



TRILEPIDEA

Newsletter of the New Zealand Plant Conservation Network

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Deadline for next issue:
Thursday 15 January 2015

**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 events@nzpcn.org.nz

Postal address:

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NEW ZEALAND

PLANT OF THE MONTH, p. 2



Gaultheria depressa var. *novae-zelandiae*.

President's message

Short and sweet. Wishing you all a very Merry Christmas, a Happy New Year, and a relaxing and refreshing break with family and friends.

Merry Christmas,

Sarah Beadel

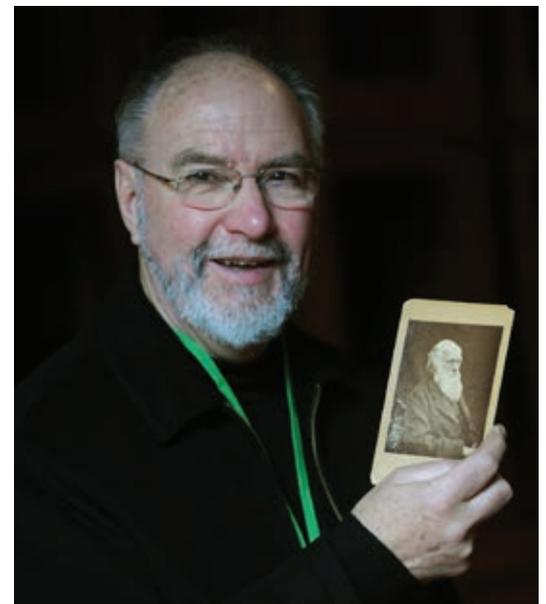
In memory of Dr David J. Galloway M.Sc., Ph.D., D.Sc. (Otago), FRSNZ, FLS, FRGS, CBiol, MIBiol (1942–2014) – the Father of New Zealand Lichenology

*Peter J. de Lange, Principal Science Advisor, Department of Conservation
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On Saturday 6 December 2014, I lost a friend and New Zealand lost the man who put New Zealand firmly on the world lichenological map—David J. Galloway. David was a rare sort of person, witty, clever, academically gifted, and well-grounded, as well as a formidable fount of knowledge. Most will know of David for his unequalled knowledge of New Zealand lichens but he was also an accomplished musician, historian, biochemist and devoted husband to Patricia—herself an internationally respected opera singer and artist.

I first knew David through reading his 1985 lichen 'flora' (strictly mycobiota) whilst still an undergraduate (Galloway 1985). Then, I happily played in lichens using David's flora as the basis for many hours of assiduous lichen collecting and 'guess work' in the herbarium of the University of Waikato (WAIK). Some years later, I nearly studied under David at the Natural History Museum, London (BM) on a revision of the Lobariaceae as a PhD student—but a political stoush between the then New Zealand Lange Government and the United Kingdom Thatcher one over our country's anti-nuclear stance got in the way. So I went on to do an M.Sc. in tephrochronostratigraphy and palaeoecology instead.

My personal meeting with David was especially memorable. In 1995, I was asked to speak at Dr Brian Molloy's Landcare Research retirement function. Brian was keen that I speak about the ideas then in development with Prof. David Norton (School of Forestry, University of Canterbury) on a framework for a New Zealand-based Threat Classification System (now in operation—see Townsend et al., 2008). This idea directly



David Galloway holds a signed photograph of Charles Darwin during a symposium David organised to celebrate Darwin's 200th birthday. Photo courtesy The Otago Daily Times.

PLANT OF THE MONTH – *GAULTHERIA DEPRESSA* VAR. *NOVAE-ZELANDIAE*



Gaultheria depressa var. *novae-zelandiae*. Photo: Jeremy Rolfe.

Plant of the month for December is *Gaultheria depressa* var. *novae-zelandiae* (snowberry).

This little alpine shrub is present in mountainous areas from the Volcanic Plateau south. Populations have been found up to 1500 m. *Gaultheria depressa* var. *novae-zelandiae* can be found in sheltered habitats such as subalpine forest or scrub. It is also found in more open areas of snow tussock grasslands, herb fields and rock outcrops.

Gaultheria depressa var. *novae-zelandiae* is a low growing shrub with oval leathery leaves. Young leaves have small hairs on the wavy margin. The hairs do not persist on mature leaves. The mature leaves have obvious teeth along the margins. The small flowers are white and bell shaped. The edible fleshy fruit is red, pink or white on different plants; found between January and April. The fruit does not have a strong flavour, much like a flavourless pear inside a berry.

You can see some great photos of this on the Network factsheet for *Gaultheria depressa* var. *novae-zelandiae* at: http://www.nzpcn.org.nz/flora_details.aspx?ID=1916

challenged the IUCN, a member of which was in the audience. At question time the said individual poured a potentially well aimed spout of verbal vitriol in my direction, which, alas, I was not able to deflect thanks to David, who stood up and told my would be verbal assailant to 'go and sit down you silly man!' I am used to holding my own but it was nice to have such a respected backer. David and I became firm friends.

Nevertheless, despite sharing some common interests and collecting a few lichens, I confess it wasn't really until 2006 that I started to take a more serious interest in David's pet subject. At that stage, I had met up with David only a few times, notably at the Auckland Museum Herbarium (AK), where I was engaged in finishing my *Kunzea* revision and he his next lichen flora (now Galloway 2007). He looked at my *Kunzea* bark samples and kindly put names on the lichens encrusting them. In the process, he reactivated my latent interest with his usual kind, gently persuasive yet highly infectious manner. So I started to work more seriously on lichens in 2007. At the time, I was much involved in field work on the Chatham Islands, so I started to collect the lichens of that archipelago with a view of perhaps putting together a checklist of them. David, as ever, was encouraging, and helped put many names on my collections, until—I suspect—a particularly 'hard out' collecting session on the islands, with Peter Heenan, utterly overwhelmed him. However, by now, I had shifted to the Kermadecs, from where David and I prepared a treatment of the Kermadec Islands Lobariaceae—a *magnum opus* on which we were putting the finishing touches to the final proofs when David's terminal illness came to the fore. Since then, of course, he has encouraged me to continue my work on that island group—a task I am slowly plodding through with lichenologist Dr Dan Blanchon and DOC colleague Dr Carol West.

Although incredibly well published and hugely respected, I do feel that David was perhaps a little misunderstood in his homeland. I have always thought that his landmark contribution to the understanding of our country's lichenized mycobiota has been unnecessarily maligned by others who perhaps felt threatened by his work, and I can say that toward the end of David's life he was much

aggrieved by this. Of necessity, David worked mostly overseas; he was, after all, based at BM for some 20 years, so many of his New Zealand treatments were conducted with European lichenologist colleagues. He was an especially avid collaborator with Per Magnus Jørgenson (Pannariaceae, Parmeliaceae), Roland Moberg (*Physica*) and, at least initially, with the late Peter James (Lobariaceae). He also worked keenly with Australians Jack Elix and Gintaras Kantvilas. His collaborations with New Zealand-based lichen collectors and lichenologists were few, perhaps because his research interests were still beyond the skills base being developed here. Irrespective of the reasons, David felt unfairly labelled a ‘loner’ and a ‘sole player’, when in fact he was an ‘encourager’ and a ‘catalyst’—he did much behind the scenes to help fund lichen work here and was incredibly supportive of students and other researchers. David especially fondly remembered his encouragement of the late ‘Hurricane [John] Bartlett’ with whom he collaborated. However, David was also a hard task master—he expected people to work as hard as he himself did, and he had no time for those who ‘played’ rather than ‘worked’ with lichens. He was less than sympathetic to those who he felt he had supported and who had let him down.

I suspect that David suffered here from the ‘tall poppy syndrome’. He had done so much that it was easier for others to take pot shots rather than get to know the man. Whatever the reason, he was most emphatic that he wanted none of it. He twice refused my suggestion that he be nominated for the New Zealand Botanical Society Allan Mere award and, initially, he was shy of being involved in the lichen threat listing for fear that his ideas and work would not be taken seriously. David need not have worried. His contribution was—as expected—essential and his passing has left us with a major issue about how to continue the lichen listing process.

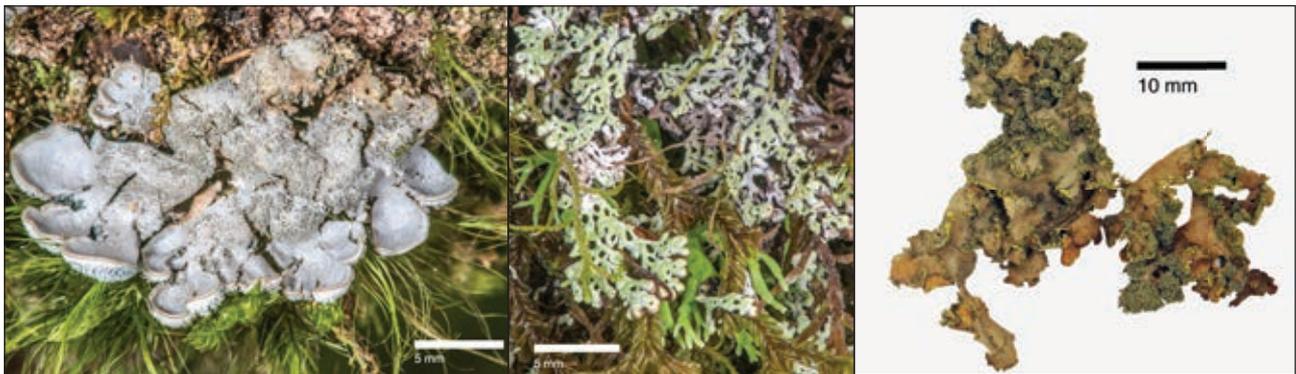
Of course ‘pot shots’ or not, it goes without saying that David’s two flora treatments were instrumental in opening New Zealand up to worldwide lichen scrutiny. Before those publications world knowledge of our lichens was confined to the useful but nevertheless understandably limited treatments of Hooker (1867) and Zahlbruckner (1934). The difference was that David’s ‘flora’ was all the better for being New Zealand-based, though necessarily the first treatment (Galloway 1985) was largely written when he was based in the United Kingdom. David’s second flora (Galloway 2007), was therefore a vastly superior treatment because he wrote most of it here and also it reflected the increased interest lichenologists now had



in the New Zealand lichenized mycobiota—indeed Galloway (2007) clocks in at a staggering two volume tome of 2261 pages! Even then, David freely admitted there was still much work to do and by 2010 he had prepared a complete revision that he had hoped to see published by Landcare in its eFlora. Of all the lichens, David was most at home with the Lobariaceae, a group he first touched base with whilst working as a summer student under his beloved mentor the late Dr James (‘Jaz’) Murray. In my dealings with David, it was always discussion about the Lobariaceae that perked him up the most and I am delighted to have worked with him on *Podostictina* and, of course, on our Kermadec treatment of that family. Yet, over the last few months, David confessed a feeling of inadequacy, stressing that all the recent discoveries being made in Pacific Lobariaceae pointed to his being a ‘terrible lumper’. This he most certainly wasn’t, and it didn’t take long for me to point out that without the foundation of David’s critical treatments—mostly done during the 1970s, 1980s and the early 1990s, when chemistry was the main advance in working out the various taxa, subsequent DNA based revisions would have been less confident and certainly not as predictive as they now are, e.g., Moncada et al. (2014).

I will leave it to others to tell of David’s academic achievements, his numerous awards and his mana internationally. Instead, I wish to finish off with a public acknowledgement of my grief for a man I knew as kind, caring and true friend in a world where increasingly ‘true friends’ are scarce. David

was always able to put a positive spin on anything, even when his terminal illness was diagnosed. He always enjoyed having ‘something sweet’ and my periodic catch ups at the Allan Herbarium and Landcare Dunedin, were always enlivened with a trip to the local café. He was particularly susceptible to ‘ginger slice’, though he admitted a penchant for anything sweet. These trips often took some hours as he enlivened the repast with hilarious anecdotes of various botanists and lichenologists he’d met—often accompanied with skillfully executed mimicry of accents and their various nuances of speech. Needless to say, field work with David was always fun. I remember vividly on one Dunedin visit shivering in woollen trousers, hat and rain coat, whilst David skipped along happily in sandals and shorts—a light jersey his only concession that it might be ‘cold’—on an ‘excursion’ to the Dunedin Cemetery. Our ostensible purpose was to see John Buchanan’s grave, but really it was to collect lichens off various head stones and railings—surely an illegal venture if there ever was! My job was to act as lookout, as David surreptitiously hammered away. Whilst so engaged, David kept me occupied with occasional outcries of ‘Marvellous’, ‘Would you look at this Peter!’ ‘But this is tremendous’, and so on. Anyone coming by could hardly fail to hear us.



A selection of lichens studied by David: (from left) *Degelia durietzii* Arv. & D.J.Galloway, *Menegazzia nothofagi* (Zahlbr.) P.James & D.J.Galloway, *Pseudocyphellaria nermula* D.J.Galloway. Photos: Jeremy Rolfe.

Yes, David will be missed. Right now I mostly feel ‘empty’. It’s hard to accept that no longer will I be able to phone him up with a single ‘quick question’ and then spend some three hours of fascinating conversation before eventually getting the answer. There will be no more emails full of fun, gossip, useful contacts and good, sound advice. Our checklist of the Chatham Islands lichens will now I guess never see fruition—nor his Stewart Island one, nor sadly will David’s wonderful autobiographical book on his life and lichens be finished, or that long planned ‘correction to Beaglehole’s nonsense about Joseph Banks. David’s passing has left a hole in New Zealand that will be difficult for anyone in New Zealand to bridge, let alone world lichenology. I am honoured to have known David and privileged to have known him as ‘just’ David. David and Patricia let me into their lives and I am the richer for it. My deepest sympathy goes out to Patricia who has lost not only a husband but a life-long friend. It’s going to be really hard to continue the work David started but we New Zealanders owe him that much—his work must continue.

Acknowledgements

I’d like to thank Sarah Beadel and Drs Dan Blanchon, Avi Holzapfel, Rhys Gardner, Carol West, Eric Scott for their helpful comments on a draft of this article. I don’t find it easy writing such things—their insights and understanding vastly improved my initial daubing’s.

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NZPCN's quintessential winner of 2014 Favourite Plant: New Zealand Favourite Plant/Worst Weed concludes

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Favourite Plant

The 2014 Favourite Plant and Worst Weed election has come to an end. Voting for your favourite New Zealand plant and worst weed was run through November. The 12th annual competition for favourite plant was contested fiercely in the early stages between an orchid, a colorful legume, a rare rata, and a commonly known southern tree. Toward the end of the vote the favourite was clear, deservedly earning 30% of the vote.

The winner of the 2014 Favourite Plant as voted by you is....

Bartlett's rata, rata moehau—*Metrosideros bartlettii*



Metrosideros bartlettii, Te Paki.

Photos: Peter de Lange (top) and Jeremy Rolfe.

Many people obviously know of this magnificent “Threatened/Nationally Critical” rata because some specialist nurseries sell it and it can be found growing in several universities and botanical gardens throughout the country. An article further describing the winner and its story features elsewhere in this newsletter. Here are some of the of the fantastic and knowledgeable comments made by you the voters:

Gillian wrote: “I first got to know this tree in 1991 and then spent several weeks being eaten alive by mossies searching for more in 1992. It’s such a neat tree, so special and its so sad its going under.”

Brian wrote: “It’s a spectacular tree and a taonga to local iwi.”

Martin wrote: “Rata Moehau is magnificent—it exudes mana.”

Shelly wrote: “Any botanist worth their salt should take a pilgrimage to Te Paki to see this spectacular tree.”

Dave wrote: “An amazing tree indeed. I have worked under its canopy at Radar Bush—a wonderful forest, wonderful place and amazing flora.”

Fran wrote: “Vote for your ‘Favourite Plant’ to me is about raising profiles, and if it can help aid a plant’s conservation by drawing it to the media’s eye even better—this tree is threatened by possums and myrtle rust (when it gets to NZ)—it’s known from less than 25 surviving wild trees and very little genetic diversity is in cultivation. It needs help so it gets my vote.”

Pieter wrote: “It’s a special tree—so uncommon, amazing flowers, a flagship species for Te Paki forests.”

Debby wrote: “Iconic, massive, spectacular.”

In second place, gaining 19% of the vote, for the first time ever in the top 10, an orchid, kauri greenhood (*Pterostylis brumalis* also known as *Diplodium brumale*). This fantastic winter flowering orchid is easily overlooked and is always found in association with the iconic kauri. This slender orchid may reach a height of 20 cm, considerable for a New Zealand orchid. Found naturally occurring in kauri forests this species is likely to be spotted in bloom between June and October from the Kaimai Ranges northward. Many voters commented on the prettiness of this species; some of the remarks made were:

Anne wrote: “What a stunning miniature orchid—so delicate. I thought orchids were like the cymbidiums or phalaenopsis style rather than this exquisite plant. It’s gorgeous.”

Emma wrote: “This is a clever orchid that tricks its pollinator into pollinating it by its labellum that snaps shut when the pollinator lands on it. Recently, research suggests that greenhood orchids are sexually deceptive.”

Christina wrote: “I love looking out for these little orchids when I’m out walking in the bush—secretive but beautiful!”



Pterostylis brumalis, Kauri Glen, Northcote. Photo: Jeremy Rolfe.

In third place, earning 12.5% of the vote, came the prickly and hardy, Dobson’s speargrass (*Aciphylla dobsonii*). Another first timer in the top 10, this extreme survival expert grows on alpine scree ridge crests of South Canterbury and North Otago. The cushion forming herb up to 1 metre across, is often the most conspicuous plant in the area. It also provides habitat for a large weevil species. Many of the comments about this species highlighted its colourful appearance. Some of the comments were:

Alice wrote: “A school of these orange spikey sea creatures stranded high up on a grey mountain rock field is an extraordinary sight. Add it to your botanical bucket list. As a bonus they come with photogenic large weevils and huge heads of white flowers on stout stalks.”

Trevor wrote: “Because it is an uncommon, but remarkable, plant of the South Island high country. Its habit is a superb visual complement to the broken rock areas which it inhabits.”

Miles wrote: “There’s simply no other plant quite like it.”

Worst Weed

The worst weed competition, which is in its third year, also had a clear winner, garnering 33% of the vote. This species is a pain all over the country and is, again, a much deserved winner. The winner of the 2014 Worst Weed as voted by you is:....

Veldt grass—*Ehrharta erecta*

This highly invasive and extremely successful pest was first recorded in Wellington in 1943. Since its arrival from South Africa, it has spread throughout the country. It has been recorded flowering every month of the year making it a prolific seeder. Its ability to propagate in low fertility areas makes it difficult to contain and has led to its spread into almost all environs of our country. This weed is a very justified winner of the 2014 Worst Weed.

Some of the very annoyed comments (wow, this plant really angers people) made by voters include:



The distinctive seed heads of the 2014 Worst Weed—*Ehrharta erecta*. Photo: Jeremy Rolfe.

Matt wrote, “*Ghastly weed the world over—it needs to be returned back to the veldt.*”

Chris wrote: “*It came in with nursery-bought plants and occupied shady and edge spaces where some of the more exciting native communities of my neighbourhood grow. It has taken 3 years to exhaust the seedbank but I have now eradicated it!*”

John wrote: “*Just trying to control it in your garden is enough to make me swear but look at what it is doing to our coastal areas, forests and lowlands.*”

Gerald wrote: “*What a pox of a plant.*”

Joel wrote: “*I loathe it—once it’s established, short of napalming your property* you just can’t keep on top of it. * And when the dust has cleared it will probably be the first thing to recover...*”

Peter wrote: “*Because, being a grass, it’s always being overlooked as a problem ‘weed’. It spreads like wildfire—nothing seems to stop it; it’s sun- and shade-tolerant, produces a mass of seeds within 2 months of germination, smothers everything and is spread by birds, in soil and illegally dumped garden waste. It’s now been collected in North, South, Stewart and Chatham Islands, and between 1 and 1000 m a.s.l.*”

The other worst weeds included species that are usually highly invasive and visibly detrimental to both urban and wild areas. These species include the rampant pampas grass, convolvulus and, as always, *Tradescantia*.

The New Zealand Plant Conservation Network would like to thank the hundreds of you who voted in our annual Favourite Plant / Worst Weed poll. This year has again found new and very worthy winners; we can only hope that this recognition will help our local flora gain more exposure, recognition and protection to guard its wonderful and unique qualities. Please vote again in November 2015 for your Favourite New Zealand Plant and Worst Weed; maybe an orchid will win next year.

New Zealand’s Top 10 Favourite Plants 2014	% of vote	New Zealand’s Top 10 Worst Weeds 2014	% of vote
1. Bartlett’s rata <i>Metrosideros bartlettii</i>	30.0	1. Veldt grass <i>Ehrharta erecta</i>	33.0
2. Kauri greenhood <i>Pterostylis brumalis</i>	19.0	2. Pampas grass <i>Cortaderia selloana</i>	11.0
3. Dobson’s speargrass <i>Aciphylla dobsonii</i>	12.5	3. Convolvulus <i>Convolvulus arvensis</i>	9.0
4. Kakabeak <i>Clianthus puniceus</i>	7.0	4. Tradescantia <i>Tradescantia fluminensis</i>	5.5
5. Kamahi <i>Weinmannia racemosa</i>	5.0	5. Rhododendron <i>Rhododendron ponticum</i> subsp. <i>ponticum</i>	5.0
6. Copper beard orchid <i>Calochilus herbaceus</i>	4.6	6. Darwin’s barberry <i>Berberis darwinii</i>	4.5
7. New Zealand gloxinia <i>Rhabdothamnus solandri</i>	3.3	7. Elaeagnus <i>Elaeagnus × reflexa</i>	4.2
8. Wiggywig <i>Muehlenbeckia astonii</i>	2.1	8. Aristea <i>Aristea ecklonii</i>	3.6
9. Wood rose <i>Dactyloctenium aegyptium</i>	2.0	9. Old man’s beard <i>Clematis vitalba</i>	2.7
10. <i>Dracophyllum townsonii</i>	1.6	10. Spanish heath <i>Erica lusitanica</i>	1.8

***Leptinella rotundata*—an enigmatic plant living life on the edge**

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Leptinella rotundata (as *Cotula dioica* var. *rotundata*) was discovered and described by Thomas Cheeseman from specimens he collected from ‘cliffs, Waitakere west’ in 1906 (Cheeseman 1906). Lloyd (1972) recognised its distinctiveness from the then *Cotula dioica* (now *Leptinella dioica*) and elevated it to species rank as *C. rotundata*. Although he noted it as occurring in two localities, his studies, his taxonomic decisions and all of his reproductive biological studies were based on plants found on the southern coastal slopes of Maunganui Bluff, near Aranga. The extinction of *Leptinella rotundata* from the Waitakere coastline seems not to have been explicitly stated by Lloyd (1972) or Given (1981) – though they both implied it. Rather it seems to have been Williams & Given (1981) who first stated it was extinct there and this view seems to have been accepted as a fact until its rediscovery there (reported below). Subsequently, as far as *Cotula rotundata* is concerned, aside from a generic adjustment whereby this species, and all the other indigenous New Zealand *Cotula*, save *C. australis* and *C. coronopifolia*, were transferred to *Leptinella* (Lloyd & Webb 1987) little more was said or done about this species.

Williams & Given (1981) and Given (1981) were the first to formally list this species’ conservation status (as “Endangered” using the IUCN system of that time). They also discussed the then widely perceived precarious survival of this plant, noting its presence at Maunganui Bluff owed much to the diligence of a local ranger and that it was threatened by weeds, grazing and recreational development. Wilson & Given (1989) added to that information noting that the species was threatened by ongoing coastal erosion. Somewhat enigmatically, Williams & Given (1981) also noted that a ‘small colony located about 2 km south of that known at present [i.e. Maunganui Bluff] could not be found in January 1979’. We can find no herbarium specimens or data about this population. Ironically, it seems that, as a consequence of Given’s comments in his first book (Given 1981), the Maunganui Bluff *Leptinella* site became rather too well known, and so, ironically, well collected by botanists and horticulturists alike.

The plants at Maunganui Bluff were, Lloyd (1972) noted, ‘monoecious’, each plant bearing staminate and bisexual capitula in roughly equal numbers. But, as with many things in nature, nothing is ever so simple, as the late Professor David Lloyd pointed out to one of us (P.J. de Lange hereafter ‘PdL’) during a conversation about this species in October 1991; at that time, Lloyd described this species as gynodioecious, with plants exhibiting either male capitula or sexual perfect (hermaphrodite) ones—and that’s the view of de Lange et al. (2010). But is this right? Read on.

In 1990, former New Zealand wildlife officer, and then Whangarei based Department of Conservation (DOC) technical officer, Peter Anderson, discovered a new population of *Leptinella rotundata* near Mitimiti, a small, remote coastal settlement, just north of the Hokianga Harbour. Peter’s find earned him a ‘Black Mac’—the then esteemed award for the plant find of the month, awarded by the DOC Northland botanist of the time, Lisa Forester. Plants from this site were held briefly in cultivation, and were deemed ‘female hermaphrodites’ by the late Professor Lloyd.

During October 1991, whilst *en route* to Pukenui (Houhora)—the initial staging post for an expedition by boat to the Three Kings Islands, PdL along with then DOC technician, Ian Flux, and former Percy Reserve manager, Tony Silbery, were investigating reports of an extant titirangi (*Hebe speciosa*) population at the Arai Te Uru, Hokianga South Head (the type locality of the species). There, whilst hanging precariously off the cliff face, another population of *Leptinella rotundata* was discovered. These plants, comprising ‘female hermaphrodites’ and the first entirely male plant to have ever been seen (D.G. Lloyd *in litt.*) grew under pohutukawa (*Metrosideros excelsa*), in open gaps amongst oioi (*Apodasmia similis*), harakeke (*Phormium tenax*) and in coastal turf dominated by *Selliera radicans* and *Samolus repens* var. *repens* right on the edge of a series of massive basaltic conglomerate cliff faces.

The largest population grew under wind-shorn, salt-blasted pohutukawa, but small pockets also grew where the wind and salt blast had shorn back the oioi leaving a narrow band 10–30 cm wide of coastal turf just above the cliff face. Surveying here is a dangerous affair but, in 1992, PdL, accompanied by Gillian Crowcroft, had another look, noting four disjunct populations scattered in this precarious habitat along a cliff face running some 800 m from the harbour entrance south to a large cleft in the cliff face which permits access to a small sandy beach. These finds suggested that *Leptinella rotundata* might potentially be found anywhere along Northland's west coast, and DOC staff were encouraged to keep an eye out for it.

However, aside from a 1996 visit to Mitimiti, where another population of *Leptinella* was found close to Anderson's 1990 site, no further populations were found until 2009 when one of us (Andrew Townsend) discovered a new population on the west coast of Te Paki near Scott Point. That population appears to comprise females and male plants (Fig. 1) and grew scattered over several kilometres of coastline in much the same habitat as that already described for Arai Te Uru, Hokianga (Fig. 2).



Figure 2. *Leptinella rotundata* habitat, Te Paki. In this image *Leptinella* plants grow at the head of an erosion scar amongst oioi (*Apodasmia similis*) and dried off harakeke (*Phormium tenax*). Photo: A.J. Townsend.

In 2010, a chance encounter by PdL with Cam Kilgour (now living in Australia, but then working on contract for the former Auckland Regional Council) on a ferry bound for Waiheke Island, resulted in the rediscovery of *Leptinella rotundata* in the Waitakere Ranges. Cam, ever keen to go out and have a look for things botanical had it put to him by PdL to try to rediscover the *Leptinella*. So Cam, armed with a detailed description of the species then known ecology and apparent habitat preferences, jokingly said he'd find it. All jokes aside though, it came as a considerable shock—but a good one—when Cam popped out to the Waitakere coast a few days later and, within a few hours, did rediscover it. Those populations (three in total) are, collectively, probably the largest known for the species. They occupy a range of habitats from cliff faces, associated talus slopes, and steeply sloping sand overlying sandstone. Its rediscovery was also somewhat of an embarrassment to local botanists inured to the idea the *Leptinella* was extinct in that area, since it was found literally on their botanical doorstep, along a portion of coastline that (of course) no one had ever thought worth looking for this species on. Another two populations were since found by Cam, Brenda Osborne and

Janeen Collings in coastal scrub and turf in two remote bays on private land to the south of Te Henga. If only the same could happen for the presumed extinct Waitakere endemic *Lepidium amissum*!

Concerns in 2009 that the Arai Te Uru and Maunganui Bluff populations had 'gone under' resulted in this species changing its threat status to 'Threatened/Nationally Critical' (de Lange et al., 2009; de Lange et al., 2010). This status change also resulted in the authors heading out to these sites in September 2010 to find out what was actually happening. The Arai Te Uru populations we confirmed as still extant, though there had been a decline of 50%, with the loss of two of those noted in 1992 that had been present on the actual cliff margins through coastal erosion. Also, the largest, the one found in 1991 under a pohutukawa, was now being subjected to a weed invasion as possums had been

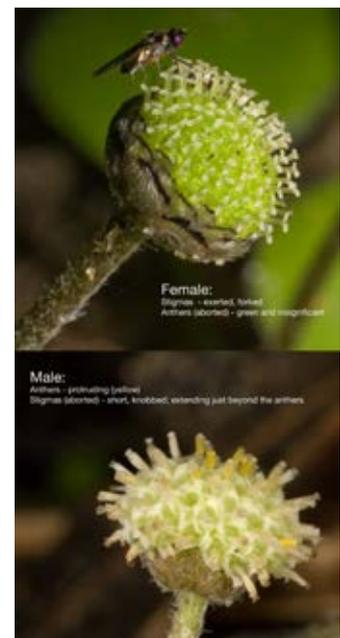


Figure 1. *Leptinella rotundata* female and male capitula, Te Paki population. Photo: A.J. Townsend.

impacting on the sheltering pohutukawa canopy, thereby allowing light-demanding weeds to get away. Similarly, at Maunganui Bluff, the species was rediscovered though there coastal erosion had resulted in a significant loss of core habitat. As such, the species though still persisting there, was now present in much smaller numbers and, having retreated upslope, was now potentially at risk of being shaded out by oioi and flax (*Phormium cookianum* subsp. *hookeri*).

A further problem at the Maunganui Bluff site is that, erosion aside, it is now impossible to know how much of the natural ‘population’ exists and how to distinguish that from ongoing translocations of cultivated material by local Waipoua forest guardian Stephen King and others. Irrespective, another brief site inspection in September 2014 suggests that, collectively, the Maunganui Bluff ‘population’ is continuing to deteriorate.

As well as confirming the persistence of the Maunganui and Arai Te Uru *Leptinella* sites, our 2010 survey inspired much ‘in-the-field’ discussion as to why this species had yet to be found between Maunganui Bluff and the Waitakere Ranges. Suitable habitat for *Leptinella* exists, for example, along the Ripiro Beach—but that area’s remoteness and difficulty of access we felt had perhaps hampered a more comprehensive survey of its biodiversity values. Subsequently, inspired by such musings, in late 2010, the senior author discovered a new population on the Ripiro Beach (Fig. 3), close to the tiny coastal settlement of Omamari. That population grows in a damp dune hollow under a sheltering canopy of wind shorn pohutukawa and it too comprises male and ‘female hermaphrodites’. Interestingly, this population occurs 8.5 km south of Aranga—was this, perhaps the enigmatic one reported by Williams & Given (1981) or is there another yet to be found between them?

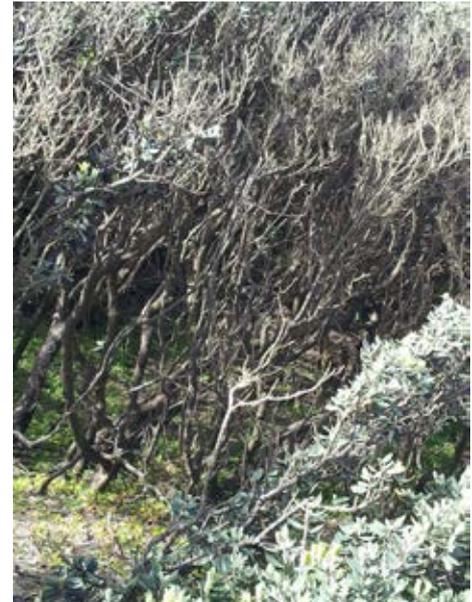


Figure 3. *Leptinella rotundata* habitat on the Ripiro Beach—*Leptinella* grows under wind-shorn pohutukawa (*Metrosideros excelsa*) in dune hollows.

Photo: P.J. de Lange.

Collectively then, since the species was first described, the number of *Leptinella rotundata* sites has increased to 11 spanning the west Northland coastline from Te Pahi south to the Waitakere Ranges. Despite these gains—and note that there have been as yet no population losses—*Leptinella rotundata* still remains a threatened species (de Lange et al. (2013) list it as ‘Threatened/Nationally Vulnerable’). Most of the known populations comprise a few square metres (only those in the Waitakere Ranges exceed this (though not by much)). Also, of those populations seen, only four comprise mixed sex-types, though, frustratingly, even at those sites the sex-types are not found intermingled (though it would also seem that the sexual expression of the species might need another look since, as far as we can tell, it is neither ‘monoecious’ or properly ‘gynodioecious’). Nothing is known about the species’ genetic variation either or the extent of gene-flow within populations. Based on the distances involved, we assume that gene-flow between populations is non-existent. Also, most (if not all) of the populations are at risk, not only from natural processes like coastal erosion (which probably benefits the species through creating fresh habitat but also threatens it if the habitat loss exceeds the habitat creation process) but also from possums, which damage the associated vegetation and even browse plants, by weed invasions (these often facilitated by possums opening up and/or destroying the surrounding vegetation), and possibly through inbreeding depression and other cryptic genetic issues. We just don’t know.

Of course the sex structure of *Leptinella rotundata* has its parallels in other *Leptinella*, e.g., *L. dispersa* subsp. *rupestris*, whose widely scattered populations comprise isolated male and females for which, as yet, no sites where both sexes co-exist have been discovered (C.C. Ogle, pers. comm.). The same pattern is also famously known for *Gunnera hamiltonii* (Gunneraceae), a strictly dioecious species in

which natural fruit set has yet to be reported (de Lange et al., 2010). The late Professor Lloyd in discussion with PdL (October 1991) was of course fascinated by this distribution of sex-types in *Leptinella* and wondered what it all meant – alas we still don't know – beyond the obvious that without co-existence natural sexual spread is unlikely. Also, we don't know whether 'selfed' seed produced by hermaphrodites will suffer from inbreeding depression and whether it will genetically retard those populations where in crossing is the only possible means of sexual reproduction. As is so often the case with our threatened plant flora, we find we are merely lifting the lid on a veritable Pandora's box of management issues impacting on our ability to undertake effective conservation measures. Obviously, someone needs to study the population genetics of this species – and maybe this article will encourage a 'someone' to do it.

We now have some better idea of this species' ecology. In summary, we have observed that, with the exception of the Ripiro Beach and some of the Waitakere Range populations that grow within sand dunes, all the other ones have been found on coastal headlands and cliff faces, invariably within the ecotone being coastal scrub and tree land, flax land and oioi rush land (Fig. 4), in coastal turf, especially in those places kept open by salt blast and wind ablation (Fig. 5). Whilst thriving in semi-shade, the species clearly requires vegetation 'windows' and is soon lost where the overlying vegetation thickens, or through competition from other ground covers like *Tetragonia implexicoma*. Seasonal drought, although killing *Leptinella*, has also been noted as aiding it through the elimination of other associated ground covers. It seems that so long as some stems of *Leptinella* persist, it can rapidly recolonise those sites where other herbs have been drought stressed 'out'.



Figure 4. Another example of *Leptinella rotundata* habitat at Te Pahi, here plants grow in light gaps amongst harakeke, oioi and wiwi (*Ficinia nodosa*) and toetoe (*Austroderia* aff. *splendens*). Photo: A.J. Townsend.



Figure 5. *Leptinella rotundata* plants grow in exposed coastal turf around margins of basalt boulders, at Maunganui Bluff. Although not a preferred habitat, provided there is a little shelter *Leptinella* can persist in these situations and sometimes may even form large colonies. Photo: A.J. Townsend.

So at least we can now better define where to look for this species. Cultivation also offers some clues. For example, our view that it has a preference for semi-shade is demonstrated by cultivating this species. *Leptinella rotundata* fares poorly in exposed conditions. The species is also short-lived, commonly thriving for a few years, then dying out, usually from the centre of well-established plants. To keep it, requires constant 'reviving' by planting the outer stems into fresh soil. These traits suggest a species that naturally moves about and, certainly in the habitats where we have seen it, support the idea that constant disturbance is needed to maintain it. What we don't understand is how it gets about these habitats, especially in those single-sex sites where plants may be found tens to hundreds of metres apart. Its clandestine disperser has yet to be observed—we doubt it is being moved by the wind much, but water flooding across its precipitous habitats during heavy rain fall must move some seed and also plants through detachment. But water alone cannot explain some of its occurrences—we speculate that maybe burrowing seabirds such as shearwaters and petrels (several of which are still extant

in *Leptinella* habitats) may have moved it about. Again there is so much we don't know that 'someone' out there needs to study.

In the interim, *Leptinella rotundata* remains a seriously threatened species. Because it is short-lived and tends to die out centrally it doesn't seem to be widely cultivated. Ex-situ stocks therefore offer little in the long-term to secure this species. Understanding its autecology, supplemented by increasing our knowledge of its population genetics, in site and between site genetic variation will. We hope this article will stimulate an interest to see such work done. In the meantime, there is also the hope that these notes will encourage other 'westies' out there to start looking, as we have shown, this plant may very well be in your west coast bach back yard, and why is it confined to west Northland? We suggest looking along the South Kaipara Beach, and along the western Manukau—western Waikato coastline.

Acknowledgements

Peter de Lange wishes to thank Si Burke and Candy Elsmore for accommodation at Omamari, and transport along the Ripiro Beach.

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New rhizobial species nodulate *Sophora* in New Zealand

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Sophora (kowhai, 8 spp.) in the tribe Sophoreae is one of only four legume genera native to the main New Zealand islands. The others are the closely related *Carmichaelia* (New Zealand broom, 23 spp.), *Clianthus* (kakabeak, 2 spp.) and *Montigena* (scree pea, 1 sp.) in the legume sub-tribe Carmichaelinae. All four genera are capable of forming symbioses with nitrogen fixing bacteria (rhizobia) in root nodules.

Previously, we reported that although *Montigena* is confined to a specialised scree habitat, it does not have its own specific rhizobia, but shares a group of rhizobia with *Carmichaelia* and *Clianthus*; these strains did not nodulate *Sophora* spp. (*Trilepidia* 116: 7). A major finding was that the nodulation genes of rhizobia that nodulate *Montigena*, *Carmichaelia* and *Clianthus* are very different from those of rhizobia outside New Zealand and on current evidence, unique to New Zealand rhizobia. These rhizobia are likely to be an unnamed species of the genus *Mesorhizobium*.

Here we report on 45 five rhizobia isolated from *Sophora* spp. sampled at six sites in the South Island: alluvial limestone river terrace, Waima/Ure River, Marlborough (41° 52'S 174° 0'E, 147 m); alluvial outwash river fan, Pororari River, Westland (42° 6'S



A nodule from *Sophora microphylla* growing along the Rakaia River.

171° 20'E, 1 m); margin of estuary, Saltwater Creek, Greymouth, Westland (42° 30'S 171° 9'E, 2 m); margin of Greywacke rock outcrop, Kowai River, Springfield, Canterbury (43° 19'S 171° 46'E, 612 m); alluvial Greywacke river terrace, upper Rakaia River, Canterbury (43° 26'S 171° 34'E, 357 m) and among Haast Schist rock outcrop, Waitaki River, Otago (44° 53'S 170° 48'E, 126 m).

The nodulation genes of these *Sophora* rhizobia are very different from those of rhizobia from outside New Zealand and those of rhizobia previously shown to nodulate *Carmichaelia*, *Clianthus* and *Montigena*. The rhizobia from *Sophora* did not nodulate *Carmichaelia australis* but, surprisingly, most of them did produce nitrogen-fixing nodules on *Clianthus puniceus*. Thus, *Clianthus puniceus* can share some rhizobia with *Sophora* spp. and others with *Carmichaelia* spp. and *Montigena*. Analysis of DNA indicated that there are at least five new *Mesorhizobium* spp. within the 45 rhizobia isolated from *Sophora*. Generally, rhizobia from the same field site grouped together in relation to their genetic profile and this could, at least in part, be due to adaptation of the bacteria to local conditions outside the plant. The 'drivers' for the diversity of *Sophora* rhizobia are unknown. Characteristics of the sampling sites may be important since the field sites represent a variety of South Island habitats, including parent rock type (e.g., schist, greywacke and limestone), substrate (alluvium and rock outcrop), and rainfall (> 2500 mm in western South Island, < 1000 mm in eastern South Island).

Acknowledgement

This work was supported by the Brian Mason Scientific and Technical Trust and a Lincoln University Doctoral Scholarship (HWT).

Iconic, endangered and declining: Bartlett's rata, "Threatened – Nationally Critical"

Matt Ward, NZPCN Council (mattwardward@gmail.com)

Rata moehau, Bartlett's rata (*Metrosideros bartlettii*) (Fig. 1) was crowned the New Zealand Plant Conservation Network's (NZPCN) Favourite Plant of the Year for 2014. Few other species epitomise the foundation of the Network, a species in decline with an amazing and unfortunate story. This article will briefly describe the species and then provide some background to its discovery, plight and future. The author has taken much content from Peter de Lange's recent correspondence about rata moehau and will therefore reflect his passion for this species' plight in as much detail as possible.



Figure 1. *Metrosideros bartlettii*, Te Pahi. Photo: Peter de Lange.

Description

A mature rata moehau specimen can reach an impressive height of 30 metres, with a massive trunk as large as 1.5 metres diameter. Rata moehau, like northern rata, begins its life as an epiphyte (see Fig. 2). Germination occurs on the limbs of species such as puriri (*Vitex lucens*), kohekohe (*Dysoxylum spectabile*), and taraire (*Beilschmedia tarairi*) or on the trunk of mamaku (*Cyathea medullaris*). The sapling then sends its roots down into its favoured damp substrate below. The trunk will form initially



Figure 2. An epiphytic seedling of *Metrosideros bartlettii*, Te Pahi. Photo: Jeremy Rolfe.

from coalesced roots, depending on how high above the ground the specimen begins tending to govern the height of the primary trunk (Dawson, 1985). The leaves are shiny above and have a visible vein network below, similar to those of northern rata, but lacking the notched tip. The bark of the mature specimen is pale, spongy and readily sheds into soft flakes. Blooming during October and November, the flowers are white (see Fig. 1) and smaller than those of northern rata or pohutukawa. Rata moehau seed capsules mature during March and April; fertile seed is rare and looks most similar to southern rata (Webb & Simpson, 2001), with unfilled infertile seed looking more like pohutukawa seed.

Background

Amazingly, this species was not discovered until 1975 by John Bartlett, a teacher and amateur botanist from Auckland. Initially, the suspicion that this may be a unique species of rata was based on the observations of its bark. Bartlett noted its pale grey, almost white, spongy bark (Fig. 3) was very different from that of northern rata and pohutukawa, the other tree rata species found in the North Island. In 1984, when flowers were finally collected from a specimen by Nigel Clunie, there was no doubt that this was indeed a new species and endemic to only two sites in western Te Pahi (Kohuronaki and Radar Bush). Clunie was amazed by the flowers' colour describing the specimen in flower as "like snow over the tree crowns". With the collection of flowers, John Dawson was able to submit a botanical description and name the species, the name *Metrosideros bartlettii* was recognised in June 1985, then published in 1986.



Figure 3: The pale grey, spongy bark of *Metrosideros bartlettii*. Photo: Jeremy Rolfe.

Present

Rata moehau (or Bartlett's rata) is in a serious situation because the largest population occurs on privately owned waahi tapu. This population, only the third, was discovered in 1991 by Peter de Lange, Tony Silbery, Tim Shaw and Mike Avis. This population is in terminal decline because of a flourishing possum population. All of the trees occur in the tops of other trees, making seed sampling extremely difficult. As far as is known, there is no material from this site in cultivation.

The other trees in western Te Pahi occur on public conservation land and are managed for possums. The Department of Conservation (DOC) has been made aware that the largest population, mentioned above, was being eliminated by a virtually uncontrolled possum population. This population cannot be directly managed, because the iwi concerned has been busy with complex treaty settlement claims.

Currently, more work on what genetic diversity is left in the wild and in cultivation is being undertaken. Earlier work (Drummond et al., 2000) on the extant wild population of rata moehau showed that most of the genetic diversity is present within the privately owned rata moehau population. Rata moehau is self-incompatible; their work showed that the western Te Pahi trees are more closely related to each other than those in the east, therefore seed taken from western populations will do little in the long-term to secure the species.

Future

Work is underway to better understand this species. DOC and Landcare Research, along with iwi, will be seed banking all known wild plants as well as collecting tissue for DNA sequencing. This work will start in March–April 2015 and finish in June 2015. DOC will also be sampling as many cultivated plants as possible; this should resolve where the plants are from.

To further complicate the plight of rata moehau (a member of the myrtle family), New Zealand is expecting the arrival of myrtle rust (*Uredo rangelii*), presently rampant in Australia and has already reached New Caledonia. In New Zealand, DOC is uncertain what it will do. It does damage *Metrosideros* but to what degree it will affect rata moehau remains unknown. It is imperative that plants from the private population are bought into cultivation to ensure retention of the species' genetic diversity and as a preventive for when myrtle rust arrives.

Conclusion

Rata moehau epitomises a species in trouble, which is why NZPCN was formed. At up to 30 metres high this fantastic species is a dramatic site to see in bloom with its beautiful white flowers instead of the more commonly known red flowers of pohutukawa and rata. This seriously threatened tree is in serious decline with only 25 known individuals left in the wild down from 32 in the early 1990s (and most of those 25 are in ill thrift or dying). This means it more rare than kakapo. A favoured diet of the pestilent possum, many of the remaining specimens are found on private land without possum control making them very susceptible to attack. The small number of individuals, growing in three extremely isolated sites and the virtual lack of effective pollination vectors means very little if any outcrossed seed is set, affecting recruitment through inbreeding depression. Past research indicates that there is very little genetic variation left in this species and, alarmingly, most of that occurs in the largest population, which is on private land with complex legal access issues. The lack of genetic variation in the wild is compounded by the apparent lack of genetic diversity in cultivated material most of which is suspected to come from a single tree. The sad story of this species really depicts how much it needs our help, so we are very happy it has been recognised as the 2014 Favourite Plant.

The fact such a striking tree had escaped recognition for so long adds to the mystery and importance of this taonga. If possums were controlled in the areas where this exceptional species exists, its survival would be guaranteed. A species as rare in the wild as rata moehau should not be allowed to be destroyed; we as caretakers should find a common cause and determination to focus on this issue, Te Pahi's floral kakapo is going to become extinct without our intervention.

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Network Award winner wins the Prime Minister's Future Scientist prize

The 2013 Network Young Conservationist, Tim Logan from Darfield High School, has gained even higher recognition of his conservation efforts. He was recently the recipient of the Prime Minister's Future Scientist prize of \$50,000 and scholarship. This prize and scholarship were for his investigation into the survival of endangered New Zealand plants. His study, which involved a modelling programme, showed that grazing stock could help save some endangered native grassland species but could be highly detrimental to others. The prize should allow him to become suitably qualified to follow his dream of discovering what New Zealand looked like 1000 years ago.

The Network joins in congratulating Tim on his success and looks forward to the day when he fulfils his dream.

New Zealand Indigenous Flora Seed Bank (NZIFSB)—Training collectors in Dunedin

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The second NZIFSB seed collecting workshop in the South Island was held at Dunedin Botanic Garden in November with a collecting expedition at Flagstaff Reserve on the second day. Fifteen participants from a range of backgrounds took part. Participants were from the Dunedin Botanic Garden, which hosted the training workshop, Christchurch Botanic Gardens, the Department of Conservation, Otago University, Otago Polytechnic, the Eastern Institute of Technology and the New Zealand Plant Conservation Network as well as members of the public with a keen interest in being collectors for the project. The training was led by Craig McGill and discussed seed collecting protocols including defining the collecting population, protocols for determining when seed is ready to be collected, how to handle the seed between collecting and dispatch to the seed bank to ensure seed quality is not lost and how to identify seed that may be desiccation-sensitive. John Barkla, Partnerships Ranger, Coastal Otago District, discussed the permissions that must be obtained before collecting. The expedition to Flagstaff Reserve was an opportunity for participants to put into practice the theory they had learnt the day before. Zane Webber from the Margot Forde Forage Germplasm Centre (AgResearch) in Palmerston North gave an insight into some of the challenges of collecting seed in isolated regions overseas and Jesse Bythell an overview of the NZPCN website and some of the features it contains that may be helpful to collectors. Our thanks go to Dunedin Botanic Garden for hosting the training; the help and input was very much appreciated. The Dunedin training marks the end of the collector training for 2014. In 2014, there have been training workshops in the upper and lower parts of both the North and South Island. As a result, there are now 82 trained collectors throughout the country. This provides a solid base on which to build the collecting programme for 2015 and beyond.



Tom Myers and Lucy Grigg from the Dunedin Botanic Garden discuss the field data form with Zuni Steer before collecting at Flagstaff Reserve, with Max Crowe in the background.

APOLOGY

***Going Native: growing and using New Zealand native plants* by Ian Spellerberg and the late David Given. 2009 reprint**

In *Trilepidea* 132, we announced that the above publication was being remaindered by Canterbury University Press. However, the decision to do that was later revoked but the newsletter editor did not receive that information. We apologise to any members who tried to get a copy at the remaindered price only to be told it was not available at that price.

UPCOMING EVENTS

If you have important events or news that you would like publicised via this newsletter please email the Network (events@nzpcn.org.nz):

Wellington Botanical Society

Field trip: Wednesday 7 to Tuesday 13 January 2015 for the Summer Camp Trip to Nelson Lakes National Park and vicinity. **Accommodation:** Travers-Sabine Travellers' Lodge, St Arnaud, Lake Rotoiti; a motel nearby or DOC campsite by lake (for independents). Bring fresh antihistamine in case of wasp stings.

Leader and Contact: Mick Parsons, ph: 04 972 1148 or 06 273 8078 or 027 249 9663, email: mtparsons@paradise.net.nz; booking ESSENTIAL if you intend to go. Menu organiser: Bev Abbott. Registration: registration form download [here](#).

Nelson Botanical Society

Field trip: Sunday January 18, 2015 to Rawhiti Cave, Packard Road, Golden Bay. **Meet:** at the Church steps at 8.00 a.m. **PLEASE** register interest by Friday, 16 January.

Leader: Shannel Courtney, ph: 03 546 9922, email: scourtney@doc.govt.nz

Canterbury Botanical Society

Field trip: Friday 9 to Thursday 15 January Summer Camp based in Tapawera. **Accommodation:** in cabins, motel units or camping at Tapawera Settle Motels and Campground; book now with the leader.

Camp leader: Trevor Blogg, ph: 03 319 8850, email: tblogg@extra.co.nz.

University of Canterbury summer course: Practical Field Botany BIOL305

Dates: 20 – 28 January 2015. This is an intensive, short summer course designed to meet the need for training in the collection, preparation, and identification of botanical specimens. **Venue:** University of Canterbury Cass Mountain Research Area, Canterbury.

Enrolment: starts 7 October 2014.

Information: Dr Pieter Pelser, ph: 03 364 2987 ext 45605, email: pieter.pelser@canterbury.ac.nz.
