

TIAKINA TE KAURI PROTECTING SOUTHERN GIANTS

In his second article about southern kauri, **Dr Bruce Burns** looks at their unique ecology and threats. What does the future hold for this much-loved taonga in the Waikato?

© Ian Preece

Kauri is sometimes referred to as a foundation species in forests because its presence has a strong influence on which other plants can grow with it. Dead leaves, cone scales, and bark and branches of kauri are very slow to decompose, and these accumulate to create a deep organic layer on the forest floor.

These deep organic soils are invariably very low in nutrients and dry out very fast between rain events. This means only certain plants associate with kauri – those able to grow in such infertile, drought-prone soils.

Despite or because of this, kauri stands are generally the most plant-species rich of any forest type in New Zealand and contribute disproportionately to overall forest biodiversity.

This high biodiversity also increases over time so mature stands have higher plant-species richness than younger regenerating stands – and often contain highly distinctive and unique plant compositions.

For example, kauri is the dominant species at the Waiomu Kauri Grove, on the Coromandel Peninsula, where it grows with Hall's tōtara, miro, tōwai, tānekaha, tawa, rewarewa, white maire, toatoa, Kirk's daisy, *Pseudopanax discolor*, tāwheowheo, kauri grass, and karapapa.

Other common forest types at the southern end of the kauri range include areas of dense kauri regeneration after logging – for example, Otahu Valley, near Whangamata, and rare large kauri scattered within podocarp-broadleaf forest at mid-altitudes.

Kauri's southern domain is notable, however, as being the home of three more unusual plant associations with kauri.

The first occurs along the crest of the Coromandel Range and on the heights of Moehau, with often stunted kauri occurring above 600m alongside a range of distinctive

sub-montaine species, including pāhautea or yellow-silver pine (but never together), rimu, tāwari, tāwheowheo, tōwai, toro, toatoa, broadleaf, and mountain neinei.

On Moehau, several kauri in this type of association have tipped up but remain alive, the trees taking on a bizarre, somewhat prostrate, growth form. The highest altitude site on which kauri grow anywhere is around 810m in elevation, on Moehau and Table Mountain, both in the Coromandel Range.

Kauri mixed with hard beech and tānekaha is another forest type concentrated in the southern kauri domain. Hard beech (*Fuscospora truncata*) has the most northerly distribution of the five New Zealand beech species.

Stands of kauri, tānekaha, and hard beech are most associated with the Kapowai catchment of the Coromandel, the Miranda Scientific Reserve, the Hapuakohe Range, including Te Hoe, and the southern fringe of the Hūnua Ranges. Here we see two iconic plants that define the forest ecology of New Zealand, kauri and beech, coming together in one place!

Lastly, in locations around the Coromandel Peninsula, kauri forest extends to the coast, showing that kauri can also tolerate salt winds. At Potiki Bay, for example, kauri occurs as coastal forest unusually with taraire, pōhutukawa, and hard beech. Other examples of coastal kauri forest occur at Kennedy Bay and Tapuaetahi Bay.



Kauri forests are plant-species rich. © Ian Preece

THREATS TO SOUTHERN KAURI

Despite being mostly protected from logging and loss of forest integrity by further forest fragmentation, risks to the continued existence of southern kauri still exist.

Chief among these is kauri dieback disease, caused by a fungus-like plant pathogen *Phytophthora agathidicida*, which was first identified on Aotea Great Barrier Island in 1972 but not recognised on the mainland until 2006.

Kauri dieback disease attacks the roots and vascular system of kauri, eventually leading to tree starvation and death. Although kauri dieback disease is widespread in Northland and Auckland, the southern extent of kauri is almost free of this disease, with only a handful of known sites.

This near absence of kauri dieback disease in the Waikato and Bay of Plenty regions increases the importance of the kauri forest ecosystems there for the future survival of the species.

It also highlights the importance of preventing the movement of this disease to precious uninfected areas, a responsibility we all share.

A further major threat to the persistence of kauri is climate change. Modelling indicates that New Zealand will be subject to increased mean temperatures and increases in extreme weather events – for example, storms and droughts. Residents of the Coromandel Peninsula will not be surprised by these results after the storms of the 2022/2023 summer.

It is the latter that may have significant effects on kauri populations. Already, northern New Zealand has experienced record-breaking droughts in the summers of 2012/13 and 2019/2020.

Kauri are reasonably resistant to drought, with deep roots, stem water stores, and conservative water use, but there are limits to

these strategies. The small trees are at most risk of death from drought events.

This was highlighted when many small planted kauri in urban and restoration areas died during both recent droughts. Species that occur with kauri are also at risk of mortality due to drought. For example, all hard beech associated with kauri at Pukemokemoke, northwest of Hamilton, had died by 2010.

Southern kauri may, however, offer a refuge from some impacts of climate change – and potentially offer an important reservoir of genetic diversity.



Cleaning station set up to protect the forest from kauri dieback disease. © Caroline Wood

Droughts are likely to be more severe in Northland than the Waikato, and drought on the east coast will be harsher than the west coast, according to future predictions for Aotearoa. Therefore, the southern part of the kauri range provides some of the best opportunities to ensure kauri survive the increased drought episodes in the future.

The fact that kauri occur in a wide range of bioclimatic conditions within the Waikato region suggests these stands could be usefully explored for genotypes resilient to current and future threats, although the breadth of genetic variation found in these kauri populations is still unclear.

Pests, predators, and human impacts are also threats to kauri forests, just as they are for other

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SPECIAL REPORT

→ kinds of native forest. Thankfully, a large proportion of kauri in its southern domain lies within protected areas – for example, on public conservation land or in covenants.

However, significant areas of kauri forest are also found on private Waikato land that is unfenced and vulnerable to trampling and compaction by stock, as well as potential development pressures and vegetation clearance, particularly along forest margins.

Possums, goats, feral pigs, and deer also have impacts in kauri forests, either by the browsing of palatable species, predation of fauna, or disturbance of the litter and soils. Kauri seedlings themselves are often browsed by possums and goats.



Regenerating kauri forest.
© Ian Preece

THE FUTURE

The desire to restore the former magnificence of kauri forest in its southern range fuels a continued fascination with kauri among residents of the Waikato and Bay of Plenty.

The species is regularly incorporated into ecological restoration plantings – for example, at Waiwhakareke Natural Heritage Park, near Hamilton Zoo. As well, recognising the high forestry potential of kauri, plantations have been established sporadically over the last 80 or so years in various parts of its southern range.

These plantations have shown relatively fast growth rates, indicating that opportunity exists

to grow kauri in silviculture on selected good-quality sites over rotations of 60–80 years or less. Interestingly, kauri plantations monitored near the natural southern limit of the species have performed as well or better than plantations further north.

Meanwhile, carbon sequestration rates of planted kauri, while initially slow, increase in older planted stands and become a competitive option as effective carbon forests once kauri life expectancy is taken into account.

There are many fascinating facets to the story of kauri throughout its range and specifically in its southern domain. Waikato and Bay of Plenty remain strongholds, albeit reduced from their former extent. These places add much to the ecology, history, sense of place, and potential future of this iconic taonga in New Zealand.

But what of kauri’s future in the south, will kauri remain a remarkable but lesser-known point of interest there? Or will southern kauri thrive with greater recognition, protection, and opportunities to create new forests?

As an optimist, I’m hoping for and anticipating the latter.

This article was commissioned by Waikato Regional Council, with the support of Tiakina Kauri, the Kauri Protection Agency. Dr Bruce Burns is an Associate Professor, School of Biological Sciences,



University of Auckland. He is one of New Zealand’s leading kauri experts, and his article is reproduced here by kind permission. To find out more about the history of southern kauri, see Bruce’s article in our March 2023 issue. For more information about kauri protection, see www.kauriprotection.co.nz.



**Ko te kauri he whakaruruhau mō nga Iwi Katoa
Kia toitū te whenua
Kia toitū te kauri**

**Kauri is a shelter for all people
So the land endures
So the kauri endures**

Whakataukī created for the national kauri protection programme Tiakina Kauri. © Ian Preece

PROTECTING KAURI

Last year, the government launched a new National Pest Management Plan to provide nationwide consistency for managing the impact of kauri dieback disease. Keeping this devastating disease out of the Waikato rohe is a central component of the plan, which brings together government, Māori, councils, and communities to work collaboratively on kauri protection. The plan is aimed at reducing the spread and impact of the plant pathogen that causes kauri dieback disease, maintaining disease-free areas, and managing access to kauri forests. At the heart of the plan is Te Tiriti o Waitangi and a partnership between the Crown and Māori to actively work together on kauri protection and implementation, including co-design and co-governance of the work carried out under the plan.

PHOTOGRAPHY



WINNING SHOT
Toutouwai
North Island
robin. © Mark
Brimblecombe

TOP SHOTS

To celebrate Forest & Bird’s 100th birthday, the team at Bushy Park Tarapuruhi organised a photo competition to highlight the native forest and its inhabitants.

Nature photographers play a vital role connecting people to Aotearoa New Zealand’s unique landscapes and the species that live in our forests, rivers, oceans, and wetlands.

They can take us to places we may not be able to travel ourselves, give us a different perspective on the world, and open our eyes to the beauty of less charismatic species.

“A good photo can sometimes be an arrow to the heart of things, alluding to or eliciting an immediate encounter,” said Craig Potton, landscape photographer and Forest & Bird Ambassador, in his book *Moment and Memory*.

“It is the nature of art and the way of nature to push us beyond the narrow realities we often become trapped in, to new or forgotten realms of pleasure.”

Mark Brimblecombe won the adult competition with his charming toutouwai, often seen flitting around on the forest floor at Bushy Park Tarapuruhi.

The under-15s category was won by Mihaila Haami, 14, of Kai Iwi, who entered several photos and won with “rākau”.



RUNNER UP Fungi.
© Lynette Vallely

She said her images were inspired by this whakataukī Māori proverb: “Mate atu he tētēkura, ka whakaeke mai he tētēkura – As one frond perishes, another grows in its place.” “Looking through these photos felt like a real celebration of this forest and its inhabitants, which was really our purpose in launching this competition,” said Mandy Brooke, Bushy Park Sanctuary Manager.

“We often see people with cameras out visiting Bushy Park Tarapuruhi, and it seemed an opportunity to share some of their work and a very appropriate way to help celebrate Forest & Bird’s 100th birthday.”

Thank you to H&A Print for sponsoring the competition.



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