TRILEPIDEA

Newsletter of the New Zealand Plant Conservation Network

No. 237

February 2024

Deadline for next issue:
Friday 22 March 2024

SUBMIT AN ARTICLE TO THE NEWSLETTER

Contributions are welcome to the newsletter at any time. The closing date for articles for each issue is approximately the 15th of each month.

Articles may be edited and used in the newsletter and/or on the website news page.

The Network will publish almost any article about plants and plant conservation with a particular focus on the plant life of New Zealand and Oceania.

Please send news items or event information to info@nzpcn.org.nz

Postal address:
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NEW ZEALAND

PLANT OF THE MONTH, p. 2

Phylloglossum drummondii. Photo: Bill Campbell.

NZPCN 2024 conference

Taylor Davies-Colley, Bill Campbell, Marley Ford

The New Zealand Plant Conservation Network conference being held 6–9 October 2024, at Forum North in Whangārei, is now only seven months away. This conference will be all about looking to the past for lessons about the future of plant conservation in Aotearoa NZ.

Our conference theme is "Ka mua, ka muri – walking backwards into the future". With this we will be celebrating also with a special event 21 years of NZPCN.

The conference will run from Sunday to Wednesday, with workshops and a welcome event on Sunday, symposia on Monday and Tuesday, and field trips on Wednesday. Our field trips and workshops will make the most of the incredible flora of Whangārei, with the city also being the gateway to wider Te Tai Tokerau/Northland and all the amazing botanising it presents.

Keep an eye out over the next few weeks as we put out more info about the conference, workshops, field trips and sessions. Make sure you book your spot by the end of March to make the most of the lower priced early bird registration.

Registrations have opened here and more information about the conference will be forthcoming in our newsletter *Trilepidea*, and on our Facebook page.

If you or your business would like to support the conference, we are looking for conference sponsors, as well as donations to our auction raising funds towards the David Given Threatened Plant Scholarship and the John Sawyer Threatened Plant Endowment Fund. Please get in touch with conference organising committee lead Taylor Davies-Colley at nzpcnconference@gmail.com with any enquiries or offers of support. We look forward to seeing you in Whāngarei in October.

The mycorrhizal communities of *Lophomyrtus bullata* Burret (Myrtaceae) with comments on mycorrhizal ecology

Marley Ford (mfecobotany@gmail.com)

The widespread endemic tree ramarama (*Lophomyrtus bullata* Burret) has been in serious decline since the arrival of myrtle rust (*Austropuccinia psidii*) in 2017 to New Zealand. Locally, ramarama has become extinct in some areas of the East Cape. In response, the threat statuses for all indigenous Myrtaceae species have been elevated to at least 'threatened' (de Lange et al., 2018).

Species once thought to be common such as ramarama (Figure 1) have now been classed as a Threatened – Nationally Critical species (de Lange et al., 2018). My master's study looked at the mycorrhizal communities of ramarama in different vegetation associations, forming a baseline of mycorrhizal information for this species (Ford et al., 2023). This project was based at University of Auckland, funded by the Manaaki Whenua – Landcare Research Beyond Myrtle Rust programme and worked with Unitec.

PLANT OF THE MONTH – *PHYLLOGLOSSUM DRUMMONDII*

Bill Campbell (billcampbell@xtra.co.nz)

The plant of the month for February is *Phylloglossum drummondii*, a diminutive fern ally that is rarely seen due to its tiny size and the fact that the above ground parts only appear in July and die off by mid to late October. This species is known to persist now only in Northland south to about Dargaville, although historic records suggest it was once more widespread, including in the South Island at sites in Marlborough and on Banks Peninsula. Elsewhere, it is known from southern areas of Australia, where it is common.

In New Zealand, *Phylloglossum drummondii* is a coastal to lowland species, usually found at gumland sites and on recently burned ground. It is generally found in open sites where this is little competition from other species, although it does appear to tolerate a limited amount of shade.

The sterile blades usually appear in July and the fertile cones can be observed from late July onwards. Initially, the plant appears as a dark green rosette no more than 2.5 cm across. When the fertile cones appear the plants reach a similar height, yellowing as they die off during September-October. There are no other species growing in similar habitat in New Zealand with which *Phyllolossum drummondii* could be confused.

Left: Fertile plants with cones, Lake Ohia, 30 August 2015. Right: Colony at Kaimaumau following devastating fire, 15 August 2022. Photos: Bill Campbell.

This species has a current conservation status of Threatened – Nationally Endangered. Conversion of gumland habitat to farmland continues to pose a threat to this species, although the largest populations known now are in DOC/iwi-controlled reserves. In the past, over collection has impacted smaller, more vulnerable populations.

The monotypic genus name *Phylloglossum* literally translated means "leaf tongue" or "leaf tongued" but its exact meaning is unclear. The species epithet *drummondii* honours James Drummond (1784-1863), a British botanist and plant collector in Australia (1829–1863).

You can view the NZPCN website factsheet for *Phylloglossum drummondii* at https://www.nzpcn.org.nz/flora/species/phylloglossum-drummondii/.

Ramarama is found throughout the North Island and in the upper South Island. It is quite distinctive with its bubbled leaves. In te reo Māori ramarama means a "gleam of light", most likely referring to the shiny reflectiveness of the leaves. Basic autecological study is still lacking in many common New Zealand species and this is the case for the ramarama. Little emphasis has been placed on studying this species or its role and context in the greater ecosystem. My study was designed to expand our understanding on the ecology of ramarama by looking at its mycorrhizal communities. Mycorrhizal communities play an important role in the survival of plant species and have a potential role in disease resistance. Thus, we examined the fungal communities of ramarama, with special emphasis on the arbuscular mycorrhizal fungi, together with vegetation and site characteristics in three forest associations in Northern New Zealand.

Figure 1. Ramarama (*Lophomyrtus bullata*) in flower from the Marlborough Sounds.

Here is some background in mycorrhizal ecology for New Zealand. Over 90% of plant species have mutually beneficial relationships with mycorrhizal fungi. In these relationships, the fungus colonizes the root tissue of the host plant. It then provides host plants with services such as improved access to nutrients, water absorption, and disease resistance. In return, the plant host is necessary for the fungus's growth and reproduction. The are two main types of mycorrhizal, arbuscular being the most common. They live within the plant cells while ectomycorrhiza live around the cell. Arbuscular fungi make up the majority of fungal partners in our New Zealand forests, including broadleaf, podocarps (Podocarpaceae Endl.) and kauri (Agathis australis (D.Don) Loudon). While an ectomycorrhiza relationship is less common but forms a partnership with beech (Nothofagaceae Kuprian), kānuka (*Kunzea* spp.) and mānuka (*Leptospermum* spp.). Arbuscular Taxonomic concepts fall down on mycorrhiza with only 220 species recognised globally (Öpik et al., 2020).

Globally in mycorrhizal ecology the seductive story of the 'wood wide web' has been falsely perpetuated in both science and media. The 'wood wide web' is vaguely defined, a network of mycorrhizal fungi shared in a vegetation association. The fable is that forests work together, trees share carbon, water, and other nutrients, and can even send chemical warnings of dangers such as insect attacks (Karst et al., 2023). These thoughts have had a wide influence over media, forest management and even the relationships between self-interest and altruism in human society (Karst et al., 2023). Generalisations are made such as seedlings benefiting from being connected to mature trees but this varies depending on manty factors, including tree species, soil, seedling location etc. (Karst et al., 2023). Other claims include that trees use these networks to signal danger, recognise offspring and share nutrients, are all based on little or misinterpreted evidence (Karst et al., 2023).

A confirmation bias of study into mycorrhizal has spilled into the media and the seductive narrative has become mainstreamed (Karst et al., 2023). "Common mycelial networks" seems the most appropriate definition for these communities (Karst et al., 2023). This means the fungal filaments that spread out through forest soil, often (at least temporarily) physically connecting the roots of two neighbouring trees (Karst et al., 2023). They are a diversity of fungi, with their own niche spaces and relationships. Conclusions around mycorrhizal ecology are variable and heavily context dependent but there is evidence for benefits, negative and neutral effects of these mycorrhizal connections (Karst et al., 2023). These networks are site dependent, affected by slope, age of associations and a range of

other factors (Karst et al., 2023). In summary they are more complex than the socialist principle being portrayed in the media. The most interesting questions here might be "when does mycorrhizal networks play a role, such as in extreme environmental conditions like drought?", especially in the context of pathogens and climate change.

In my study, Molecular analyses demonstrated a diverse fungal community, including representatives of nine families of arbuscular mycorrhizae. The family Archaeosporaceae was particularly well represented in abundant and diversity. Other fungal phyla such as Ascomycota, Basidiomycota, and Zygomycota were also found to associate with ramarama. Mycorrhizal species composition across vegetation associations was similar, but abundances differed. This is the first study to demonstrate the multiple fungal species associated with ramarama, which may help in the remediation of this vulnerable plant. Further, root staining provided additional evidence of arbuscular mycorrhizae colonisation rather than ectomycorrhiza. Under the microscope, arbuscular mycorrhizal structures such as hyphal coils, arbuscules, and vesicles were visible (Figure 2).

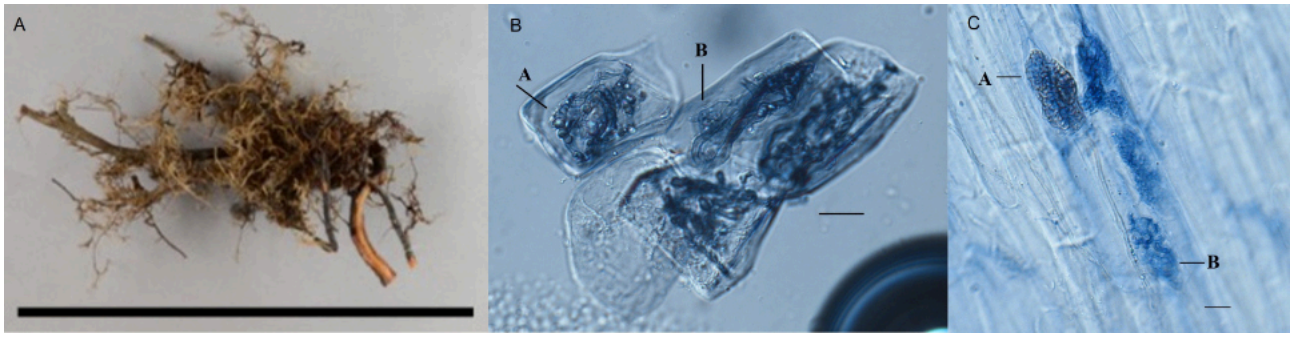

Figure 2. (a) Roots of ramarama after cleaning, Scale bar 15 cm; (b) AM fungi within the root cells of ramarama A is an arbuscule and B is a fungal coil. The AM fungal coils appear dark blue due to the trypan stain. Magnification 400×, scale bar 10 µm;(c) AM fungal structures and a dark septate fungal endophyte within the root cells of ramarama. A is a dark septate endophyte and B is an arbuscule. Fungal structures appear dark blue due to the trypan stain. Magnification 400×, scale bar 20 µm.

There were differences in abundance and richness between fungal families across the three-forest association: coastal, montane and cloud forest and this was compared with soil characteristics. Carbon, nitrogen, and C:N ratio was shown to influence the composition of 18S fungal, but not ITS communities. The highest abundance of Glomeraceae was found at the site with the lowest soil pH, contrasting with previous studies reporting that Glomeraceae prefer alkaline and neutral substrates (Bainardet al. 2015). Since we found that Glomeraceae abundance associated with low soil pH, it may be possible that other soil properties (e.g. nitrogen and/or phosphorus content; He et al.2003) and plant species identity (Lekberg & Waller 2016) may be driving mycorrhizal community composition in these sites.

Arbuscular mycorrhizal communities have been shown to differ in composition between broadly defined habitats (tropical forests, temperate forests, grasslands, etc.) and the number of arbuscular taxa on a host can differ between habitats (Öpiket al. 2006). We found that the arbuscular 'species' across the three forest associations were similar even though there are some differences in plant community composition across the three sites. The occurrences and abundances of data suggest that individual trees may have the same fungal species composition but not the same species abundances. Further sampling of arbuscular associated with ramarama in other habitats and sites may confirm if this trend is observed elsewhere and enable further insights on the influence of ramarama.

Further, during the fieldwork a new population of the Nationally Endangered (de Lange et al., 2018) and Regionally sparse (Miller & Holland, 2008) grass *Microlaena carsei* was found. Other outcomes of this study include a management report of one of the study sites, the Tutamoe Domain for the Kaipara District Council (Ford, 2021) and a botanical report published in the Auckland Botanical Society Journal (Ford, 2022).

What does this mean for the future of ramarama? Myrtle rust has been found at all three sample sites. At the coastal site, Maunganui Bluff, all the sampled trees have since died but ramarama persists at the site. Future research should look at the whole soil microbial communities, both fungal and bacterial to identify taxa related to disease suppression as well as taxa that can support ramarama health. These taxa could then be isolated and screened against myrtle rust to assess their potential for use as a biocontrol agent.

This research has just been published in the New Zealand Journal of Ecology. The paper can read here: https://newzealandecology.org/nzje/3545?bclid=IwAR3ywTw6dZw4wx33E5hqAcHfQ3ub2jJ3SWG0zzCU6CVYa86qWZvkSvOgQHo

More information

https://www.landcareresearch.co.nz/discover-our-research/biodiversity-biosecurity/ecosystem-resilience/beyond-myrtle-rust/news/new-paper-ramarama-trees-support-diverse-fungal-communities/?fbclid=IwAR3ywTw6dZw4wx33E5hqAcHfQ3ub2jJ3SWG0zzCU6CVYa86qWZvkSvOgQHo

Some interesting resources on mycorrhizal fungi

https://undark.org/2023/05/25/where-the-wood-wide-web-narrative-went-wrong/

https://podcasts.google.com/feed/aHR0cHM6Ly93d3cuaW5kZWZlbnNlb2ZwbGFudHMuY29tL3BvZGNhc3Q_Zm9ybWF0PXJzcw/episode/NTQ0NTkxZTZlNGIwMTM1Mjg1YWViNWI2OjU0YTZkMjViZTRiMGFiMzhmZWRlODg0Njo2NDg1ZjM0OGI4NzFlMzIxZTA2MDNlMjQ?sa=X&ved=0CAUQkfYCahgKEwjApL26x5eDAxUAAAAAHQAAAAAQuQE

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Acknowledgements

I would like to give a massive thank you to my supervisors: Mahajabeen Padamsee (who also reviewed this draft), Luitgard Schwendemann and Peter de Lange, Andrew Dopheide, the support received from NZPCN, Te Rorua iwi, local landowners, the Kaipara District Council and the Department of Conservation - Kauri Coast. This research was funded by Beyond Myrtle Rust and completed in collaboration with Manaaki Whenua – Landcare Research, Unitec, and the University of Auckland.

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www.LandTyping.nz

Di Lucas ONZM BSc, MLA, Life & Registered Member NZILA www.lucas-associates.co.nz

Due to Gondwana origins and long isolation on active plate boundaries, Aotearoa New Zealand involves wonderfully diverse and complex lands in terms of geomorphology and biodiversity. Challenged in trying to respectfully address the underlying nature of each place, and the lack of place-specific information enabling their story to be respectfully told through landscape planning, design and management, in my MLA decades ago I pursued a typology to depict the underlying nature of land.

As human-induced land-cover and land-use change can be rapid, and consequently many information systems are quickly outdated, I sought to instead provide a fairly timeless and a multi-scale method to enable contextual application at a site.

In the Canterbury Regional Landscape Study[1] (1993) we included land typing undertaken by Ian Lynn, Manaaki Whenua Landcare Research. Canterbury was divided into lowlands v high country, these into Broad Land Types[2] which were divided into 44 Land Types. Each type of country was mapped at 1;250,000 with key information recorded in a description plus a chart and model addressing Landform Components. Land Types and Landform Components have since been mapped at 1:50,000 for some areas.

With a strong physiographic basis, land typing delineates and models areas with a recurring pattern of topography, soils, natural vegetation and a relatively uniform climate. The nested hierarchy structure, with small-scale units of analysis within larger units, is GIS friendly, with finer detail providing more information at regional/district/catchment levels. This ensures a scientifically validated base for integrating management within a broader framework.

The method has been applied in various regions, districts and catchments, including as a basis for land management planning, monitoring ecological integrity[3], providing native plant guides[4], and also for developing landscape and natural character assessments (both terrestrial and marine) based on the underlying biophysical character that forms a logical context for associative and experiential dimensions. The method has been variously utilised at all scales and found useful for land management planning within regions and districts of Aotearoa NZ.

Due to its usefulness, rather than limited to often historic council documents, various interests including councils, scientists, Boffa Miskell and MPI agreed we make the information easily available by creating a land typing information hub – www.LandTyping.nz. Our team has therefore digitised and uploaded available land typing and addressed the gaps across the motu. Ian Lynn has been the key land typing expert, with Jeremy Head providing most of the models and Lindsay Chan the GIS. In particular locations the team have been assisted over the decades by many other experts including Willie Shaw, Mike Page, Shannel Courtney, Neill Simpson, Colin Meurk, Mike Pole, and the late Terry Crippen.

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[1] Boffa Miskell and Lucas Associates, for Canterbury Regional Council

[2] termed Land Systems in 1993.

[3] *A Framework for Monitoring Ecological Integrity in the Bay of Plenty Region*. Lucas Associates, 1998.

[4] *A Guide for Planting & Restoring the Nature of Waitakere City*. Lucas Associates in association with Stephen King, for Waitakere City Council 1996.

Wairau Plain Landscape Concept Guidelines. Lucas Associates for Marlborough District Council, 2002.

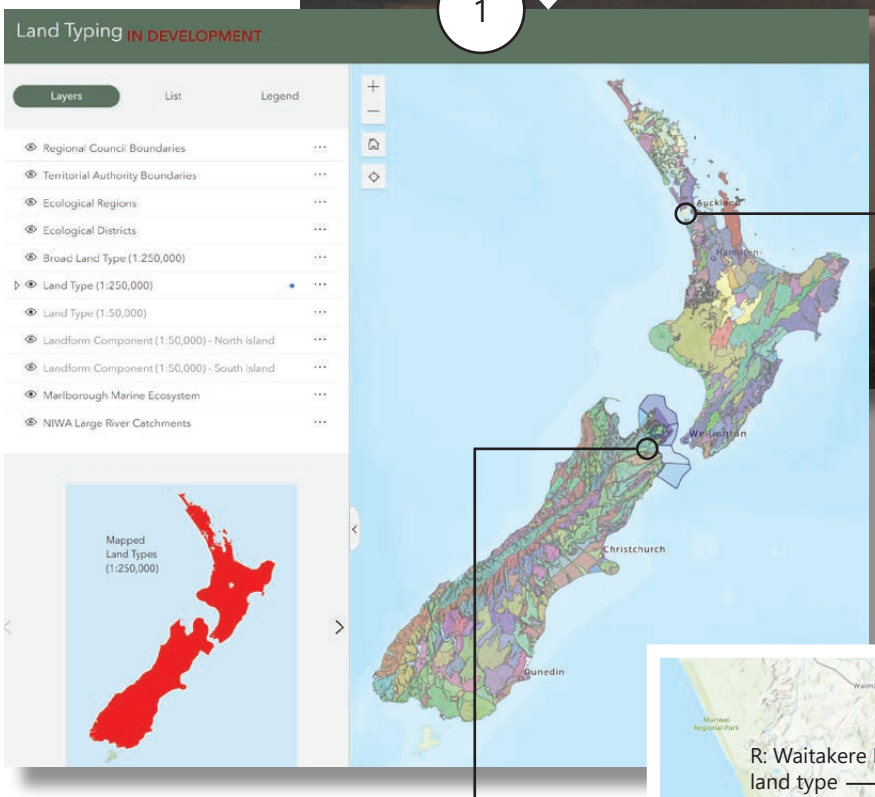
LAND TYPING

Recognising natural underlayers for guidance in managing the whenua

A method addressing land systems, land typing provides a typology that has been variously utilised for several decades as a basis for differentiating and understanding the underlying natural diversity of Aotearoa lands, ecosystems and landscapes. It provides a useful basis for assessing, characterising, planning, designing and managing lands and waters. This land typing explicitly provides for natural habitat diversity. The method assists people in "making sense" of different land and ecosystem typologies at various scales. Underpinned by geomorphology, as an information system the method is timeless and not vulnerable to upsets by land use or land cover change. It assists in referencing and reinstating the nature of place.

VIEW MAP HERE

1



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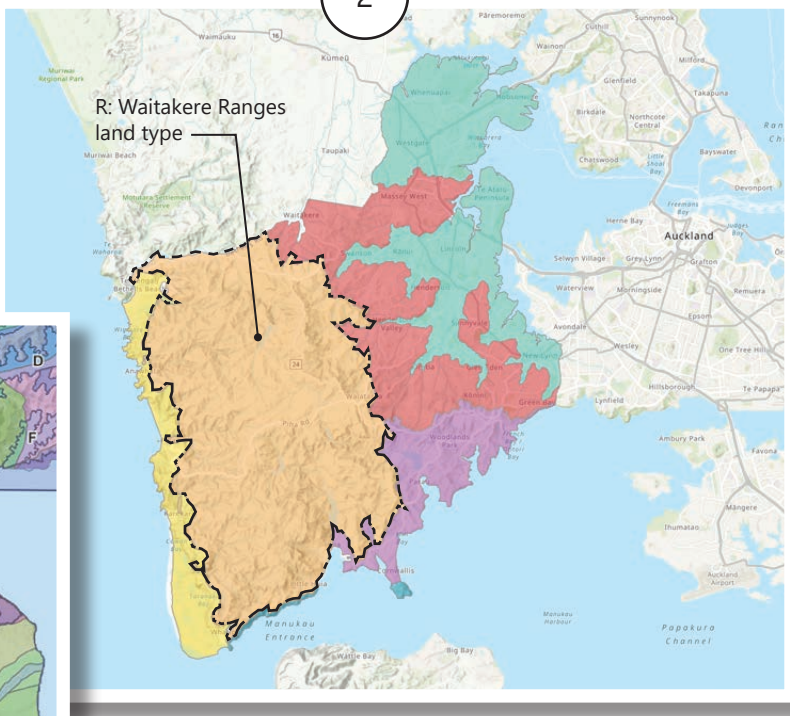

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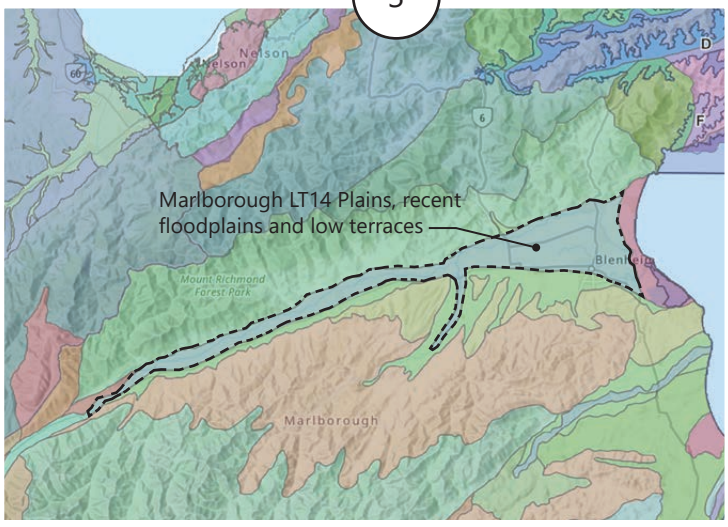
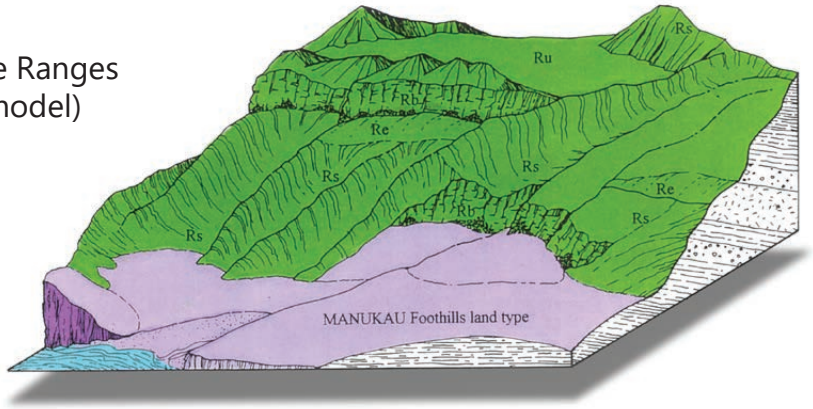


Go to www.LandTyping.nz...

as simple as 1, 2 (or) 3...

2a R: Waitakere Ranges land type (model)



Landform component	Geology	Approximate maximum elevation asl; Slope	Soils	Example areas	Comments
R: Waitakere RANGES land type Undulating to precipitous slopes of the Waitakere Ranges formed of volcanic and volcanic rich rocks, and associated alluvial flats and wetlands; <480m asl; 1400-2000+mm annual rainfall					
Ru: Upland plateau and basin	weathered lava, volcanic breccia-conglomerate, and volcanic sandstone: (Lone Kauri, Piha, Nihotupu Formations of the Waitakere group)	>300m; undulating to strongly rolling, (minor moderately steep slopes)	clayey soil on weathered lava, volcanic conglomerate-breccia and sandstone; well to moderately well drained: leached brown granular loams and clays (Waitakere series)	Piha Road-Cutty Grass track	
Rs: Steep hills and valleys	weathered or partially weathered, lava, volcanic breccia conglomerate, and volcanic sandstone: (Lone Kauri, Piha, Nihotupu Formations)	<400m*; moderately steep to very steep	clayey soils on weathered volcanics and stoney clay or silty soils on partially weathered volcanics; well to moderately well drained: brown granular loams and clay hill soils (Waitakere and Parau series) and related steepland soils (Huia Series)	Piha Valley	includes rolling ridge crests
Re: Easy slopes	weathered volcanic breccia-conglomerate, and volcanic sandstone: (Piha, Nihotupu Formations of the Waitakere group)	<300m: rolling to strongly rolling	clayey soil on weathered lava, volcanic conglomerate-breccia and sandstone; wen to moderately well drained: leached brown granular loams and clays (Waitakere and Parau series)	next to Kauri Knoll	excludes the higher elevation Ru
Rb: Bluffs, and gorges, adjacent slopes, and rockfall material	very hard, volcanic breccia conglomerate, lava and volcanic sandstone: (Lone Kauri, Pil1a, Nihotupu Formations)	<400m; precipitous or very steep		Karamatua and Pararaha Valleys	smaller bluffs and gorges found throughout Rs
Ra: Narrow alluvial	soft mud, sand and gravel; volcanic			Valley	extends into Westcoa.st land type
					Bethells Swamp

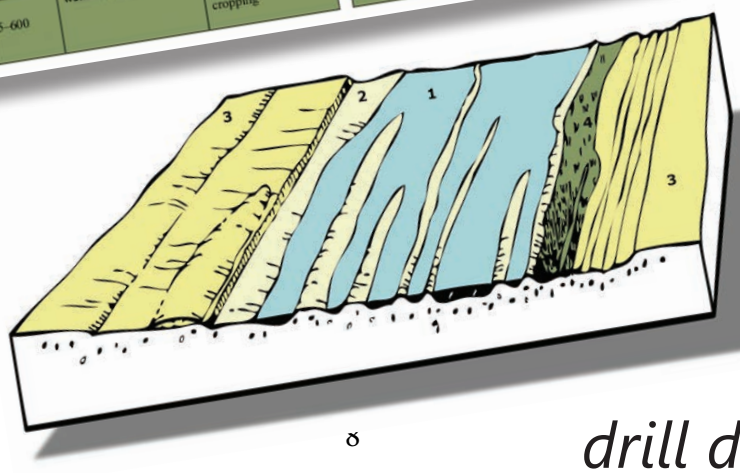
Description:

The Recent floodplains and low terraces land type incorporates wide, braided, active and recently active riverbeds, Recent floodplain terraces and associated backswamp wetlands, coastal swamp deposits and minor inland dune belts. Elevation ranges from 0 to 600 m and rainfall from 600 to 1200 mm p.a. The land type includes the lowland sections of the Wairau and Awatere river valleys.

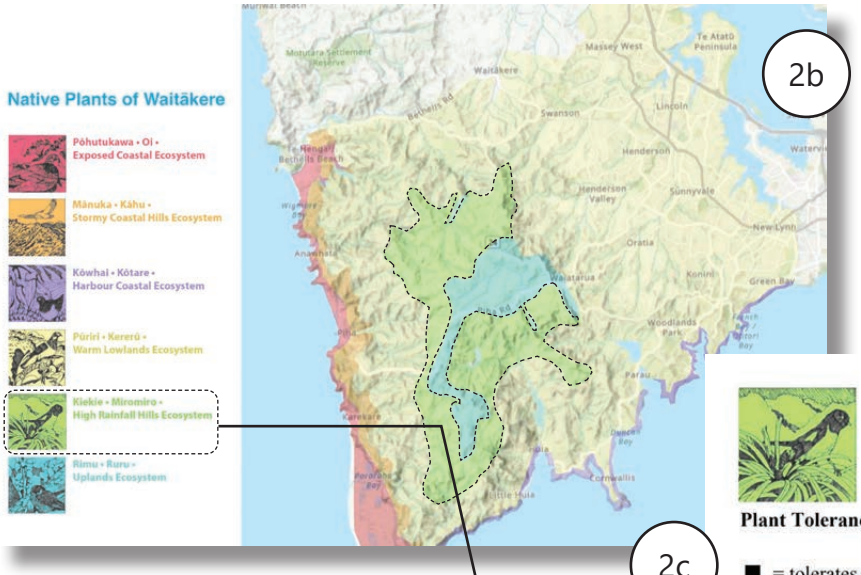
	Landform component	Geological formation	Elevation (m)	Remnant native vegetation	Present land use
1.	active braided floodplain	Holocene and Recent fluvial deposits	0–600	ephemeral communities	opportunist grazing, scrub wasteland
2.	recently abandoned braided floodplain	Holocene and Recent fluvial deposits	0–600	danthonia grassland, kōwhai, kānuka, matagouri scrub, bracken, cabbage trees	extensive grazing, opportunist grazing, scrub wasteland, exotic forestry
3.	low terraces	Holocene and Recent alluvium	5–600	danthonia grassland, kōwhai, kānuka, matagouri, scrub, cabbage trees, bracken	intensive grazing, cash and feed cropping, viticulture, orchards
4.	backswamps	Holocene and Recent alluvium and organic deposits	5–600	wetland, rush/sedge	intensive grazing, cash and feed cropping

Agronomic potential	Potential land use	Potential impacts
low	opportunist grazing	largely 'natural' environment, exotic 'river control' trees, exotic scrub
low	extensive grazing, exotic forestry	exotic pasture, forestry, scrub establishment
high	cash and feed cropping, horticulture, viticulture, orchards, intensive grazing	intensified land use, windbreaks, irrigation, subdivision
high	cash and feed cropping, horticulture, intensive grazing	intensified land use, drainage, windbreaks, subdivision

3a Marlborough LT14 Plains, recent floodplains and low terraces (model)



drill down deeper...



R: Waitakere Ranges (ecosystems)

R: Waitakere Ranges (plants)

Kiekie • Miromiro • High Rainfall Hills Ecosystem

Plant Tolerances:

■ = tolerates or needs
□ = intolerant
1/2 = tolerant of some
e = shade tolerant to establish
E = needs shade to establish

Food for native birds

f: flower
F: fruit

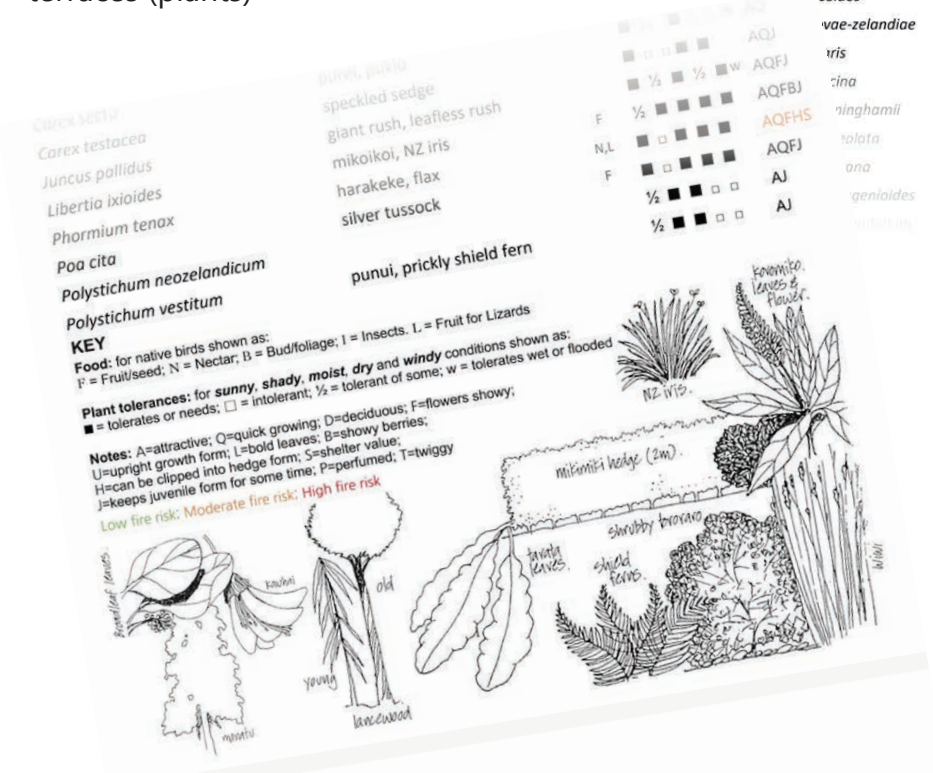
Flammability category:

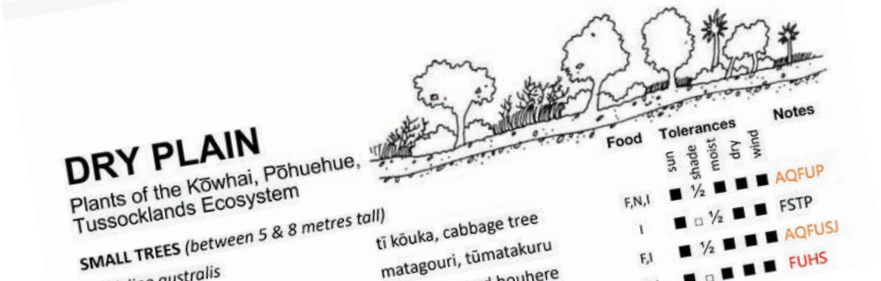
H = high fire risk
M =moderate fire risk
L =low fire risk

		Flower & Fruit	Fire Risk	Tolerances: sun	shade	dry	moist	wind
Tall trees								
Agathis australis	kauri		M	■	e	½	■	½
Dacrycarpus dacrydioides	kahikatea, white pine	F	-	■	e	□	■	□
Dacrydium cupressinum	rimu		M	■	E	□	■	□
Metrosideros excelsa	pōhutukawa	f	-	■	□	■	■	½
Pectinopitys ferruginea	miro, brown pine	F	-	■	E■	½	■	½
Podocarpus laetus	Hall's tōtara		-	■	½	■	■	■
Medium trees								
Beilschmiedia tawa	tawa		M	■	E■	□	■	□
Didymocheton spectabilis	kohekohe, NZ mahogany	f	-	■	E■	□	■	□
Elaeocarpus dentatus	hīnau		-	■	E½	½	■	□
Elaeocarpus hookerianus	pōkākā		-	■	½	□	■	□
Ixerba brexioides	tawari		-	■	e½	□	■	□
Knightia excelsa	rewarewa, NZ honeysuckle		M	■	½	½	■	½
Kun[illegible]coides	kānuka	f	H	■	½	■	■	■
[illegible]vae-zelandiae	pukatea		-	■	E	□	½	□
[illegible]ris	mangeao, tangeao		-	■	E	■	■	½
[illegible]cina	toro		-	■	■	□	■	□
[illegible]hinghamii	black maire		-	■	½	□	■	□
[illegible]olata	white maire		-	■	½	½	■	□
[illegible]ana	narrow-leaved maire		-	■	E	½	■	□
[illegible]genioides	tarata, lemonwood		M	■	½	½	■	□
[illegible]	[illegible]		M	■	½	½	■	½

3b

Marlborough LT14 Plains, recent floodplains and low terraces (plants)





to area-specific planting detail...

WELT specimen occurrence data now available on GBIF

WELT Herbarium at Museum of New Zealand Te Papa Tongarewa has just published its specimen data and images to the Global Biodiversity Information Facility (GBIF).

WELT Herbarium dataset: https://www.gbif.org/dataset/cafff6a5-1fa4-4a90-a2b3-f3db78b93d02

This adds 250,000 records and over 90,000 images of all plant groups, with particular strengths in seed plants of Aotearoa New Zealand and the Pacific.

This dataset will be updated every two weeks with additions and changes. Te Papa is now working on also publishing datasets of its zoological records.

Read more at https://blog.tepapa.govt.nz/2024/02/19/te-papas-botanical-specimen-data-now-on-gbif/

If you have any questions, please contact digitaloutreach@tepapa.govt.nz.

UPCOMING EVENTS

If you have events or news that you would like publicised via this newsletter please email the Network (info@nzpcn.org.nz), prior to the published copy deadline, with details of meetings, field trips or other events taking place during the following month or later. The deadline for copy for the following month's *Trilepidea* is at the top of the front page of each issue.

If you intend to participate in one of the advertised botanical society meetings or field trips please check with the relevant society beforehand to confirm that the published details still stand.

Coastal Restoration Trust of New Zealand 2024 Annual conference

Venue: Maketū marae in Kāwhia from 20-22 March 2024.

Details: about the programme, accommodation, venue and registration https://www.coastalrestorationconference.org.nz/

National Wetland Symposia 2024

Dates: 10–11 April 2024, with optional field trip 12 April.

Venue: Copthorne Hotel and Resort, Waitangi.
This is an event for community groups, landowners, iwi, scientists, wetland managers and students who are interested in sharing and learning about wetlands.

Details: of speakers, field trips and training, along with tickets https://www.wetlandtrust.org.nz/what-we-do/symposia/

Auckland Botanical Society

Meeting: Wednesday 6 March, includes AGM.

Venue: Unitec, School of Natural Sciences, 139 Carrington Road, Mt. Albert, Auckland. Gate 4, Building 115, Room 1028.

Field Trip: Saturday 16 March. See website https://sites.google.com/site/aucklandbotanicalsociety/ for further details.

Rotorua Botanical Society

Field Trip: Saturday 9 March to Okareka wetland walkway, Acacia Road, Lake Okareka. **Meet:** Lake Okareka walkway carpark, Acacia Road, Lake Okareka at 9.00am.	**Leader:** Rob Fairley, email rafchch@gmail.com, ph. 021 0247 7614.
Field trip followed by 40th anniversary function.	**Details:** https://www.wildlands.co.nz/company/rotorua-botanical-society/
Field Trip: Saturday 23 March to Mount Tarawera (combined with Forest and Bird). **Meet:** DOC Ashpit Road campground, Lake Rerewhakaaitu at 7.45am.	**Leader:** Paul Cashmore, email pcashmore@doc.govt.nz, ph. 07 349 7432 (wk). Numbers limited, so please register with Paul by 11 March at the latest.
Field Trip: Saturday 2 March to Paraparaumu Scenic Reserve. **Meet:** Main reserve car park at 10.00am.	**Co-Leaders:** Jenny Fraser, email jennyjfraser@gmail.com; and Pattern Reid.
Meeting: Monday 18 March at 7.30pm. **Topic:** Disentangling the effects of deer and possums from those of natural disturbance in NZ's forests. **Speaker:** Peter Bellingham, Senior Researcher, Manaaki Whenua – Landcare Research.	**Venue:** Victoria University, Wellington, Lecture Theatre M101.

Nelson Botanical Society

Field Trip/Meeting: Please refer to the website: https://www.nelsonbotanicalsociety.org/trips-meetings.

Canterbury Botanical Society

Field Trips/Meetings: Please refer to the website: https://canterburybotanicalsociety.org.nz/canterbury-botanical-meetings-field-trips for current details.

Botanical Society of Otago

Field Trip: Saturday 9 March to Hikaroroa/Mount Watkins. **Meet:** Botany Department carpark at 9.00am.	**Contact:** Lydia Metcalfe, ph. 027 726 5556.
Meeting: Wednesday 13 March at 5.20pm. **Speaker**: Jess Paull. **Topic:** The Sequoioideae: What can extant lineages tell us about evolution?	**Venue:** Main seminar room, Manaaki Whenua Landcare Research, 764 Cumberland Street, Dunedin. Contact: Gretchen Brownstein, email brownsteing@landcareresearch.co.nz, ph. 021 065 8497.