the area. It will deter animals for 3-6 months but may not work for the tastiest plants such as kowhai and cabbage trees.

Young plants can be enclosed in tree shelters that prevent them being nibbled. These are made of soft fine plastic netting or thin plastic sleeves held up by wire stakes, or of corrugated plastic held in place with a stake. Wire netting can be used around small areas of plants.

Pigs, goats and deer

Ungulates have devastating impacts on native vegetation, most observable in depleted forest understories. Pigs also prey on native invertebrates such as Powelliphanta snails. Stock fencing may be the best way to exclude feral goats and pigs. Sheep-netting with barbed wire run below the bottom strand and one or two electric outriggers, is most effective. Even then, the fence may occasionally be breached. To exclude deer, 2m high netting is needed. If these species are within an extensive bush or scrub site, hunting may be the easiest way to keep their numbers down.

Pigs can also be caught in live traps. A good locally-designed trap is described in the National Possum Control Agencies (NPCA) booklet A10 (see website references).

Right: Friends of Flora uses only kill traps – this possum met a swift end.
Photo: Friends of Flora

Far right: The call of the whio, or blue duck, was once a common sound near Flora Stream. The loss of whio and other native bird calls was a strong impetus for Friends of Flora's formation.
Photo: Bush and Beyond



Exotic fish

Exotic fish can have a severe impact on waterways and lakes. They eat native fish, stir up mud from the bottom (which clouds the water and prevents aquatic plants from photosynthesising), and generally compete with native fish for space and resources. However, they are difficult to control and require professional eradication. It is an offence to move or distribute any coarse fish species, as well as mosquito fish (*Gambusia*). Contact your local Department of Conservation office for information or check out the Tasman-Nelson Regional Pest Management Strategy document on the Tasman District Council website, www.tasman.govt.nz

Wasps

Common and German wasps are known to impact heavily on native insect species, profoundly altering the ecological dynamics of our native ecosystems. They consume much of the beech honeydew, a critical part of beech forest ecology, and are suspected of driving native long-tailed bats towards extinction. They also kill nestling birds.

Wasp nests can be readily destroyed with carbaryl insecticide or with a little petrol/kerosene/diesel in a bottle jammed into the nest entrance at night. You can sometimes observe wasp flight paths that lead to a nest. Control attempts after late April are fairly pointless as wasps are then heading into natural seasonal decline. Check out the Tasman District Council website for further information by searching under 'wasps'.

No registered wasp bait is currently available that can be set out for them to carry back to their nests. Without it, no large-scale wasp control can be undertaken. This is a disastrous gap in our current pest control armoury.

Pukekos

This native bird has proven to be a nuisance at some revegetation sites. They will uproot newly established plants and disperse mulches and weed mats through scratching and pulling. There appears to be no easy way to prevent such damage, other than pegging down plant protectors or matting.



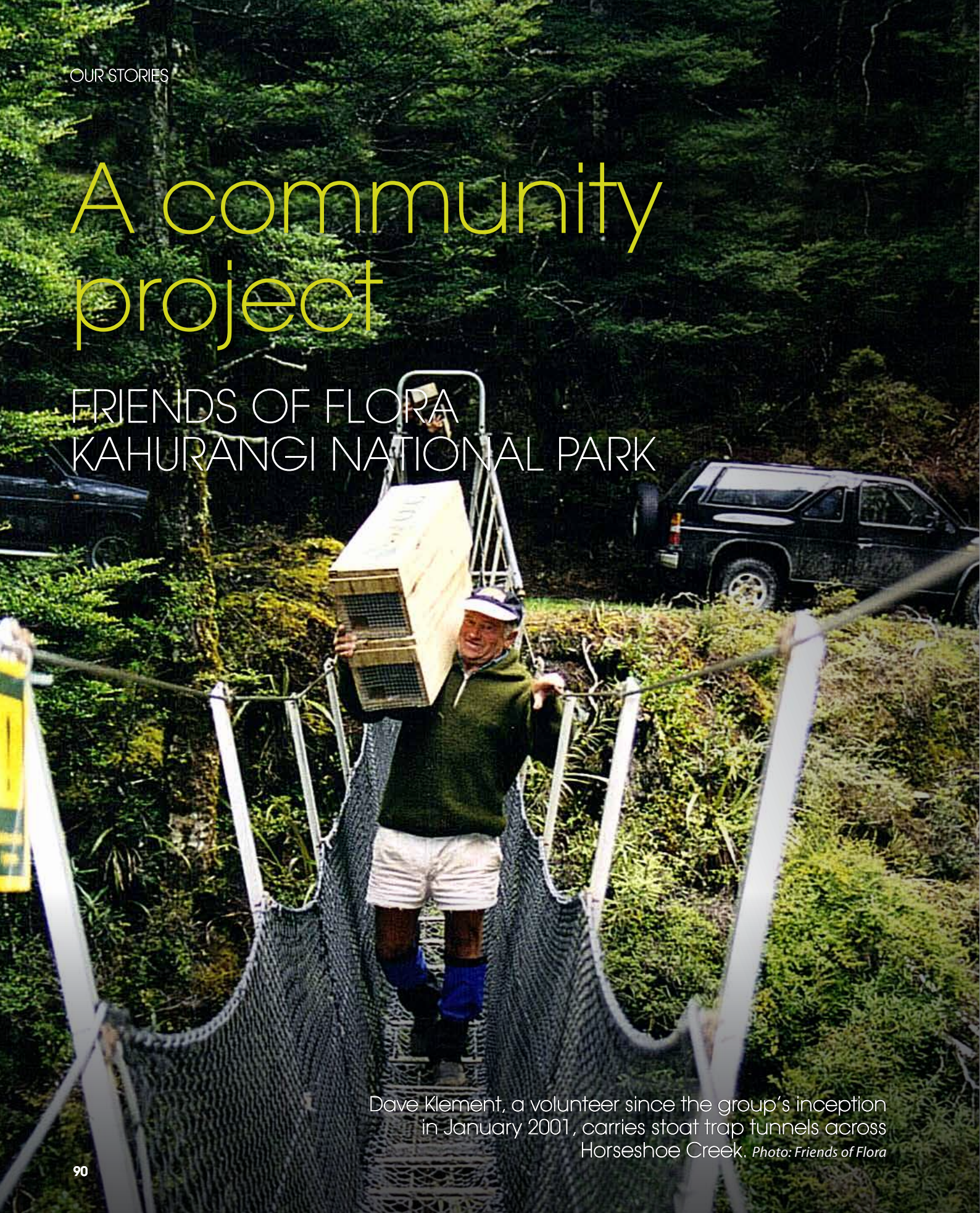
Left: NBRR have brought back native birds by effective pest control in the foothills above Richmond. To share their successes, they have built a bird hide at Jimmy Lee Creek Reserve, giving visitors a chance to watch native birds at the feeding station.

Page opposite: A NBRR nesting box for morepork at Jimmy Lee Creek Reserve.



A community project

FRIENDS OF FLORA
KAHURANGI NATIONAL PARK

A man in a green sweater and white shorts is walking across a suspension bridge made of a grey net. He is carrying a large, light-colored wooden box with metal mesh on the sides. The bridge is suspended by thick ropes and is set against a backdrop of dense green forest. In the background, a dark SUV is parked on a dirt road. The scene is brightly lit, suggesting daytime.

Dave Klement, a volunteer since the group's inception in January 2001, carries stoat trap tunnels across Horseshoe Creek. *Photo: Friends of Flora*

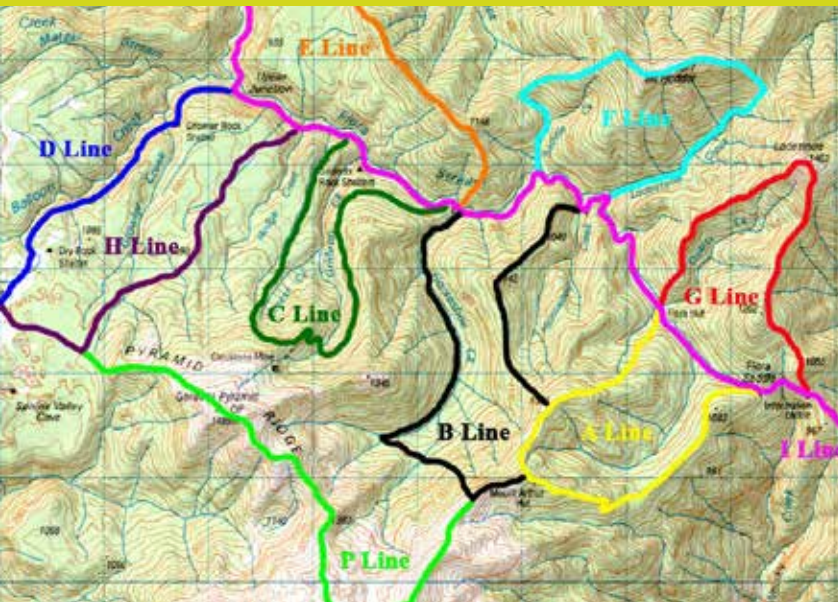
Imagine a pack on your back loaded up with the heavy arsenal needed for predator control work: rat, stoat and possum traps and bait. Add your personal food, water and clothes for any weather change. Now set off into Kahurangi National Park, walking 5-10km through steep mountainous terrain – maybe even climbing 500 metres vertically. Every 100m, you need to get down on your knees to check and reset traps, then stow gear and head off again.

That is exactly what 30-40 people (drawn from 60-70 active volunteers) do every month, Chris Potter explains. Some also do bird counts. These are the Friends of Flora, a dedicated group of locals from Riwaka, Motueka and the Motueka Valley, Tasman and Richmond who range in age from 18-80 years. They have been trapping since 2001, with trap-lines now extending for 68km covering 5000ha.

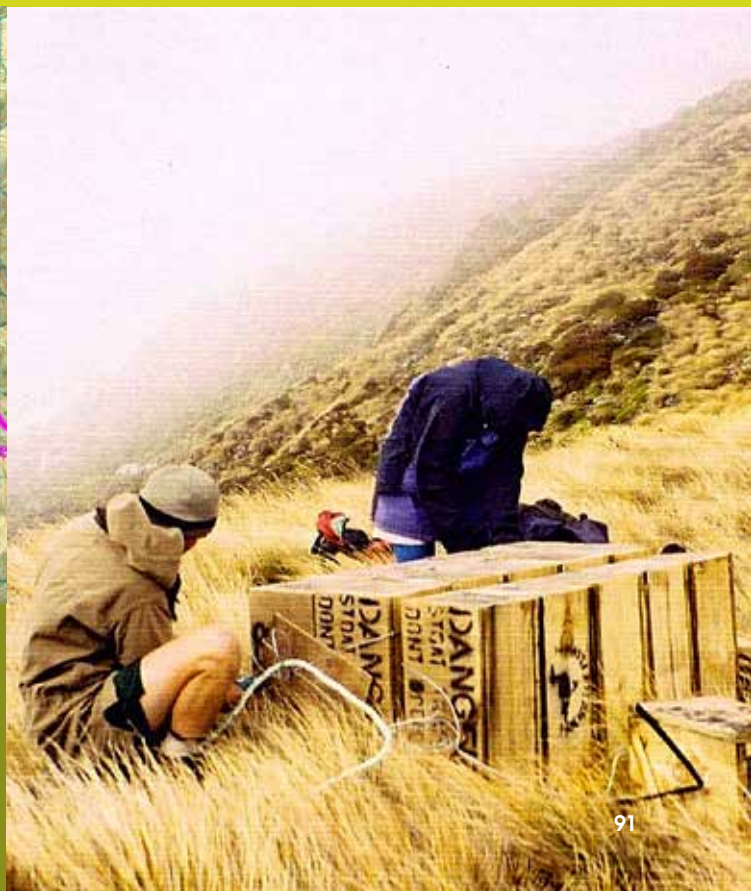
Friends of Flora (FoF) was established as a society in 2001 after a group of locals who frequented Kahurangi National Park noticed that 'the bush was getting quieter and quieter and that really concerned them, especially as the accounts of early explorers noted that birdsong in our forests was deafening.'

Chris was chairman of the group for the first six years. Its main aim is to protect and, where possible, return the endemic birds to the Flora Stream area, a predator control vision with no precedent in this country on that scale in a national park at that time.' More recently, Friends of Flora have negotiated a Memorandum of Understanding with DoC – 'one of the first with a community group'.

Camaraderie is central, with members enjoying one another's company and the task in hand. 'It's amazing the loyalty people develop for a line of traps in the forest.'



Above: A section of the Friends of Flora trapping lines in Kahurangi National Park.



Right : A bundle of new traps is untied for distribution, now on foot, by Friends of Flora volunteers Kieran Parish (left) and Maryann Ewers. *Photo: Friends of Flora*

OUR STORIES: A community project

An engaging feature of the FoF website is the ability to click on the mapped series of trap lines and access 'What's My Line?' – members' stories about their line. (More than 50 issues of The FoF newsletter have been produced by its dedicated editor, Ivan Rodgers, and all are available online.)

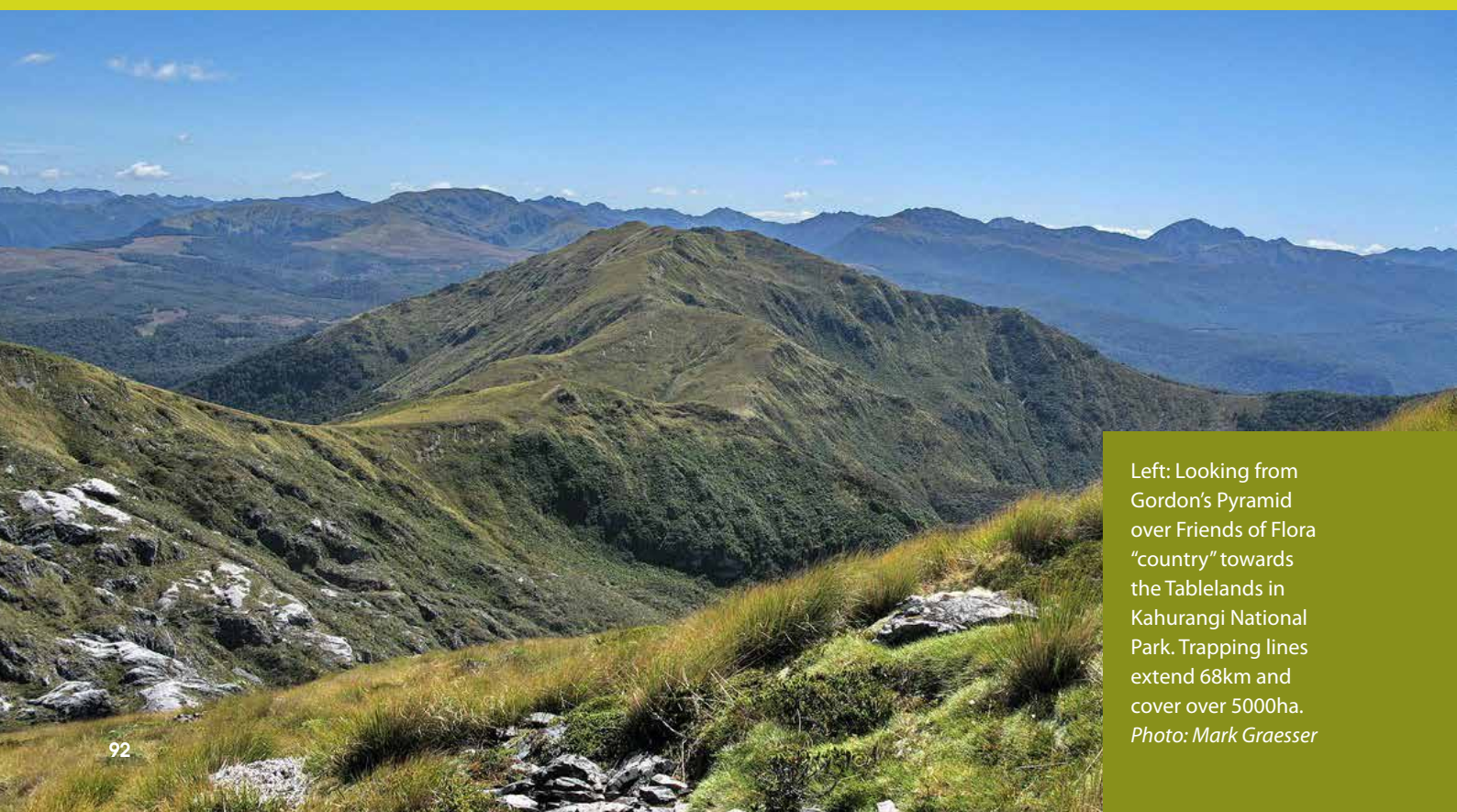
Their trapping methods are carefully considered. All are kill traps – no leg-hold devices or toxins are used by FoF. Some of the traps are made by students and teachers at Motueka High School. The 'Mot Rat Trappers' add personalised messages such as 'Enter at your own risk', and one trap sports a skull-and-crossbones. The graffiti brings a smile to the faces of the hard-working volunteers.

'For several of the students, it has clearly been a formative experience,' says Chris. 'One who went on to do environmental science said that she had learned so much by going along with all those people who exude wisdom.'

While the scale of the operation is different in a smaller or domestic area, the principles are exactly the same, says Chris. 'We have traps in our home restoration project and if you are doing well, you get a vote of confidence from the birds when they trust your area enough to nest there and raise their young. It is so rewarding, knowing where all the bird nests are, and recording when and where there is a new one.'

Friends of Flora successes are heartwarming. In 2007, who (blue duck – the emblem for the FoF) fledged and survived to maturity in the Flora Stream area for the first time in 12 years. Numbers of who continue to increase, along with many other species of native birds. But far from relaxing their efforts, FoF has taken on the challenge of re-establishing rooroa, the great spotted kiwi.

One night, way up near Boulder Lake in Kahurangi, Chris heard them and to him it sounded like 'an original voice, a living dinosaur – the amazing timelessness of it'. That cry in the dark, in a wider sense, is being answered by this remarkable group of people.



Left: Looking from Gordon's Pyramid over Friends of Flora "country" towards the Tablelands in Kahurangi National Park. Trapping lines extend 68km and cover over 5000ha. Photo: Mark Graesser

Michael's kiwi experience

A YOUNG FRIENDS OF FLORA VOLUNTEER

'Thanks to the efforts of FoF, I was given the opportunity to fly into the Clark River to assist in catching seven pairs of great spotted kiwi. Naturally I jumped at the chance to have a close encounter with one of our national icons, and to help in bringing them back to the Flora.

'Having never heard, seen, or let alone handled one of these precious birds, this was going to be a once-in-a-lifetime opportunity.

The first night out listening was greatly anticipated and the first call was amazing. It's like nothing I've ever heard. The sound is something that cannot be described, it's just so unique.

'The next night, the team was out to catch a kiwi. After setting up a small amplifier, we settled down in complete darkness to wait. It didn't take long, however. A strapping male charged out of the undergrowth, and it seemed, straight into the hands of James (the expert). I was surprised to find out that the males are smaller than the females.

'Later on in the week, I had the chance to actually hold one of these fantastic animals. They have powerful legs but the rest of their body feels fragile, and indeed it is. The week Sandra and I spent in the Clark is and will be one of the highlights of my life ...'

Top (right): Michael Douglas holds a rooroa (great spotted kiwi) on the "trip of a lifetime" assisting the team of DoC and FoF workers, plus two professional kiwi dog handlers, locating 12 rooroa in the Clark River, Kahurangi National Park. *Photo: Friends of Flora*

Right: In May 2010, a dozen great spotted kiwi/rooroa were returned to FoF's Flora Stream pest control area in Kahurangi National Park from the Clark River area. It was a dream come true for the group, who have spent nearly 10 years trapping pests.

About 100 people gathered to welcome and celebrate the return of the kiwi. Rev Gladys Taingahue is pictured blessing the birds, which are inside their travel boxes. At this point the Golden Bay iwi Manawhenua ki Mohua (Ngati Rarua, Ngati Tama and Te Atiawa) have handed over kaitiakitanga/guardianship of the kiwi to Motueka iwi, Ngati Rarua and Te Atiawa. *Photo: Trish Grant, DoC*



Fencing

Pest exclusion fences

Multi-species exclusion fences have become well publicised, with an increasing number being put up around the country. However, their cost-benefit advantages over ongoing pest control are hotly debated. Issues include:

- Very high initial costs (feasibility, planning, fence building, pest eradication)
- High ongoing costs (fence maintenance, predator surveillance, management of periodic incursions, predator management outside the fence, monitoring ecological responses, people management)
- High costs potentially take resources from other projects
- Limited biodiversity gains as fenced areas are likely to be small. Big sites may not be sustainable because of the high ongoing costs of detecting and managing incursions
- The need to clearly identify desired ecological outcomes. Intensive pest management may be cheaper and adequate.

Total mammalian predator fences have been erected around sites that range from 16 to 3,000ha in size. They are extremely expensive, as they are designed to exclude anything from baby mice to deer, depending on requirements. The only significant fence manufacturers at present are 'Xcluder' (www.xcluder.co.nz) and 'Pest Proof Fences' (www.pestproofences.co.nz).

Fences that exclude only possums have also been put up at the base of a number of peninsulas and headlands around New Zealand, where a relatively small amount of fence cuts off a large area. None have yet proven to be foolproof but they drastically slow the rate of reinvasion.

Possums and ship rats are the two key bird predators in lowland forest in settled landscapes where hole-nesting species vulnerable to stoats are absent. A fence to exclude just these species would be ideal but has yet to appear.

Goats can be fenced out using tight fencing (netting or 7-9 wires and close batons) and at least a top hot wire, if not an outrigger. Pigs are more difficult to fence out but it has been achieved with stock netting and a low electric wire set 15cm out from the fence and 25cm above ground to stop them rooting underneath. This needs regular checks for shorting and is best suited within forest where shade precludes fast-growing weeds and grasses. Running barbed wire along the bottom of stock netting is also helpful.

Fencing out stock

Restoring areas back to their natural diversity may depend on keeping farm stock out of the area. This is obviously required where new plantings have been established, but it is also crucial for existing natural features so they can recover from the effects of grazing. Wetlands, streams and forest fragments can all be seriously degraded by stock.

Fencing waterways

Ditches, creeks, streams, rivers and wetlands should all be fenced to keep stock from damaging banks and margins, plus polluting waterways.

Landowners may feel this is land they cannot afford to lose, but there are considerable benefits from fencing and planting stream and wetland margins:

- Stock handling is made easier
- Shelter and summer shade for stock improves their health and performance
- Stream bank erosion is reduced
- Stock losses through drowning or casting are reduced
- Improved local and international perception that NZ farmers/land-owners look after the land and farm sustainably
- Foot rot in sheep is reduced by being kept off wet ground
- Pugging of pasture margins is lessened.

Fencing without replanting also has ecological benefits:

- Grassy margins grow and filter nutrients and sediments from pasture runoff
- Native regeneration takes place
- The existing wetland or stream is protected from trampling damage.

Seeps and wetlands

Wetlands and seeps can be highly effective filters of nutrient run-off, faecal bacteria and viruses, and sediment. They help to keep downstream waters in good condition so long as stock are excluded from them. They are particularly vulnerable to pugging and destruction by stock, due to the soft ground that they occupy.

If it is not practical to fully fence your seeps, a permanent or seasonal electric tape may control stock. On the other hand, wetlands are now so rare and important for conservation in lowland Tasman District that they should all be permanently fenced if stock are present.

Ditches and small streams

Farm drains or ditches should all be fenced at least a metre back from the water. This allows for rank grass growth that will filter run-off and help shade out aquatic weeds that could otherwise choke the drain.

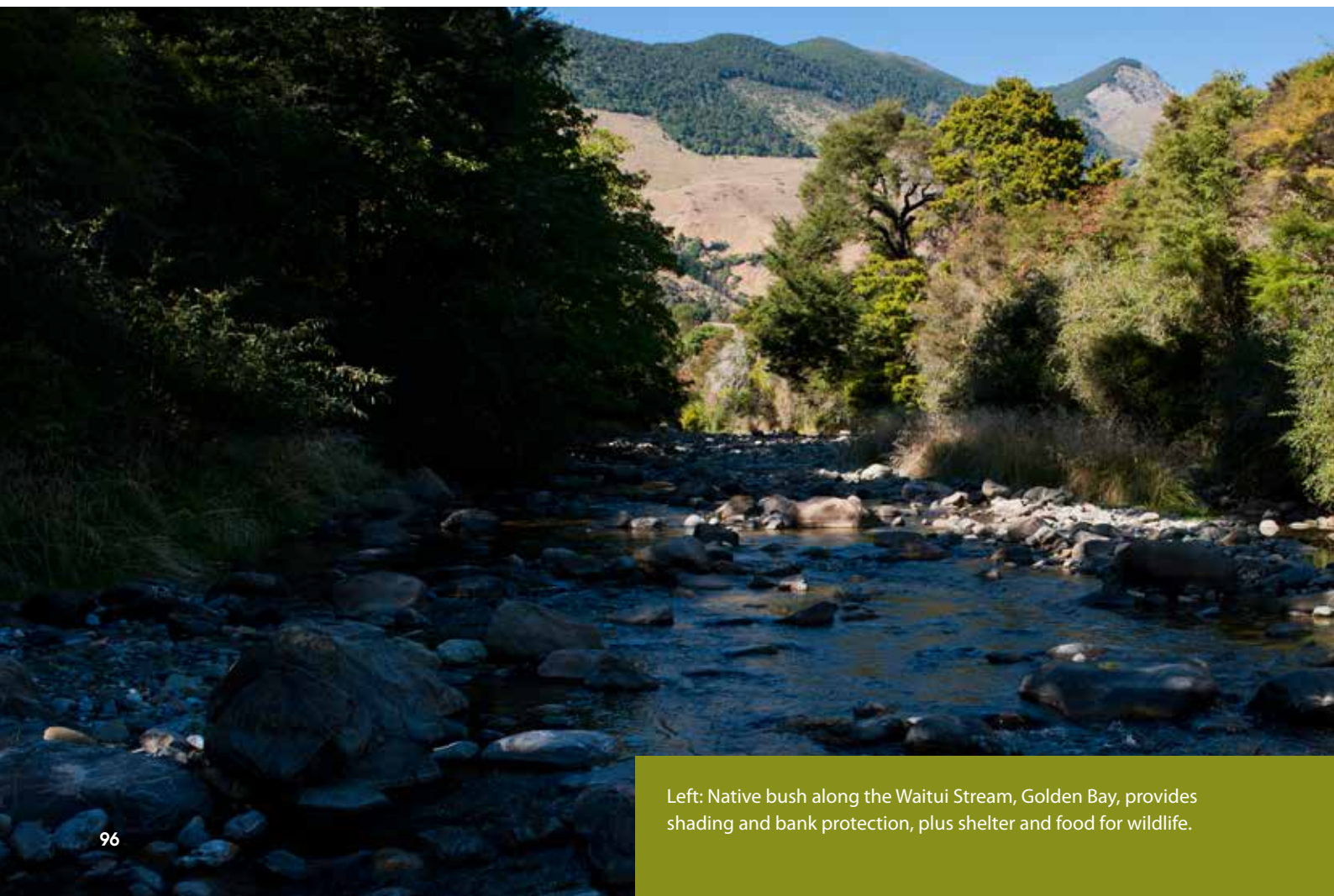
Small streams are a 'must' to fence because they usually support more stream life per square metre than larger waterways and they are more vulnerable to degradation and pollution. They also proliferate through most pastoral settings. If small streams at the top of a

catchment are polluted, they affect the whole waterway all the way to the sea. Fencing set-back distances from the water margins will vary with stream size and the steepness of the surrounding land. In general, the steeper and longer the slope of the adjoining land, the wider the fenced margin needs to be. This should be at least 2m for the smallest streams on gentle topography, and much more where long steep slopes drop to the stream. On gentle terrain, allow for the fact that streams may naturally widen and meander.

Many smaller streams have been artificially straightened, with a serious reduction in the diversity of aquatic habitat and in the niches available for native fish. This can be remedied by placing large rocks or secured logs in such a way that the straight flow is deflected. Localised erosion will soon create bends and deeper hollows in the streambed. This results in a more varied current, stream width and bank shape, and in time, a meandering stream.

Rivers

Along most rivers and larger streams, fences should be at least three to five metres back from the water if they are to survive floods, and much further if the topography is low-lying. If riparian planting is envisaged, a narrow fenced area is also tricky to maintain, especially if it is steep. Deeper plantings will, in any case, suppress weeds and hold the bank together better. Important considerations are how vulnerable the banks are to erosion, and where floodwaters go after heavy rain.



Left: Native bush along the Waitui Stream, Golden Bay, provides shading and bank protection, plus shelter and food for wildlife.

Coping with floods

Floodwaters are the biggest threat to fences along waterways. If fences cannot be sited away from regular flood paths, they should be designed to either cope with floods and flood debris, or be readily repairable through simplicity of design.

Reduce the risks:

- Use the minimum number of wires possible that still contain stock
- Minimise the use of battens in the most flood-prone areas
- Build separate sections of fence across flood-prone areas so that they don't drag the rest with them if they get damaged. These can be designed so that they readily pop off the posts rather than drag them over, using lightly hammered unbarbed staples and wire ends that are only moderately secured so they let go under pressure
- Use hanging chains and sheets of iron across waterways that can swing upward with rising waters.

Fencing forest remnants

The single most important issue for looking after forest remnants is to fence stock out of them. With free stock access, forests have no long term future and will eventually break up into treeland before final disintegration occurs.

Stock damage forests by:

- Preventing regeneration of canopy trees so that they cannot replace themselves
- Trampling and browsing the understorey and eliminating palatable or fragile species
- Creating canopy gaps (in time) that favour weed invasion such as old man's beard
- Bringing in weed seeds in their dung or on their fur or feet
- Elevating soil fertility that changes the forest ecology in favour of weeds rather than natives
- Damaging roots with their hooves and bark through rubbing or chewing
- Causing erosion and soil compaction
- Reducing vegetation density and diversity, making the bush less attractive for native birds for cover, food and nest sites
- Promoting non-palatable species.

Some landowners choose to graze their bush areas for weed control, especially around the edges. With a little effort, these margins can be sprayed, fenced and replanted with natives that will suppress other weeds effectively. However, fencing does mean that unless palatable weeds such as old man's beard are controlled, they will colonise the forest more rapidly than if stock were present.

Shelter for stock is important, but if areas of bush or trees are fenced off, stock can still seek shade beside the trees. A few trees could be left outside the fence – or at least until shelter trees planted in the paddock are large enough to provide sufficient shade.

Choosing the best fence

Nothing is more heartbreaking than having stock break into a regenerating area of bush or newly planted area. A stock-proof fence is essential. For sheep, goats or pigs (domestic or feral), either a conventional eight-wire post and batten fence or one made of sheep netting is needed. Ideally, run goats in paddocks away from the edge of native vegetation as they are notoriously difficult to contain, or else add electrified outriggers to the fences to prevent goats jumping over. Goat horns can become tangled in netting unless electric outriggers keep them away from it.

A conventional post and batten fence is the usual option for cattle. A hot top wire is also recommended to prevent cattle reaching over and straining the fence.

A well-maintained three-wire electric fence can be a cheaper option for dairy cattle and horses, provided the power source is reliable, the animals are trained to it, and the fence is checked regularly. Some farmers recommend avoiding battens around bush blocks to reduce maintenance associated with fallen trees and branches but there is an increased risk of stock breaching the fence.

For farmers running dairy cattle on flood-prone land alongside streams and rivers, a one- or two-wire electric fence with permanent posts is usually best. For sheep in a similar situation, four electric wires are needed.

Having a gate or another way of extricating stock if they get into a fenced area is important. A retractable gate made of two to four electrified tapes is a low-cost option if the power supply is reliable. As animals often enter through gates left or forced open, any such gates should be well secured.

Fencing costs

The cost of a fence varies enormously depending on the terrain, accessibility to machinery, and on the number of bends (and hence strainer posts) required.

Netting fence is very similar in price to an eight-wire/batten fence, but netting is costly to put up along undulating ground. Posts will be required every 5m, angle posts at bends, and strainers every 200-300m. With wire fences, batons every metre or two are necessary (the spacing depends on the animal).



Material costs will vary, depending on terrain, from \$5-\$9/m, and contract labour from around \$7-\$10/m for 500m of stock-proof fence (2011 prices). Short runs cost more due to the fixed price of getting machinery on-site. Easy ground can thus be fenced at \$12/m, whereas difficult, small sites could be up to \$20/m.

Funding assistance – Tasman District Council

The River and Stream Management Fund has been set up as a result of the recommendations outlined in the Tasman District Council Riparian Land Management Strategy. This focuses primarily on improving water quality, and aquatic and terrestrial habitat, by managing stock access and maintaining vegetation buffers.

The Strategy provides for financial help to landowners or groups for stream management projects (mainly fencing). These incentives are allocated according to the level of public benefit of the works, which may include preventing erosion, improving water quality, and protecting important habitat.

Financial assistance is available under the following criteria:

- Approved works contribute to the stability or health of the catchment system as a whole
- Cash or work contribution equivalent to 50% of the total cost of the work is available from the landowner or occupier
- The landowner or occupier is responsible for maintaining the works properly (a written agreement may be required)
- All aspects of riparian management on the property will be addressed over a practicable time period.

The type of fencing depends on the farm management system. Similarly, management of the riparian areas will vary from controlled grazing to total exclusion of stock.

The fund targets upper catchment areas, i.e. on small streams and watercourses. Research indicates that upper catchment streams and creeks, drains and wetland areas that feed into major watercourses are more susceptible to degradation than larger watercourses. The best reward for effort comes when enhancement or restoration is focused primarily on the headwaters. However, other areas such as main rivers and wetlands can also be assessed and have been included in the programme.

Right: Stock grazing, trampling and taking shelter around established native trees not only prevents new generations establishing, but also causes structural damage to roots and trunks that significantly compromises the health and life of the tree.

Left: David Harwood and Philip Simpson walk along the fence that protects the ancient totara forest on the Harwood property in Upper Takaka.



Conservation ethic passing from father to son

NICK AND JEREMY WARD

'It would have been the worst decision of my life, and on my conscience all my life, if we had felled the forest for economic gain.'

Sitting at the kitchen table in the Ward family home in Upper Moutere, your eye is drawn down lines of productive espaliered apples, to a towering 'island' of stately trees. Giant kahikatea, rimu, totara and matai, several hundred years old, whose ancestors started life here after the last Ice Age 12,000 years ago, are lifted high above the horticultural and pastoral lands that surround them. It is a sight that the Ward family treasures.

This remnant has been protected for future generations with a QE11 Open Space covenant. It was surveyed as part of the Native Habitats Tasman Project and met the criteria for a significant site. Nick Ward and his son Jeremy obviously share a strong sense of guardianship for this remnant.

'I am very lucky to have a son who is as passionate as I am about this stand of lowland podocarp swamp forest,' says Nick.

Looking at the aerial photo of the remnant, he says 'it would have been the worst decision of my life, and on my conscience all my life, if we had felled the forest for economic gain.' Instead, 'the spiritually uplifting experience of being in the bush, the coolness in summer, the smells, bird calls, the ooze from the swamp' have been preserved. Nick also cites 'a sense of the timeless land; of only being in there a short time but it can feel like a lifetime.' Fifty native plant species have been recorded in this remnant.

For Jeremy, the island of trees was his favourite place while growing up. 'The mystery of such an immense forest almost overwhelmed, but fascinated me endlessly.' It was 'Boys Own adventure stuff' to get through the seemingly impenetrable overhead and underfoot weed barrier and a wide 'moat of water' from man-made ditches and natural watercourses. But he did and, not surprisingly, track building became his thing.

Right: Nick Ward and son Jeremy share a strong sense of guardianship for the lowland forest remnant the family has preserved through a QE11 covenant.





Jeremy uses seasoned woody weed material from on-site to make tracks that 'rot down and take their place in the earth again.' 'Saving the environment but using what's there' is important to Jeremy.

The property was in a 'wild weeded state' when they bought it in 1996. Despite great progress on clearing weeds around the island of trees, control is an ongoing need. Still today, willows and barberry are chainsaw territory, slashing blackberry is a constant, and within the remnant, vigilant weeding is required.

However, clearing weeds and planting native species on the forest fringe have been given a boost 'thanks to successful applications to the Department of Conservation Biodiversity Condition and Advisory Funds'. These have provided assistance in two ways: heavy machinery to remove large weed species, and specialist advice from Titoki Nursery about which colonising species to plant into that habitat. In 2009, the Wards planted species such as manuka, kanuka and cabbage trees, which, in their protective green sleeves, make a welcome sight along a broad section of the remnant fringe.

Wandering along a track in the forest, father and son share thoughts and ideas about the forest they know intimately and care deeply about: 'It will be extremely rewarding as an old person to come back here – to see our tangible contribution towards something with ensured protection for the future' and 'I've developed a reverence for this forest – a sense of how insignificant we humans are.'

The conservation ethic, like parent tree to seedling offspring, is being passed to the next generation.

Given that extensive forest in the surrounding area has been cleared and replaced by farms and horticulture, what would Nick and Jeremy love to see surrounding their 'island'? 'All the remnants protected and ecologically restored, expanded and linked,' says father. 'I'd love to see mostly forest – well maybe 95 percent cover so it wasn't too scary,' says son.



Left: Nick Ward with a majestic matai within the forest on their property.

Above (top): Maire is a rare plant in Tasman District and a single tree was discovered when the remnant was surveyed, resulting in the inclusion of the Ward forest in the Tasman Significant Native Habitats Project.

Above (lower): Kahikatea fruit lies on the forest floor, having fallen from the parent tree.

Opposite page (top): Father and son check the recent native plantings, enabled in part by successful applications to the DoC Biodiversity Condition and Advice funds.

Opposite page (lower): Jeremy Ward on one of the numerous tracks he builds from wood generated from clearing weed species.





SECTION 03:

legal
protection

Covenanting

One of the key ways to protect your natural area is to legally protect it through covenanting.

There are several ways of putting a covenant on a part of your title that protects an area of treeland, forest, wetland or stream in perpetuity. This process gives legal protection to the site, whilst enabling you the landowner to still exercise full rights over it. The covenant prevents future landowners from destroying the site and undoing any restoration work that may have been done. The covenant can be tailored to your needs. For example, it may still be possible to take firewood from fallen trees, or have a sustainable forestry management programme over part of a covenant. Allowance can be made to have tracks through it, or for the site to include structures such as water tanks or huts.

The Queen Elizabeth the Second National Trust, better known as QEII, is the usual avenue for such protection. Nationally there are currently over 3000 covenants on private land, protecting more than 100,000ha – which is nearly five times the area of Abel Tasman National Park, covering a broad range of biodiversity throughout lowland New Zealand. In Tasman District there are now 139 approved or registered covenants covering 3300ha. These include beech and podocarp forests, swamps, and regenerating hillsides. New restoration plantings can also be covenanted.



To start the process you should contact the local representative and have a site visit, at no cost to you, and discuss what is involved. You can then continue with the covenanting or take it no further. Survey costs are generally borne by the Trust and so the whole process may well not cost you anything. If stock fencing is required, cost sharing may be negotiable with the Trust. After registration, the QEII representative will visit every two years, and is available for help or advice at any time. Day-to-day management of the area such as fence maintenance or weed control is the responsibility of the landowner. Provided the covenant conditions are adhered to, it is up to you how much time you put into looking after such an area.

One of the other advantages of covenanting is that you are more likely to be successful when applying for funds for such things as fence replacement or weed control. By covenanting you are showing the sort of commitment that funding agencies like to see when assessing who to fund.

The other mechanisms to covenant are through the Council and DoC. There are no particular advantages in doing so, but the information is included here for completeness. Covenants through the Council usually occur when the Council asks for it as a condition of subdivision where native forests or wetlands occur within the area. But it is quite possible to do so through your own initiative. Covenanting through the Department of Conservation is also possible under current legislation. Most such covenants pre-date the establishment of QEII and the mechanism has essentially been superseded.

Below: Te Tai Tapu bluffs reflected in the still surface of one of the lakes at Mangarakau Swamp, protected in perpetuity by covenant. The veil of mist cloaks the Field Centre, sentinel like, looking over this vast wetland. *Photo: John Gilardi, 2005*







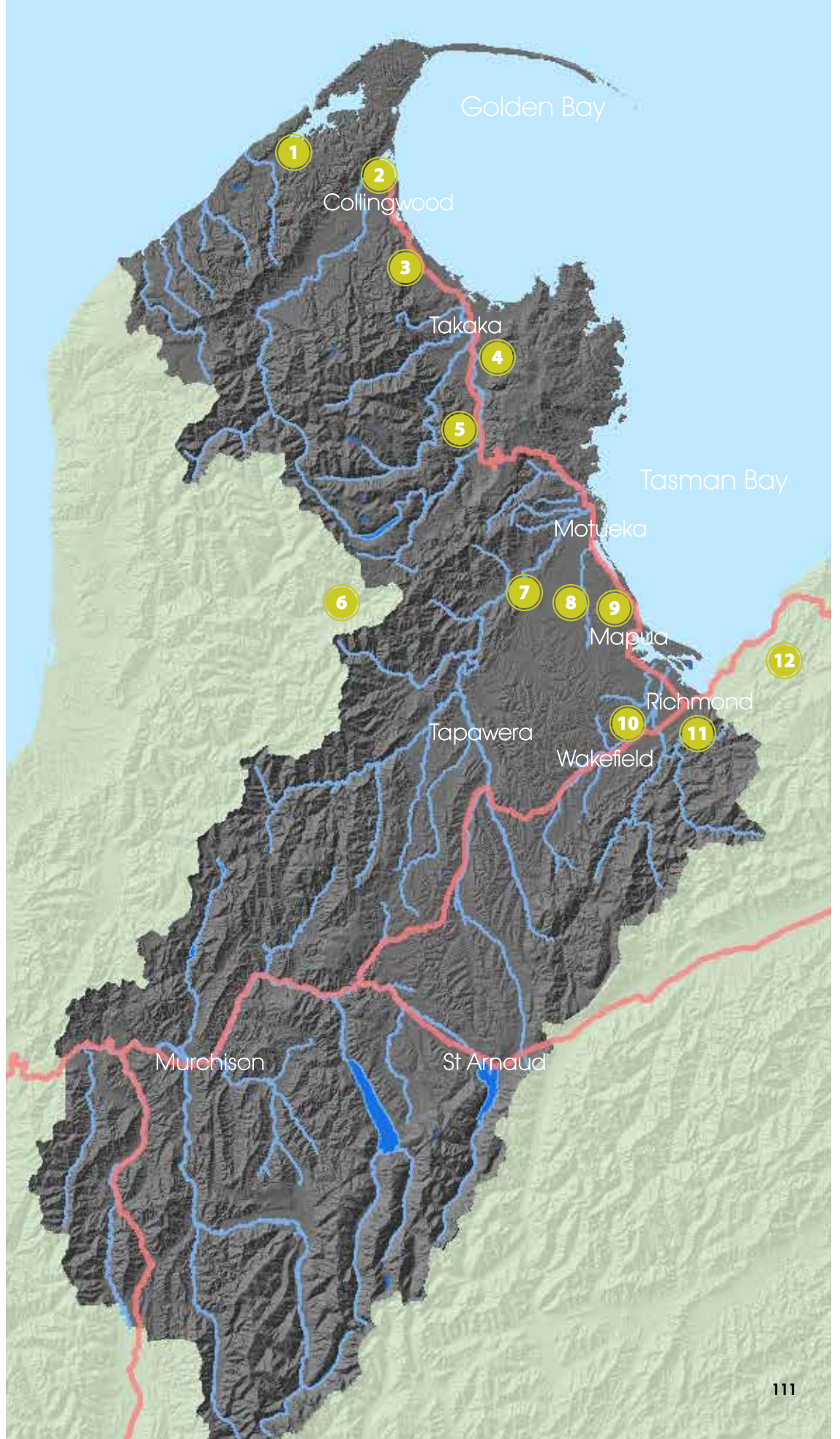
SECTION 04:

references

Location map

'Our stories' locations:

- 1 **Stay together, learn the flowers, go light:** Friends of Mangarakau
- 2 **Working in a common cause:** Sue Brown, Kathy Hindmarsh, Michelle Riley & Jo-Anne Vaughan
- 3 **Saving a swamp:** Gerard Hindmarsh
- 4 **Her hands have woven my kete:** Cherie Byrne
- 5 **Its time to put things back:** Philip Simpson
- 6 **A community project:** Friends of Flora, Kahurangi National Park
- 7 **Learning to give trees a chance:** Ngatimoti School
- 8 **Conservation ethics passing from father to son:** Nick and Jeremy Ward
- 9 **Groves of life:** Friends of Mapua Wetland
- 10 **Big picture, long timeframe:** Martin Conway
Behind every plant is a story: Tim Le Gros
- 11 **Bringing back the birdsong:** Native Bird Recovery Richmond (NBRR)
- 12 **Fighting weeds is fighting the energy of the sun:** Peter Williams



Funding

Various funding options are available to assist a restoration project. Contact details, if not provided below, are in the subsequent section 'Sourcing Information'.

Tasman District Council

The Council can assist with fencing costs along waterways. It is also undertaking a district-wide survey of natural areas on private land, with the voluntary participation by landowners. This provides free biodiversity information and advice. This survey is systematically working through the district on a schedule of geographical areas.

QE II National Trust

If you seek formal protection of your site for future generations this can be done through a QEII covenant (see above). In doing so, you may qualify for fencing assistance from QEII (and for some initial weed control, although this relies on a successful Biodiversity Fund bid). The terms of the agreement are negotiable case by case.

Biodiversity Advice and Condition Fund

www.biodiversity.govt.nz/land/nzbs/pvtland/condition.html
This Department of Conservation/Ministry for the Environment-administered fund services biodiversity advice and restoration projects for private individuals and community groups on private land. Advice from successful applicants is invaluable in helping to put a good application together as the fund is heavily oversubscribed.

Fish & Game

Fish & Game offers free advice on protecting and enhancing streams and water bodies for waterfowl and native fish. F&G also services the Gamebird Habitat Stamp Programme (on behalf of the New Zealand Gamebird Habitat Trust), which funds the protection, enhancement or creation of game bird habitat. Limited numbers of wetland plants are given away to projects in the Nelson/Tasman area.

Nga Whenua Rahui

www.doc.govt.nz/getting-involved/volunteer-join-or-start-a-project/start-or-fund-a-project/funding/for-landowners/nga-whenua-rahui/
This is a contestable Ministerial fund established to help protect indigenous ecosystems on Maori land by providing incentives for voluntary conservation.

Ministry for the Environment Community Environment Fund

www.mfe.govt.nz/withyou/funding/community-environment-fund/guide-for-applicants/page1.html
The ministry has recently set up a Community Environment Fund and is inviting applications from community groups that are legal entities, such as registered charities.

Sustainable Farming Fund

www.maf.govt.nz/agriculture/funding-programmes/sustainable-farming-fund.aspx

The Ministry of Agriculture and Forestry (MAF) administers a Sustainable Farming Fund. Funded projects relate to improving sustainability and performance on farms and have included wetland restoration and native silviculture.

Tasman Environmental Trust

This Trust is contactable c/o Lindsay Vaughan, Tasman District Council. There are already many organisations involved in protecting and enhancing the natural environment in the Tasman area and the Trust does not duplicate the work of these groups. Its aim is to provide assistance for those environmental projects that would fall through the gaps if they were unable to get assistance from existing funding agencies. The focus is on land not owned by the Crown. This includes the Cobb Mitigation Fund, which supports conservation initiatives in Golden Bay, with a focus on the Takaka River catchment.

World Wide Fund for Nature (WWF)

www.wwf.org.nz

Charitable trusts may apply for funding for restoration projects. Advice should be sought as to what type of activities they are likely to fund.

The Pacific Development and Conservation Trust

www.dia.govt.nz/diawebsite.nsf/wpg_URL/Services-Trust-&-Fellowship-Grants-The-Pacific-Development-and-Conservation-Trust?OpenDocument

Established from money received from France in recognition of events surrounding the destruction of the Rainbow Warrior vessel in 1985, this fund is largely aimed at community-driven projects.

Canterbury Community Trust

www.commtrust.org.nz

This fund is open for charitable trusts and incorporated societies where the project has considerable community benefits.

BOC Where There's Water Community Environmental Grants

www.waternz.org.nz/wherethereswater.html

Grants are available to schools, community groups and other non-profit organisations, for environmental projects that have a water focus.

Air New Zealand Environment Trust

www.airnzenvironmenttrust.org.nz/apply-for-funding/

The Trust will fund projects that have a direct impact on the restoration of the New Zealand environment. This can cover a wide range of activities, from directly restoring or regenerating land or waterways, through to education and research.

Lottery Environment and Heritage Grants

www.communitymatters.govt.nz/Funding-and-grants---Lottery-grants---Lottery-Environment-and-Heritage

This fund is administered by the Department of Internal Affairs for community groups and individuals and covers a range of activities that include ecological restoration, predator control, preparation of restoration plans, and the design of interpretative panels and signs.

Sourcing: information, plants & hardware

Organisations

Tasman District Council

www.tasman.govt.nz
(03) 543 8400
Biosecurity Co-ordinator, Lindsay Vaughan: (03) 543 8432, for weed and pest information.
Resource Scientist (Land), Andrew Burton: (03) 543 8446 for riparian (streamside) fencing grants.

Nelson City Council

www.ncc.govt.nz
(03) 546 0200
Sustainable Land Management Adviser, Lynne Hall: (03) 546 0308 for restoration advice and information on council grants.

Queen Elizabeth II National Trust

www.qe2.org.nz
National Office: (04) 472 6626
Regional Representative: Tom Stein (03) 574 2978, email: tstein@openspace.org.nz

Fish & Game

www.fishandgame.org.nz
Nelson/Marlborough: (03) 544 6382

Department of Conservation

www.doc.govt.nz
Nelson/Marlborough Conservancy Office: (03) 546 9335
Motueka Area Office: (03) 528 1810
St Arnaud Area Office: (03) 521 1806
Golden Bay Area Office: (03) 525 8026
Murchison Field Centre: (03) 523 1006

New Zealand Landcare Trust

www.landcare.org.nz
Regional Representative: Barbara Stuart: (03) 545 0443, e-mail: barbara.stuart@landcare.org.nz

Ministry for the Environment

www.mfe.govt.nz
0800 100 087

Ministry of Agriculture and Forestry

www.maf.govt.nz
(04) 894 0100

Regional groups

Nelson/Tasman Forest and Bird

www.forestandbird.org.nz/what-we-do/branches/nelson-tasman

The group holds monthly excursions and a series of winter talks

Nelson Botanical Society

Cathy Jones, email: cjones@doc.govt.nz; phone: (03) 546 9499

The Society holds monthly excursions and a series of winter talks.

Nelson/Tasman Weedbusters

Michael North, email: totara@ts.co.nz; phone (03) 545 2431

This mobile group operates around Nelson, Waimea, Moutere, Dovedale and lower Motueka Valley.

Friends of Nelson Haven and Tasman Bay

www.nelsonhaven.org.nz/index.php

The Friends campaign for the protection of the coastline and the coastal waters of the region.



Regional community restoration projects

Golden Bay

Friends of the Cobb – Search at www.doc.govt.nz/getting-involved/volunteer-join-or-start-a-project/join-a-group/nelson-tasman

Friends of Mangarakau Swamp – Search at www.doc.govt.nz/getting-involved/volunteer-join-or-start-a-project/join-a-group/nelson-tasman

Onekaka Biodiversity Group – Search at www.doc.govt.nz/getting-involved/volunteer-join-or-start-a-project/join-a-group/nelson-tasman

Motueka

Abel Tasman Birdsong Trust – www.abeltasmanbirdsong.co.nz

Friends of Flora – www.fof.org.nz

Kumeras Restoration Project – www.motuekaonline.org.nz/attractions/thingstodo/raumanukas.html

Otuwhero Wetland Restoration Project – Abel Tasman Educational Trust www.atet.org.nz/contactatet.php

Waimea/Moutere

Friends of Mapua Wetland
Janet Taylor, email: janettaylor@kinect.co.nz

Native Bird Recovery Richmond
Neil Page phone (03) 544 5418

Plant Right Now (Waimea Inlet Restoration)
Gillian Bishop, email: mb7@xtra.co.nz

Wakefield Bush Restoration Society – Helen Campbell, email: maccam@ts.co.nz

Nelson Lakes/Murchison

Friends of Rotoiti – www.friendsofrotoiti.org.nz

Murchison Environmental Care Group – Search at www.doc.govt.nz/getting-involved/volunteer-join-or-start-a-project/join-a-group/nelson-tasman

Nelson

Birdlife on the Grampians – Search at www.forestandbird.org.nz

Marsden Valley Traplines – Don Sullivan phone (03) 547 7705

Brook Waimarama Sanctuary – www.brooksantuary.org

Paremata Flats Restoration Project (Delaware Bay) – Search at www.forestandbird.org.nz

Nelson City Council organises winter planting days at Council reserves such as the Tahunanui Beach dunes, Wakapuaka sandflats and Paremata Flats (Delaware Bay).



Native nurseries in Tasman/Nelson

Titoki Nursery Ltd

Palmer Road, Brightwater.

Phone/fax (03) 542 3421

email: titoki@tasman.net

Specialise in container-grown eco-sourced plants and contract growing for large projects.

Appleton's Nursery

1748 Main Road South, Wakefield

Phone (03) 541 8309

Specialise in open-bed-grown timber trees, including local native species.

Mainly Natives Plant Nursery

70 Malling Road, Redwood Valley, Richmond

Phone (03) 544 0966

Specialise in container-grown eco-sourced plants.

Nelmac Nursery

Atawhai Drive, Nelson

Phone (03) 546 0910

email: rob@nelmac.co.nz

Specialise in container-grown eco-sourced plants and contract growing for large projects. (This is not a walk-in retail nursery so contact them first – medium to large orders only).



Bait stations, lures and traps

A large range of live traps, kill traps and poison bait deployment systems is available for all introduced mammals and marsupials in the Tasman area. Find out which are the better designs, as judged by local experience. Searching the internet for these products is straightforward, with many of the following products available from the manufactures or suppliers such as:

Goodnature www.goodnature.co.nz, Connovation www.connovation.co.nz, Animal Control Products Ltd www.pestoff.co.nz, Philproof Pest Control Products www.philproof.co.nz, and Kamate Traps Ltd www.kamatetraps.com. Innovative new designs are continually being researched, and this is a rapidly evolving area of biodiversity restoration.

Possums

'Warrior', 'Sentinel', 'Possum Master' and 'Timms' include most of the kill trap designs now available. Live cage traps also work well. Leg-hold traps, although still legal, are not recommended due to their cruelty. Bait stations include 'Philproof' and 'Striker' brands. A self re-setting trap (the Henry automatic possum trap) powered by a gas canister proved highly effective in recent trials and is now commercially available. Possum control methods are set out in detail in the National Possum Control Agencies (NPCA) booklet A3.

Rats

The 'Victor' rat trap is the best conventional trap, available from general hardware stores.

'Ka Mate' rat traps are an innovative new design that mice cannot set off, and which neither rots nor rusts. 'DoC 150, 200 & 250' series traps are effective on rats, as well as other predators.

Hedgehogs

DoC 150, 200 & 250 series' traps humanely kill hedgehogs. If weka are present, there is no easy way of precluding them from traps that are accessible to hedgehogs.

Stoats, weasels and ferrets

'Fenn' mustelid traps are the traditional trap for stoats, but these no longer pass humane killing guidelines. Those that do are the 'DoC 150, 200 & 250 series' (only the 250 is strong enough for ferrets). Lures made from rabbit meat have now been designed but await sufficient widespread use to determine their effectiveness in different situations.

A self re-setting trap (the Henry automatic stoat trap), powered by a gas canister, proved highly effective in trials and is now commercially available.

Further information on trapping can be found in the 'Field Guide to Mustelid Trapping' (2005) by David Blair, available from the Yellow-eyed Penguin Trust, PO Box 5409, Dunedin.

www.yellow-eyedpenguin.org.nz

Also check out the National Possum Control Agencies (NPCA) booklet A8.

Feral cats

Live cage traps are effective, particularly in winter, baited with fresh or tinned fish. Humane kill traps are 'Conibear', 'Timms' and 'Belisle Super x220'. Where weka are present these need to be mounted either within a tunnel with chimney entrance, or at the top of an elevated ramp to avoid non-target kills – see the National Possum Control Agencies (NPCA) booklet A11. In general, feral cats are difficult to detect and control.

Toxins

A range of toxins are available for possums and rodents. Many of these are quite persistent, particularly the anticoagulants (e.g. pindone, diphacanone, brodifacoum) and can affect native predators through secondary poisoning. Least environmentally damaging are baits with cholecalciferol (gel, paste or pellets) and cyanide (as paste or enclosed pellets) for those operators with the necessary certification. A toxin for controlling mammalian pests, PAPP, was approved by ERMA in March 2011. This will provide better control of stoats and feral cats. There are no wasp toxins currently registered for use in bait-stations after an earlier product was withdrawn, leaving a huge gap in pest control techniques for restoring natural areas.

Agricultural hardware stores such as CRT and PGG Wrightson stock a good range of products, or can supply them if ordered.

Appendix

Table of national 'weediness' scores for the most common threatening weeds of Nelson/Tasman. Scores are from the out-of-print DoC publication 'Ecological Weeds on Conservation Land in New Zealand: a database' (1997-Working Draft). These scores are derived from a formula that takes account of a large range of factors such as growth rate, seed persistence, rate of spread and smothering ability among others.

Weed Name	Weediness Score	Notes
	HIGH	
Old Man's Beard	33	
Pussy Willow*	32	
Japanese Honeysuckle	31	
Hawthorn	31	Score MH in Nel/Tas
Blackberry*	31	Score MH in Nel/Tas
	MED-HIGH	
Tall Fescue*	29	
Crack Willow*	28	
Purple Pampas*	28	
Pampas*	28	
Climbing Asparagus	28	
Gorse*	28	
Banana Passionfruit	27	Score H in Nel/Tas
Wilding Pine*	27	
Silver Wattle*	27	
Sycamore	27	
	MEDIUM	
Barberry	26	
Buddleia*	26	
German Ivy	26	
Convolvulus	25	
Broom*	25	
Mexican Daisy*	25	
Ivy	25	
Stinking Iris	25	
Wandering Willy	25	
	MED-LOW	
Spanish Heath*	23	
Selaginella	23	
Himalayan Honeysuckle	22	
Elder	22	
Periwinkle	22	
Hops	21	
	LOW	
Jerusalem Cherry	19	

* Scores are most valid for naturally open habitats such as wetlands, natural tussock/shrublands e.g. serpentine vegetation, and steep open faces such as bluffs and slips, as well as sites that are open due to early-stage restoration work. Scores are from the out-of-print DoC publication 'Ecological Weeds on Conservation Land in New Zealand: a database' (1997-Working Draft).

Website references

Department of Conservation

www.doc.govt.nz

- 'From Seed to Success – Tool Kit for Community Conservation Projects' - enter title into the search box.
- Table of New Zealand-wide native trees and shrubs that attract native birds under Home>Conservation>Tree planting for native birds.

Tasman District Council

www.tasman.govt.nz

- A Council revegetation map and a species list for each area is printed in Council's 'Ecosystems of Tasman District' or are available from the Council website under Home>Environment>Land>Native Plant Restoration (Golden Bay or Tasman Bay or Buller) or directly, at for example <http://tdc.govt.nz/index.php?NativePlantRestorationTasmanBay>
- Council has booklets on animal pest control for coastal wetlands, freshwater wetlands and native forest remnants. These are available on the website under Environment>pests&weeds>pestanimals.
- Council also publishes a 'Good Practice Guide to Managing Wetlands in Tasman District' brochure. <http://web.tdc.govt.nz/pdfs/TRMP%20Wetlands.pdf>
- The Tasman Resource Management Plan (TRMP) rules relating to wetlands are available in the TRMP Plan Guide 'Provisions for Wetlands' guide No. V-20. <http://web.tdc.govt.nz/pdfs/Plan%20Water%20Wetlands.pdf>
- Native Fish Where? (Tasman District Council 2009) includes a pull-out leaflet 'Fish-friendly culverts and rock ramps in small streams'. This is available at www.tasman.govt.nz/pdfs/Fish-friendly-culverts-web.pdf
- The proceedings of a 2008 Tasman District Council Estuary Restoration Workshop are available at www.tasman.govt.nz/pdfs/Estuary%20Restoration%20Workshop%20proceedings%202008-05.pdf

Other Councils

A number of regional councils have excellent publications on restoration that go into more detail than is possible with this publication.

- Greater Wellington Regional Council – www.gw.govt.nz/restoring-natural-areas
- Waikato Regional Council – www.waikato.govt.nz/Publications/Biodiversity/
- Auckland Regional Council – www.arc.govt.nz/environment/plants-and-animals/publications/publications_home.cfm
- Northland Regional Council – www.nrc.govt.nz/Resource-Library-Summary/Publications/Land

The New Zealand Plant Conservation Network

www.nzpcn.org.nz

Detailed descriptions of weed and native plant species are under www.nzpcn.org.nz/exotic_plant_life_and_weeds/index.asp

Weedbusters

www.weedbusters.org.nz

- They provide (less detailed) weed descriptions and how to control them under Home>Weed Info>Weed Search.
- They also provide more general information on techniques under Home>Resource Centre>How To>Control Weeds.

Landcare Trust

www.landcare.org.nz

The Trust has published 'Landcare – A Practical Guide', a very useful introductory guide for farmers wanting to undertake restoration by forming their own landcare group. The publication can be downloaded at www.landcare.org.nz/landcareguide/

Landcare Research

www.landcareresearch.co.nz

This crown research institute publishes a number of useful books and papers on restoration, most notably their excellent wetland restoration guide, which is available as a free download at www.landcareresearch.co.nz/services/biocons/wetlands/

A support system has been developed to help people select the most appropriate system to control vertebrate pests. Search under 'vertebrate pest support decision' at www.landcareresearch.co.nz

Bibliography

Bradley J. (1988). Bringing Back the Bush

The Bradley method of bush regeneration. Sydney: Lansdowne Press. [This describes how to use natural ecological processes to allow native areas to regenerate themselves].

Butler, D.J. (2008). Tasman District Biodiversity Overview

Indigenous Terrestrial Vertebrates and Invertebrates. Richmond, Nelson, N.Z.: Tasman District Council. A description of the rich fauna of the district and the threats they face.

Courtney, S.P., Bradshaw, D.H., Moore, S.H., & Atkinson, M.A., (2003). Living Heritage: Growing Native Plants in Nelson.

Nelson, N.Z. Department of Conservation, Nelson-Marlborough Conservancy, Nelson City Council.

Evans, B. (1983). Revegetation Manual using New Zealand Native Plants.

Wellington, N.Z.: Queen Elizabeth II National Trust. Out of print – try your library.

Janssen H. (2006): Bush Vitality Assessment: growing common futures.

Wellington, N.Z.: Department of Conservation/The Author.

Metcalf, L. (2000). The Propagation of New Zealand Native Plants.

Auckland, N.Z.: Godwit. Excellent small handbook on growing your own native plants from seeds and cuttings.

Preece, J. (2000). An Overview of the Freshwater Wetlands of Tasman District.

Richmond, Nelson, N.Z.: Tasman District Council. This describes the wetlands of the district and catalogues their dramatic decline.

Peters, M and Clarkson, B. (2010). Wetland Restoration: a Handbook for New Zealand Freshwater Systems.

Lincoln, N.Z. Manaaki Whenua Press.

Porteous, T. (1993): Native Forest Restoration – A practical guide for landowners.

Wellington, N.Z.: Queen Elizabeth II National Trust. Excellent handbook, especially good on plant propagation and weed control. Out of print – try your library.

Simpson, P. & Walls, G. (2004). Tasman District Biodiversity Overview – Indigenous Ecosystems.

Richmond, Nelson, N.Z.: Tasman District Council. This provides a broad overview of the native ecosystems of the district.

Spellerberg, I. & Given, D. (eds.) (2004): Going Native: Making Use of New Zealand Native Plants.

Christchurch, NZ: Canterbury University Press.

New Zealand Journal of Ecology, Volume 34 No.1 “Special Issue: Feathers to Fur – the ecological transformation of Aotearoa”.

Christchurch, N.Z.: New Zealand Ecological Society.

Glossary of Plant Names

Common	Latin
Akeake	<i>Dodonea viscosa</i>
Akiraho	<i>Olearia paniculata</i>
Barberry	<i>Berberis vulgaris</i>
Black beech/tawhairauriki	<i>Nothofagus solandri</i> var <i>solandri</i>
Blackberry	<i>Rubus fruticosus</i> agg.
Bottlebrush	<i>Callistemon</i> species
Brazilian coral tree	<i>Erythrina crista-galli</i>
Broom	<i>Cytisus scoparius</i>
Cabbage tree/ti kouka	<i>Cordyline australis</i>
Cedar wattle	<i>Acacia elata</i>
Chilean fire bush	<i>Embothrium coccineum</i>
Chinese lantern	<i>Abutilon</i> species
Cotoneaster	<i>Cotoneaster</i> species
Elder	<i>Sambucus nigra</i>
Fivefinger/whauwhaupaku	<i>Pseudopanax arboreus</i>
Flame tree	<i>Brachychiton acerifolius</i>
Flowering quince	<i>Chaenomeles japonica</i> and <i>C. speciosa</i>
Fuchsia/kotukutuku	<i>Fuchsia excorticata</i>
Gorse	<i>Ulex europaeus</i>
Harakeke/swamp flax	<i>Phormium tenax</i>
Hard beech/hututawhai	<i>Nothofagus truncata</i>
Hawthorn	<i>Crataegus monogyna</i>
Heart-leaved silver gum	<i>Eucalyptus cordata</i>
Kahikatea	<i>Dacrycarpus dacrydioides</i>
Kakabeak/kowhai ngutu-kaka	<i>Clianthus puniceus</i>
Kanono/large-leaved coprosma	<i>Coprosma grandifolia</i>
Kanuka	<i>Kunzea ericoides</i>
Karamu	<i>Coprosma robusta</i>
Kawakawa	<i>Macropiper excelsum</i>
Kohekohe	<i>Dysoxylum spectabile</i>
Kohuhu	<i>Pittosporum tenuifolium</i>
Koromiko	<i>Hebe stricta</i>
Lowland ribbonwood/manatu	<i>Plagianthus regius</i>

Common	Latin
Mahoe	<i>Melicytus ramiflorus</i>
Manuka	<i>Leptospermum scoparium</i>
Matai	<i>Prumnopitys taxifolia</i>
Miro	<i>Stachypitys ferruginea</i>
Mugga or red ironbark	<i>Eucalyptus sideroxylon</i>
Ngaio	<i>Myoporum laetum</i>
North Island kowhai	<i>Sophora tetrapetala</i>
Northern rata	<i>Metrosideros robusta</i>
Paperbark	<i>Melaleuca</i> species
Poroporo	<i>Solanum aviculare</i>
Raupo	<i>Typha australis</i>
Red beech/tawhairaunui	<i>Nothofagus fusca</i>
Red hot poker	<i>Kniphofia</i> species
Red rata vine	<i>Metrosideros fulgens</i>
Rewarewa	<i>Knightia excelsa</i>
Rimu	<i>Dacrydium cuppresinum</i>
Rowan/mountain ash	<i>Sorbus aucuparia</i>
Saltmarsh ribbonwood	<i>Plagianthus divaricatus</i>
Shining coprosma	<i>Coprosma lucida</i>
South Island kowhai	<i>Sophora microphylla</i>
Southern rata	<i>Metrosideros umbellata</i>
Sycamore	<i>Acer pseudoplatanus</i>
Tagasaste/tree lucerne	<i>Chamaecytisus palmensis</i>
Tarata/lemonwood	<i>Pittosporum eugenoides</i>
Tasmanian blue gum	<i>Eucalyptus globulus</i>
Tawa	<i>Beilschmiedia tawa</i>
Toetoe (South Island)	<i>Cortaderia richardii</i>
Totara (lowland)	<i>Podocarpus totara</i>
Tuart	<i>Eucalyptus gomphocephala</i>
Tutu	<i>Coriaria arborescens</i>
Waratah	<i>Telopea</i> species
Wharariki/coastal flax	<i>Phormium cookianum</i>
Wineberry/makomako	<i>Aristotelia serrata</i>
Yellow gum	<i>Eucalyptus leucoxyllon</i> var. <i>rosea</i>

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– Maggie Atkinson

Project Team

Maggie Atkinson

Maggie has a degree in landscape architecture and was community and landscape specialist in the ICM research programme. She was co-team leader for the NZ pilot art-science project, which created the photostory exhibition of the Motueka River catchment, *Travelling River*. Maggie is author of *Our Stories* and led the development of the style of *Go Wild*.

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Michael is a freelance ecologist contracted by Tasman District Council to provide the technical content of this guide. He is surveying native remnants on private land in Tasman District under the Council's Significant Native Habitats Programme.

Lindsay Vaughan

Lindsay is a Biosecurity Coordinator at Tasman District Council and oversees a range of biodiversity and biosecurity projects. He has been inspired by the commitment of those who are restoring and protecting indigenous ecosystems.

Oliver Weber

Oliver is a photographer based in Moutere. He enjoys the challenge of capturing natural environments and people in ways that convey their essence and unique personality.



From left: Lindsay Vaughan, Michael North, Maggie Atkinson.



Oliver Weber. Photo: Maggie Atkinson







“It’s time to put things back,” says botanist Philip Simpson. *Go Wild* is a new style of native forest restoration manual, combining the “how to” with the stories of people who have done it, inspire it and live it.

Martin and Jo Conway are preserving “the story of the past”, nurseryman Tim Le Gros matches plants to site, volunteer trappers in Richmond and Kahurangi bring back the native birds, wetlands are revived at Mangarakau and Mapua, the baton passes to a new generation at Ngatimoti School, weaver Hazel Walls creates beauty from heritage harakeke, a quartet of women lead the charge in Golden Bay, botanist Peter Williams advocates “the art of the possible”, and father and son Nick and Jeremy Ward nurture their “island” of stately native trees.

The *Go Wild* manual guides you through choosing a site and plants, establishing “pioneers”, feeding native birds, protecting your regenerating bush from stock and predators, “making weeds work for you”, establishing wildlife corridors, restoring dunes and wetlands, and trapping pests. We detail covenanting, funding agencies, suppliers, conservation groups and sources of advice.

go wild – now.