TRILEPIDEA

NEWSLETTER OF THE NEW ZEALAND PLANT CONSERVATION NETWORK

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President's message

I am often impressed by how advances in technology assist our plant conservation efforts. The loss of indigenous vegetation across the New Zealand landscape has, in the past, been very difficult to quantify. The Landcover Database provides a technique to measure changes in land cover over time. It is a digital map of New Zealand that is created using satellite imagery. There have been two editions produced so far (1996/97 and 2000/01). It has recently been confirmed that Landcare Research will create two more editions to show land cover in 2008 and 2012. This is good news because the resulting information can be used to inform policy or management by showing where loss (or gain) is occurring. I look forward to seeing the third edition when it is released next year.

The NZPCN website continues to provide a popular resource for those interested in finding information about New Zealand's flora. The new plant factsheet PDF maker, funded by TFBIS, is a great addition to the site. The printed factsheet has a very attractive layout and contains all the information you need about a species. Please make use of this resource to encourage others to learn about our indigenous plants. The more that New Zealanders understand and appreciate their unique plant life, the more likely it is that plant conservation efforts will be supported.

Philippa Crisp
Greater Wellington

PLANT OF THE MONTH – *COPROSMA TALBROCKIEI*

Coprosma talbrockiei. Photo: Simon Walls.

Plant of the month for August is *Coprosma talbrockiei*. *Coprosma talbrockiei* is endemic to north-west Nelson, mainly in Kahurangi National Park, in the Gouland Downs and Aorere area, and also on north side of the Buller Catchment. It grows in sub-alpine and lowland sites, often on peat or in poorly drained, impoverished soils with moss cushions, lichen or within *Donatia novae-zelandiae*.

It is prostrate with only slightly woody short stems bearing mid-green glabrous leaves arranged in threes about the stem nodes. Fruits are opaque, white, and scurfy (have a loose flaky crust coating the surface), reaching about 5 mm diameter. *Coprosma atropurpurea* is similar, but differs by having thicker woody stems, some stiff hairs on the leaf, and translucent, dark red to purple black fruits.

Recent study suggests that *C. talbrockiei* might be better placed in the genus *Durringtonia* or in a genus of its own. *Coprosma talbrockiei* is nationally endangered with no large populations. All plants seem to produce fruit but seedlings are scarce. Gorse may pose a threat at some sites. The Network fact sheet for *C. talbrockiei* can be found at: www.nzpcn.org.nz/flora_details.asp?ID=455

Tree Protection in Auckland from 1 January 2012

Sigrid Shayer, Chair, The Tree Council

Our concerns about the implications for tree protection following the recent changes to the Resource Management Act have been subdued by a recent decision by the Environment Court (31 May) (see: www.thetreecouncil.org.nz/news_detail.php/article/154/). The Court has ruled that many situations covered by existing tree protection rules will continue to be legitimate after 1 January 2012, the date when the RMA changes come into operation. The Council is now confident that there are mechanisms available to it to provide a degree of protection to urban vegetation beyond what was first anticipated as possible with the RMA. The effect of the amended Act is that rules can only be used to protect "trees or groups of trees" that are "specifically identified" in the District Plan, and if they are in an urban environment (for definition, see box).

Auckland Council applied to the Environment Court seeking direction on what "*groups of trees*" might include, and what was required to ensure trees and groups of trees were "*specifically identified*", as worded in the amended RMA legislation. The original councils involved in taking this action were Waitakere City, North Shore City and the Auckland Regional Council, supported by the Environmental Defence Society, Waitakere Ranges Protection Society and The Tree Council. A spectrum of eight rules from the Auckland Council District Plan (Waitakere) and the Auckland Council District Plan (North Shore) was the subject of the declaration.

Implications

Auckland Council's legal advisors have undertaken a comprehensive assessment of relevant rules in the Auckland Council District Plan, providing much greater clarity on which of the existing rules will still be legal on 1 January 2012, and on the range of provisions available to the Council for use in the Unitary Plan. The declaration relates specifically to some residential zones and natural areas in Waitakere and North Shore, but is interpreted to be able to apply to all councils – to what is existing now and to future changes. The Council's legal team consider that more existing Auckland Council District Plan rules will be able to remain than anticipated, for instance in residential or heritage zones, for ecological or landscape reasons.

The Council considers therefore that it will be unnecessary and inefficient to pursue adding trees to the Schedule of notable trees if they are in these particular still protected areas, e.g., Titirangi/ Laingholm; clifflines around the Waitemata Harbour. The legal advice and its implications are to be reported to the Regional Development and Operations Committee of Auckland Council in September. Staff are currently working on a communication plan for the public.

THIS IS ALL GOOD NEWS!

The Resource Management (Simplifying and Streamlining) Amendment Act 2009 (the Simplifying Act) amended the Resource Management Act 1991 (the RMA) through the insertion of the direction that "… a [District Plan] rule must not prohibit or restrict the felling, trimming, damaging, or removal of any tree or group of trees in an urban environment unless the tree or group of trees is… specifically identified in the plan; or… located within an area in the district that… is a reserve (within the meaning of section 2(1) of the Reserves Act 1977); or… is subject to a conservation management plan or conservation management strategy prepared in accordance with the Conservation Act 1987 or the Reserves Act 1977."

The Simplifying Act introduced a definition of what "urban environment" means for the purpose of this provision. To be with an urban environment a site must be:

- 4000m^2 or smaller; and
- be connected to reticulated water supply and sewerage; and
- have on it a building which is used as a dwelling, or for industrial or commercial purposes.

This means that most development sites will still be covered by general tree protection rules, as there will not be a building, and in many cases not have any reticulated water or sewage. Sites over 4000m^2 will also still be covered.

As published in the Tree Council's winter edition of Arborea

Kermadec Biodiscovery Expedition 2011 (Part II – The Meyers)

Peter de Lange, Department of Conservation (pdelange@doc.govt.nz)

The Meyer Islands (Fig.1) are a confusing bunch, depending on which map or book you read they are "The Meyers", "The Meyer Islands", sometimes part of the "Herald Islets" (and then, *helpfully* known as a subset of these "The Meyers") or simply referred to as "Meyers". I remain confused but have opted for distinguishing them from the outer Herald Islets (Dayrell, North, South and West Chanter) and Napier and Nugent (which seem to have no collective and are usually referred to by their name and nothing else) as "The Meyers".

In May 2009, I had been promised a visit to The Meyers, which one could glimpse every day from the look out at Matatirohia (if the weather was good). I had been told that these islands had the nicest forest in the Kermadecs and were *the* place to see *Senecio kermadecensis* (which one can otherwise see only as a few desultory plants persisting on Raoul in the Accommodation House garden). However, my two and half days there never permitted such an excursion; instead I had to look at them frustratedly when they were so tantalizingly close to Fishing Rock as I prepared to depart Raoul.

Figure 1. The twin humps of North Meyer Island and South Meyer Island (right hand side) as viewed from Fishing Rock, Raoul Island (May 2009). South Chanter and a portion of North Chanter (two of the Herald Islets) are just visible behind South Meyer and to the left of North Meyer, can be seen Dayrell (the western most of the Herald Islets).

So things were decidedly different when on May 12 2011, we ended up moored off North Meyer. This mooring said by *RV Braveheart* skipper, Matt Jolly, to be "the best mooring Raoul can offer" gave us an excellent view of the western slopes. However, as the sun came up what we saw shocked us (Fig. 2). There was no forest, only devastation. All of this was the result of Cyclone Bune that had screamed into the Kermadec Islands on 28 March 2011. Of it, Jess Clark, Head Ranger, Raoul Island, remarked, "At first, we were excited at the prospect of experiencing our first cyclone but after a while, when its intensity increased, the power went out and trees flew by the windows, the gravity of the situation sank in and many of the volunteers who had laughed it all off initially were very upset by the time it had passed". Back in Auckland, I had heard from Auckland Conservancy staff that "Cyclone Bune had made a bit of a mess of Raoul, and especially The Meyers". As I viewed the western side of The Meyers I realised that this was indeed the "mother of all understatements"; North and South Meyer were a mess (as was, we were soon to learn, Raoul). Where previously dense Kermadec pohutukawa (*Metrosideros kermadecensis*) had festooned the steep breccia cliffs, there was now a bleak skeletal forest of torn trunks, tossed branches, uplifted root stocks, huge slip scars and lots of red-brown earth streaming in rivulets into the sea (Fig. 3). Effectively the forest had all but gone and the only greenery to be seen was mostly a mass of blue billy goat weed[1] (*Ageratum houstonianum*) (Fig. 4). The obvious abundance of this weed was a real concern, as earlier in 2004, then Auckland Conservancy, Department of Conservation Botanist, Bec Stanley, had identified this, quite correctly, as the most serious threat to *Senecio kermadecensis*.

Figure 2. North Meyer (western side) at dawn, 12 May 2011, showing cyclone damaged forest. The bright green mass in the centre of the island is an almost monospecific growth of blue billy goat weed (*Ageratum houstonianum*). Photo: Malcolm Francis.

1. A ridiculous vernacular if there ever was one!

Figure 3 (left). Western slopes of North Meyer showing forest destruction and fresh erosion scar caused by Cyclone Bune.

Figure 4 (centre). Blue billy goat weed (*Ageratum houstonianum*) seedlings growing in cyclone damaged forest. Other associated ground cover plants include *Paspalum dilatatum*, black nightshade (*Solanum nigrum*), *Solanum nodiflorum*, *Siegesbeckia orientalis*, *Oplismenus imbecillus* subsp. *imbecillus*, and *Carex kermadecensis*. Forest trees include karaka (*Corynocarpus laevigatus*), mahoe (*Melicytus* aff. *ramiflorus*), Kermadec ngaio (*Myoporum rapense* subsp. *kermadecense*) and Kermadec pohutukawa (*Metrosideros kermadecensis*).

Figure 5 (right). Thomas The Tank Engine—the preferred tender used to land on the outer Kermadec islands—getting ready to set off from the *RV Braveheart*, Matt Jolly (skipper), Broughton Lattey (*Braveheart* crew), Warren Chinn (Entomologist, Department of Conservation) and Peter de Lange (Botanist, Department of Conservation). Photo: Malcolm Francis.

Stepping into the tender "Thomas" (as in "Thomas the Tank Engine" because the tender was built like a tank according to Matt Jolly), we headed off, watched by an appreciative audience crowding the deck of the *Braveheart* (Fig. 5). So we did our best trying to look confident and assured, and not in the slightest unnerved by the numerous Galapagos sharks (*Carcharhinus galapagensis*) circling about us. As for the landings, we knew that they were to be bow landings and that we would need to leap off as required by the skipper and land with "graceful" precision, sometimes on cliff faces. Thankfully, our first such test landing was on North Meyer, at "Boat Harbour" (not really a harbour by any stretch of the imagination), because this proved to be some of the calmest water we experienced on the smaller Kermadec Islands. I landed first, judging that having done numerous such landings on islands around New Zealand and the Chathams, it was the best course of action. Of course, I had forgotten that I had just spent three days being tossed about on the long trip from New Zealand and now had acquired an excellent set of sea legs at the expense of my land legs, so my gracefully planned two point landing turned into a drunken ballerina effort that only narrowly avoided throwing me back into the sea. Landing was also made worse by the rock of the intertidal zone on the island, which, due to some microscopic algal slime, turned out to be incredibly slippery. This proved to be a serious problem at all of our future island landings except Raoul.

As Matt and "Thomas" departed, Warren and I looked up the cliffs of North Meyer, while thousands of roosting and nesting Kermadec petrels (*Pterodroma neglecta*) looked benignly back at us (Fig. 6) and, overhead, flying red-tailed tropic birds (*Phaethon rubicunda*) screamed abuse. From my New Zealand experience of pest free islands I was quite used to the noise of nesting sea birds but to see thousands of petrels sitting on the ground, some on eggs, some not, was something entirely new.

Figure 6. Nesting white phase Kermadec petrel (*Pterodroma neglecta*), North Meyer. Note surrounding landscape now devoid of vegetation as a result of the passage of Cyclone Bune.

They were also absurdly tame, taking Warren and me back several hundred years to a time when numerous unexplored islands had first been landed by sailors who were also greeted by similar docile, unconcerned wildlife. The petrels came in three colour phases, dark charcoal grey, whitish grey or almost completely white. Kermadec petrels, we also discovered, had a wide repartee of calls, the most amusing of which sounded like a donkey in the final throes of a long hard bray followed almost immediately by a series of asthmatic wheezes that would usually signify death in a human. Mercifully, the tameness of the petrels meant that with careful walking one could pirouette between the completely unfazed birds. Less obliging were the wedge-tailed shearwaters (*Puffinus pacificus*), whose nearly fledged chicks sat in a desultory manner outside their burrows, their parents having left them, in a deliberate starvation strategy, to force them to fly and find their own food. This meant that we were greeted by these incredibly stroppy, hungry birds that seemed to assume you would be feeding them and, when food was not forthcoming, the grumpy tikes tended to take a painfully wicked nip out of your legs as you passed them by. Petrels and shearwaters aside, we also saw a few Kermadec kakariki (*Cyanoramphus novaezelandiae cyanurus*) who also completely ignored us as they frantically ferreted about for food. It soon became evident that food was indeed a real life and death issue for these birds, since we saw more dead than alive kakariki, the dead having mostly expired from starvation. These deaths were probably the result of Cyclone Bune having destroyed virtually every edible resource on the Meyers. Although most dead kakariki had been clearly killed by starvation, we also noted a few of the dead bearing a distinct circular hole in their head. The cause of this was soon explained when I saw a kakariki that got too close to a nesting Kermadec petrel. The apparently docile petrel, suddenly, and without any obvious warning, neatly dispatched the seemingly unfortunate kakariki with a quick "thock" of its hook-ended bill to the bird's head. I say "seemingly unfortunate" because on another occasion I observed a trio of kakariki thugs pestering a nesting petrel, which once it got up to deal to one of the kakariki "thugs" immediately lost its egg, as the two other kakariki shot in from behind and dislodged and then rolled the egg out of the petrel's protection where it set off down slope, whereupon the bouncing on various rocks soon cracked it so providing its contents as food to the kakariki trio.

My first botanical task of the day was to collect seaweeds. This was not exactly easy, as I soon found that seaweeds in the Kermadecs were neither abundant nor safe to collect and, as already mentioned, the rocks of the intertidal zone are very slippery. Most seaweed I found grew on the shell surface of the giant Kermadec limpet (*Patella kermadecensis*) and these limpets lived in the surge zone. So collecting required the careful art of judging surges while trying to scrape alga off limpets. It wasn't good working conditions and I initially lost many specimens until eventually I got as near a complete range of seaweeds as I could see. Having done that, I then turned to lichens, all of which were minute crustose, saxicolous taxa, so necessitating the use of hammer and rock chisels. As any lichenologist will know, I soon found that when you start looking properly you begin finding more and more lichens. Eventually, due to time constraints, I had to put lichen collecting aside to explore the island. Thanks to Cyclone Bune, this proved an exacting task, because one was never sure if the ground you were traversing was truly sound while climbing through storm wrecked vegetation and rock over which numerous nesting, and/or roosting petrels were distributed. It was very difficult and time consuming. Although the cyclone had struck in late March, its passage had left large tracts of unstable bare earth that subsequent rain storms continued to dislodge. Consequently, I found numerous live Kermadec petrels trapped by their wings or tails in fresh mudslides that had come down during the previous night's rainfall (Fig. 7).

Figure 7. A live trapped Kermadec petrel (*Pterodroma neglecta*), one of many seen that had been trapped by the previous night's (11 May 2011) mudslides activated by the combination of unstable soil and heavy rainfall.

Although the forest had been completely trashed, it is important to stress that this is a natural process to which the vegetation is adapted. The stumps and basal branches of Kermadec pohutukawa and ngaio (*Myoporum rapense* subsp. *kermadecensis*) were already covered in new growth and many of the ngaio seen were already flowering heavily. Karaka (*Corynocarpus laevigatus*), mahoe (*Melicytus* aff. *ramiflorus*) and parapara (*Pisonia brunoniana*) were also re-sprouting and, in the case of both mahoe and parapara, in full flower. Sadly the ground cover was virtually dominated by blue billy goat weed and I didn't see any *Senecio kermadecensis* until I reached the summit ridge. Here I found numerous patches of *Senecio*, though only as seedlings and, sadly, many of these being outcompeted by blue billy goat weed (Fig. 8). Though in the long-term I doubt that the *Senecio* will be completely extirpated from the Meyers by this weed, I do feel that it will decline on these islands to such an extent that it will become extremely scarce. At that stage it will become even more vulnerable to other stochastic events like, for example, cyclones. I hope I am proved wrong.

Figure 8. *Senecio kermadecensis* seedling surrounded by, and being smothered by, blue billy goat weed (*Ageratum houstonianum*), North Meyer Island.

After several hours of traversing the cyclone-ravaged landscape, it was time to return to the shoreline. Aside from seaweeds, my collections comprised mostly lichens (including some nice examples of *Ramalina luciae* and *R. pacifica*), a few mosses (mostly *Bryum dichotomum* and *Fissidens leptocladus*) and a few liverworts (notably *Frullania pentapleura* and *Lejeunea* "hodgsoniae"). A request by Leon Perrie and Patrick Brownsey for DNA and herbarium material of two ferns (*Pellaea falcata* and *Pyrrosia*) was also fulfilled. While waiting for our pick up, a swim in a 3 m deep rock pool provided a few more seaweeds (including some brown epiphytic species growing on *Pterocladiella capillacea*—the largest red seaweed I saw on the expedition). It was here that I also had an unpleasant foot encounter with a sea urchin that was to dog the rest of my trip through an unanticipated infection. As Warren and I sat and waited for our pick up, it was time to reflect on our first day in the field on The Meyers.

Ultimately, North Meyer had provided nothing botanically new to the islands and one could say that it was really rather disappointing. However, I expected to find nothing new as the vascular flora of the islands has been very well explored and described by a succession of botanists, most notably Bill Sykes, and the island had been badly damaged by Cyclone Bune, so my first day's result was hardly surprising. Further, I felt privileged to see the island in this early state of recovery because, as I said, cyclones are a natural part of these islands and in New Zealand their impact is rarely that well documented. Such stochastic events are critical to maintaining the islands' ecosystems because they release fresh nutrients and create new habitats. It is the weeds that we humans have introduced that are the long-term problem, because, despite our best efforts, we simply cannot control all of them, and it is the impact of those that we can't control, like blue billy goat weed, which will most severely alter the indigenous vegetation. Unless someone comes up with an acceptable biocontrol, hand weeding or even spraying blue billy goat weed seem the only options and to do these on such fragile sea bird islands as the Meyers is simply not possible.

On the boat, we were delighted to see the marine team's numerous finds. We also heard and appreciated their account of the rigours of maintaining underwater fish collection stations in the face of an ever increasing number of Galapagos sharks keen on eating their catches.

The next day, we explored South Meyer. Although this island, too, had been damaged by Cyclone Bune, it seemed to have been less severely impacted than North Meyer. After the same frantic scramble for seaweeds (and on this day the expedition's first collection of an octopus (*Octopus oliveri*)), I set to collecting lichens. This took several hours longer than it had on North Meyer

because South Meyer seemed to have an even greater diversity of tiny, saxicolous, crustose species. The ascent up South Meyer was also somewhat harder than the traverse up North Meyer but all the more spectacular. Aside from the now very familiar Kermadec petrels, kakariki, wedge-tailed shearwaters and red-tailed tropic birds, I encountered my first masked boobies (*Sula dactylatra*), the fledglings of which perched here and there in the low ngaio and *Coprosma petiolata* shrubland that vegetate the windswept eastern side of the ridgeline leading up toward the island summit. It was here that I also found much better populations of *Senecio kermadecensis*, though these too were all seedlings, and blue billy goat weed was having an impact on some of the populations seen. On the summit ridge top, Warren and I encountered a thriving population of owee grass (*Cenchrus caliculatus*) (Fig. 9). Amongst this grass we found numerous black-winged petrels (*Pterodroma nigripennis*) and the odd Kermadec petrel; the birds were festooned in the spiny barbed seeds from which this grass takes its common name "Owee!" A few of the owee grass seemed to have rust on their leaves, so I collected examples of this for New Zealand's rust expert Eric McKenzie. A mysterious line of obviously planted ti pore (*Cordyline fruticosa*) as well as numerous karaka in the island forest hinted at past use of this island (and North Meyer too) by Polynesians or perhaps Maori. It is through the presence of ti pore and, on Raoul Island, candlenut (*Aleurites moluccana*), along with admittedly limited archaeological evidence, that we know that Polynesians visited the islands where they possibly traded there with Maori or, alternatively, used the Kermadecs as a temporary stop over, en route to New Zealand.

Figure 9. Owee grass (*Cenchrus caliculatus*) growing on the summit ridgeline of South Meyer. Owee grass is, for reason as yet unknown, undergoing a serious decline throughout its Pacific Islands range. The populations of the northern Kermadec Islands group are now amongst some of the largest known in the world. The specimens on South Meyer also support an, as yet, unidentified and potentially endemic rust (E.H. McKenzie pers. comm.).

Figure 10. South Meyer forest comprising a dense canopy of Kermadec pohutukawa (*Metrosideros kermadecensis*), with an understorey of Kermadec ngaio (*Myoporum rapense* subsp. *kermadecense*) and karaka (*Corynocarpus laevigatus*). Note the naturally sparse ground cover and nesting Kermadec petrels (*Pterodroma neglecta*).

The northern end of South Meyer had the most intact forest that we had yet seen (Fig. 10), though again it is hardly diverse being dominated by Kermadec pohutukawa, ngaio, with some karaka, parapara and mahoe. A sparse understorey of *Coprosma petiolata*, a little *Scaevola gracilis* and patches of the endemic blue-green *Poa polyphylla* and Kermadec ice plant (*Disphyma australe* subsp. *stricticaule*) were typical of the vegetation. As with North Meyer, liverwort diversity remained pretty Spartan, only *Frullania pentapleura* was moderately common, though one ngaio tree sported a small amount of *Cololejeunea minutissima*. Moss diversity was slightly better, though again the dominant mosses were the same as those seen on North Meyer (*Bryum dichotomum* and *Fissidens leptocladus*). A few patches of *Macromitrium brevicaule* and *Fissidens hyophilus* augmented this, along with a small amount of *Bryum argenteum*. This was found growing on scoria tuff in and around the deeply overhanging ledges occupied by nesting red-tailed tropic birds (Fig. 11). These birds were a little unnerving because they tended to make their presence felt by screaming abuse loudly at you as you passed or, on occasions and without any warning, scoring your leg with a well-aimed stab of their long, sharp, red beak. As the habitats they occupied are precipitous, such attention from the birds, no matter how understandable, was rather frightening especially as you were often

Figure 11. Adult roosting red-tailed tropic bird (*Phaethon rubicunda*) tucked within scoriaceous tuff ledges on the north-eastern summit slopes of South Meyer.

caught unawares whilst hanging onto a dubious hand hold or carefully concentrating on a traverse across a very risky bit of cliff face. It was also while negotiating the steep slopes on the northern side of the island that I came across two white-naped petrels (*Pterodroma cervicalis*) flying low over the forest canopy. White-naped petrels used to nest on Raoul Island but they were wiped out from there by a combination of feral cats (*Felis catus*) and Norway rats (*Rattus norvegicus*) that invaded the island in the 1920s, and the species is now known to nest in the Kermadec Islands group only on Macauley Island.

That afternoon, as the weather remained good, we departed South Meyer for Egeria Rock (I have no idea why this rock is so called). Egeria Rock lies about half way from the Meyers to Coral Bay, the nearest point to the Meyers on Raoul Island. Despite the good weather, a high surge was pounding the rocks when we got there (Fig. 12) and it took quite some time to find a place to land safely. Egeria had a flora like how it looked—bleak (Fig. 13). Obviously pounded by the sea and probably at times partially immersed, I found only ice plant, purslane (*Portulaca oleracea*), black night shade (*Solanum nigrum*), Kermadec ice plant, twin cress (*Lepidium didymium*), Indian doab (*Cynodon dactylon*) and, in places, seedlings of a grass forming dense patches (this was probably the native wind grass (*Lachnagrostis littoralis* subsp. *littoralis*)). A few brackish pools provided several filamentous green seaweeds and a small amount of *Caulerpa racemosa* (Fig. 14)—a small but attractive stoloniferous alga distinguished by the erect stems bearing bunches of small grape like vesicles.

Figure 12. Egeria Rock Landing—on right-hand side of the image in the small gut below the large clast in the island breccia (note yellow waterproof bag in foreground, this indicates the first secure site reached from the landing from where to sort gear).

Our pick up was just on dusk and, on our way back to the *Braveheart*, we decided to lasso a floating log of Kermadec pohutukawa that we had seen about halfway between Egeria Rock and The Meyers. This log, once winched aboard the *Braveheart*, provided the marine biologists with hours of entertainment as an assortment of crabs, fish and barnacles were extracted from its surface. The evening was then spent assisting our shark experts with the catching and DNA sampling of the ever increasing numbers of Galapagos sharks circling our boat.

Figure 13. Egeria Rock summit showing sparse vegetation of Kermadec ice plant (*Disphyma australe* subsp. *stricticaule*), purslane (*Portulaca oleracea*), Indian doab (*Cynodon dactylon*) and wind grass (*Lachnagrostis littoralis* subsp. *littoralis*).

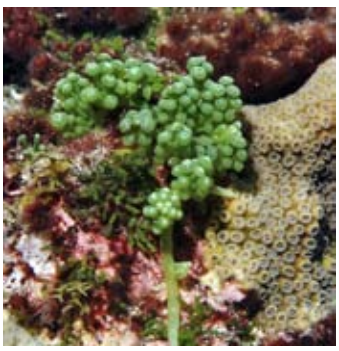

Figure 14. *Caulerpa racemosa* photographed at 12 m depth off the Meyer Islands. The distinctive upright stems bear numerous rounded vesicles and long creeping stolons. Photo: Malcolm Francis.

Acknowledgements

For this, the second part of a popular account of the Kermadec Biodiscovery Expedition 2011, I thank my colleague in the field, Warren Chinn, and also the skipper Matt Jolly, and the supporting crew of "Thomas the Tank Engine" Matt Jolly, Carl Rogers and Broughton Lattey for assistance with landing on The Meyers. Malcolm Francis kindly supplied the images for Figures 2 and 5.

Cassytha paniculata a possible indigenous biocontrol for gorse (*Ulex europaeus*)?

Peter de Lange, Department of Conservation (pdelange@doc.govt.nz)

In November 2010, I attended the Australian Biosystematics Conference at Lincoln University during which time I met Dr John Conran of the University of Adelaide, South Australia. John mentioned that he was seriously researching the feasibility of using *Cassytha paniculata* (Lauraceae) as a biocontrol for gorse (*Ulex europaeus*). *Cassytha paniculata* is indigenous to Australia as well and John had observed that, in Australia, especially in areas of impoverished soils, gorse and other exotic and indigenous nitrogen fixers were often heavily infested with, and over time killed by *C. paniculata*. So, during February 2011 field work at Te Paki, I couldn't help but note that, indeed as observed by John Conran for Australia, in Te Paki, at least, *Cassytha* did have a marked propensity to overwhelm and eventually kill roadside gorse and, in some places, also wattles (*Acacia* spp.).

Figure 1. Taihoa/mawhai (*Cassytha paniculata*) parasitising gorse (*Ulex europaeus*) along Spirits Bay Road, Te Paki. Photo: Jeremy Rolfe.

Cassytha is, of course, the basis for the common New Zealand saying "Taiho mate!" meaning "slow down, take your time" as taihoa is one of two widely used Maori names for this species[1]. The phrase, it is believed, derives from this common northern Maori name for *Cassytha*, which is said to mean "wait a while" (Evans 1981; Beever 1991); this is what you do indeed do if you have the misfortunate to be stuck in a mass of the plant. The vine's numerous cables have a remarkable ability to interlace and tangle up any surrounding vegetation, so presenting the unwilling tramper with a labyrinth of surprisingly strong wiry cables. This growth habit, in part, explains why *Cassytha* is a species people tend to avoid and dislike with about equal measure.

Currently, there are two species of *Cassytha* accepted for New Zealand, *C. paniculata*, which is universally treated as indigenous, and *C. pubescens*, which is regarded by some as naturalised (e.g., Webb et al. 1988) and by others as indigenous (e.g., de Lange & Rolfe 2010). I have seen *C. pubescens* only once, in February 2002, when driving along the Babylon Coast Road, west of Dargaville. I found it there growing in a roadside gum land scrub remnant. Based on this sighting and examination of a limited sample of New Zealand herbarium specimens, this species, in New Zealand at least, seems distinctive enough (though see comments by Cameron 1995). Nevertheless, many Australian treatments suggest that it grades into *C. paniculata* and that both species should be treated as the one variable *C. paniculata* (Weber 1981; J. Conran *pers. comm.*). Taxonomic status aside, I have since searched for *C. pubescens* in several of its recorded haunts (see Webb et al. 1988) and along the same stretch of Babylon Coast Road, but failed to find further plants. I assume it is still out there somewhere in the wild but, if so, it must now be rather scarce.

Cameron (1995) updated the distribution of *C.* noting that it appeared to be expanding southwards and this range extension could be largely attributed to deliberate and/or accidental plantings. Indeed *C. paniculata* is to be seen naturalised in a few places around Auckland. One of most impressive of these is an infestation that still occurs at Albany, Auckland, on the margin of what had been Platt's Native Plant Nursery. This resulted from an initial deliberate planting by Graeme Platt. Platt told me that he had grown the species by placing a range of potted "hosts" around some *Cassytha* growing in the then Hamilton (as in Dr Max Hamilton former Director of DSIR) garden near Mahurangi. Platt had noted that as *Cassytha* grows it produces haustoria on contact with any suitable host, so his idea was to "invite" it on to a portable host plant and, once established on this, he could snip the *Cassytha*

1. The other widely used Maori name "mawhai" is incidentally said to mean "useless"—apparently the old time Maori had as much regard for *Cassytha* as many people today. Mawhai is also one of the names recorded for *Sicyos*, another species for which some Maori, most notably those of Tainui derivation, had little fondness.

"umbilical cord" if you like, from its "mother" plant and then take the potted up plant plus *Cassytha* back to plant elsewhere. It worked, perhaps too well, because even though Platt's nursery has been closed for some 14 years now and most of the formerly wonderful plantings within the nursery grounds have given over to urban sprawl and weeds, a large patch of *Cassytha* still flourishes in the vicinity of where Platt had planted one of his infected hosts.

Similarly, at the University of Auckland, there used to be a plant of *Cassytha* infesting a single pot bound rawiri (*Kunzea ericoides* var. *linearis*). This specimen and host had originally come from near Lake Ohia (J. E. Braggins, *pers. comm*.). It had been deliberately collected from the wild to augment the university's collection of indigenous plants and to provide material for students to study. Despite the *Cassytha* being tied to a pot bound host, it was the bane of the gardeners who periodically had to remove it from a range of native and exotic plants that it had snuck on to when their backs were turned.

The late Tony Druce (*in. litt.*) had also inadvertently transplanted *Cassytha* into his garden at Pinehaven, Upper Hutt, Wellington, where he waged war with it for upwards of 15 years before finally eradicating it.

These stories all serve to confirm that *Cassytha* is an aggressive species with apparently no clear host preferences or at least none that are apparent from casual observation (cf. Loranthaceae (Norton & de Lange 1999); Viscaceae (A. Sultan pers. comm.)). It is also clear that the species is much more tolerant of the cold than its current "natural" restriction to the northern part of the North Island would suggest (indeed the same species, or species complex ranges throughout southern Australia (J. Conran, *pers. comm*.). At Pinehaven, it tolerated heavy frosts and even the occasional snow fall (A.P. Druce, *in. litt.*). So, whether the idea of unleashing *Cassytha* on tracts of unsuspecting gorse throughout New Zealand is a good idea remains to be tested. Having traversed tangles of *Cassytha* in Te Paki, I do feel that while it does indeed impact heavily on gorse and wattles there, if planted outside its current natural range the potential cost to the rest of our flora is probably too high. Also, as a bird dispersed species, can one imagine the horror of gardeners and the like if *Cassytha* happened to spread from selected sites of "biocontrol" into their, say prize wisteria, rhododendrons or roses?

John Conran's comments on the efficacy of *Cassytha* in controlling gorse, while confirmed for at least Te Paki, and certainly interesting from a wider perspective of national gorse control, do suggest that one would simply be replacing one "weed" with another indigenous one with potentially wider reaching consequences!

Acknowledgements

I'd like to thank John Conran, University of Adelaide, South Australia, for some enlightening and amusing conversations about *Cassytha* and Graeme Platt for his account of *Cassytha* cultivation. I advise people not to try it themselves. I would also like to acknowledge Amir Sultan, PhD Student, Massey University, for access to his, as yet unpublished, magnum opus on the host specificity of *Korthalsella* (Viscaceae).

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Plant fact sheet PDF maker now on Network website

A new PDF maker has been added to the Network website that allows users to convert plant species webpages into files for downloading and printing. Website users will notice that when they open up a species page within the site there is now a "Download Factsheet" link on the right hand side in the Resources box. If you click on this link you will automatically download a PDF document of the species page. This can be saved to your computer and/or printed. For example, follow the link below to the species page for *Clematis paniculata* and then look under the Resources box:

- Clematis paniculata species page

If you have any comments on any of the factsheets please use the "Comment on Factsheet" link to email us the feedback so that we can continue to improve this web resource.

This project was made possible through financial assistance from the Terrestrial and Freshwater Biodiversity Information System (TFBIS) Programme. The TFBIS Programme is funded by the Government to help to achieve the goals of the New Zealand Biodiversity Strategy and is administered by the Department of Conservation.

Flower colour added to the Network's flora search engine

Network website users can now use flower colour as part of the flora search.

A database of flower colours, for almost all native and exotic vascular plants, has been added to the Network website. This can be used to narrow the search for a plant although, due to differing perceptions of colour, the system may not always work perfectly.

Two flower colours have been added for each plant, a Main flower colour and a second Other colour. Drop down lists of flowers can be found in the flora search column on the left hand side of the web page. This database is not complete and feedback is welcome to plug gaps. Also, please let us know if you think we have made a mistake in the colour selections. This is a work in progress and will improve over time with feedback from users.

Individual and Student/Unwaged Members Subscriptions

If you are a Network member and joined before July 2010 and have not yet paid your subscription in this calendar year your subscription is now overdue. Members whose subscriptions remain unpaid at the end of August will have their access to the "members only" sections of the website disabled and be removed from the mailing list. If you are unsure whether you come into the overdue category, you can click on the "Membership renewal page" link below and login in at the prompt. The resulting page will show if and when your subscription expired.

To renew your membership on-line using our credit card facility, follow the link below:

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Paying by cheque or by internet banking is still possible and a subscription renewal notice may be downloaded from the website: www.nzpcn.org.nz/publications/Subscription-NZPCN.pdf

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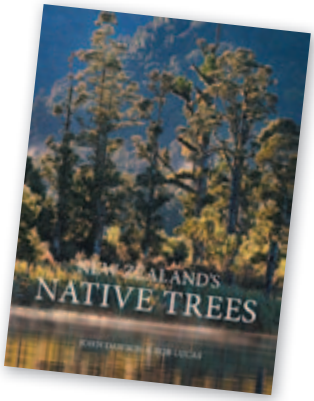
New book on New Zealand's native trees



According to its publisher, Jane Connor, a new book to be released in September, is the most comprehensive book on the subject to be published in the last 30 years. The substantial, 576-page *New Zealand's Native Trees* by botanist John Dawson and photographer Rob Lucas covers more than 320 species, subspecies and varieties of native trees, from the massive kauri and the ubiquitous cabbage tree to rare and endangered species found only on offshore islands.

'Not since John Salmon's *The Native Trees of New Zealand* was published in 1980 has a book covered our native trees in such detail,' says Connor, Managing Director and Publisher at Craig Potton Publishing. 'One of the most remarkable features of the book is the stunning collection of 2300 photographs, almost all taken by Rob Lucas. Over the last seven years, he has been from Cape Reinga to Stewart Island several times in search of trees at just the right stage to photograph.'

New Zealand is one of the world's biodiversity hotspots and our unique native forests are a major reason for this status. Not only do they look, smell and feel like no other forest on earth, the majority of plants occur nowhere else. Along with this exceptionally high level of endemism, ancient botanical connections to other places and the extraordinary adaptations of plants over millions of years of isolation add up to something that is of huge significance globally.

As well as being a fabulous reference for identification, *New Zealand's Native Trees* is a celebration of the incredible diversity of our native trees and forests. An appealing aspect of the book is the more than 50 boxed features, which tell some of the fascinating stories associated with our native trees, such as the relationship between kakapo and rimu, and the close connection between certain moths and species of *Olearia*.

Botanist John Dawson and photographer Rob Lucas have previously collaborated on several books, including *Nature Guide to the New Zealand Forest*. This new book is published in two editions, standard RRP $120.00 and limited deluxe RRP $180.00. *New Zealand's Native Trees* is a wonderful contribution to the documentation and understanding of the richness of New Zealand's native flora, and will be inspire a new generation of New Zealanders to value and preserve our natural heritage. There is a special pre-publication offer available to Network members for the standard edition—see attached order form.

In a review by Peter Arthur of Touchwood Books (and Network member) the book is described as 'The most beautifully presented tree book I have ever seen and, after 25 years of selling new and second-hand books about trees from around the world, I cannot praise it more."

Applications open for the David Given Research Scholarship

The David Given Threatened Plant Research Scholarship is now open for applications to fund research (maximum $5000) that assists the protection and recovery of New Zealand's threatened plant species and threatened plant communities. Threatened species and communities can be either nationally or regionally threatened. Plant species include vascular plants, ferns and cryptograms as well as fungi.

Applicants must be New Zealand citizens or residents but the work could involve overseas researchers who collaborate with the principal researcher. Applications addressing each of the subject areas on the scholarship application form should be emailed (preferred delivery option) to info@nzpcn.co.nz, or posted to the New Zealand Plant Conservation Network, PO Box 16 102, Wellington and marked "David Given Scholarship". Applications close 30 September 2011. The application form is included at the end of this newsletter.

The NZPCN administers the David Given Threatened Plant Research Scholarship, which is offered to applicants biennially. This award was named after the late David Given in recognition of his considerable influence on plant conservation in New Zealand and worldwide over his lifetime.

New book on New Zealand's native plants

There is also a new book on New Zealand native plants to be published on 1 September by Canterbury University Press. '*Native by Design – landscape design with New Zealand plants*' is edited by Ian Spellerberg and Michele Frey, with photography by John Maillard.

The book is lavishly illustrated with superb photographs and contains lots of ideas for using native plants in landscape and garden design. Ian Spellerberg is particularly thrilled about the book because for him it is the third he has edited in a trilogy of titles portraying the beauty and love of native plants. 'The 20 contributors provide inspiration with their amazing designs' says Ian. Co-editor, Michele Frey, adds 'This has been such an exciting adventure, meeting some fantastic and very talented landscape architects and landscape designers. Each one has shared with us some of their talent for effectively using native plants in design'.

Contributors include Xanthe White, who is exhibiting at the 2011 Chelsea flower show, Danny Kamo and Andy Ellis, successful designers at the 2009 and 2010 Ellerslie Flower Shows, and John Marsh, who has used native plants in what is the largest industrial setting for native plantings in New Zealand.

Outgoing Governor General the Rt Hon Sir Anand Satyanand, GNZM, QSO has written an enthusiastic foreword remarking "the designs show New Zealand vegetation at its best and in a variety of settings, from commercial and industrial frontages to public and private parks and urban and rural gardens". The editors, photographer and all contributors have given their time freely to bring the book to fruition. Several sponsors have generously contributed to the project, enabling all royalties to go to New Zealand native plant conservation projects.

More details will soon appear on the New Zealand Plant Conservation Network website (www.nzpcn.org.nz) .

World's plant experts call for renewed plant conservation efforts

Over 2000 scientists from 73 nations attending the 18th International Botanical Congress in Melbourne, Australia, called on the governments of the world to act to halt further declines in the plant life of the planet. The Congress acknowledged that:

- As many as two-thirds of the world's 350,000 plant species are in danger of extinction in nature during the course of the 21st century.
- Human beings depend on plants for almost every aspect of life, and our expectations of using them to build more sustainable, healthier, and better lives in the future.
- Plant diversity is increasingly threatened worldwide as a result of habitat loss, unsustainable exploitation of plant resources, pollution, climate change, the spread of invasive species and pathogens and many other factors.
- Renewed and intense efforts are urgently needed worldwide by governments, intergovernmental bodies, and scientific, environmental, and conservation organizations and institutions, if the loss of plant diversity is to be successfully halted.

In adopting six resolutions they asked for the incorporation and mainstreaming of the objectives of the Global Strategy for Plant Conservation (GSPC) into all relevant plans, policies and programmes, including economic development policies, and programmes to achieve sustainable development and poverty alleviation, as well as into national biodiversity strategies and action plans.

They also challenged botanical, environmental and conservation organizations, such as the Network, to redouble their efforts to achieve the objectives of the Global Strategy by 2020.

Finally, they asked governments, inter-governmental agencies and donors to provide new resources to support plant conservation actions and to help build capacity for the management and conservation of plant resources worldwide.

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):

Conservation Biology Conference 2011

Change of venue and dates: as a result of the 22 February earthquake that damaged much of Christchurch, including the Convention Centre, the ICCB conference 2011 has had to be shifted to Auckland with a consequential change of dates. The conference will now be held 5–9 December 2011 at the Sky City Auckland Convention Centre.	**More information:** Please visit our website for the most current information on the meeting (www.conbio.org/2011). We will update it regularly with the latest information on the venue, accommodations, conference trips, social events, and more.

26th John Child Bryophyte and Lichen Workshop

Workshop: Thursday 1 December – Tuesday 6 December, 2011. **Venue:** Matawai; 70 km north of Gisborne on State Highway 2. Open to all who are interested in bryophytes and/or lichens. Various levels of accommodation available. A second circular will be sent out in August to those who have expressed interest. Confirmation of attendance and a deposit will be called for in that circular.	**Contact:** Anne Redpath, email: wairataforestfarm@farmside.co.nz or Leon Perrie, email: leonp@tepapa.govt.nz

60th New Zealand Ecological Society Conference

"Ecology in the Heartland: celebrating 60 years of the New Zealand Ecological Society". This year, the Conference is being held in Rotorua from 28 August to 1 September.	**Further information:** visit the conference website: www.nzecologyconference2011.com

Auckland Botanical Society

Meeting: Wednesday 7 September at 7.30 p.m. a talk by Peter de Lange titled 'The botany at the tip of the great fish's tail: North Cape'. **Venue:** Unitec School of Health Sciences, Gate 4, Building 115. Room 2005.	**Contact:** Maureen Young, email: youngmaureen@xtra.co.nz.
Field trip: Saturday 17 – Sunday 18 September to Whangarei.	**Leader:** Maureen Young, ph: 09 425 7162, email: youngmaureen@xtra.co.nz.

Kaipatiki Project

Community Planting Day: Saturday 3 September at Eskdale Reserve, Glenfield Rd, North Shore, Auckland. **Start:** 9.30 a.m. or whenever you can. Come and help us plant new native trees in this beautiful reserve—bring a spade if you have one. Free BBQ for all planters.	**More info:** www.kaipatiki.org.nz

Waikato Botanical Society

Meeting: Monday 12 September a talk by Dr Carol West, Department of Conservation, titled 'Understanding vegetation changes in a dynamic landscape—Raoul Island and the Kermadecs'. **Venue:** Environment Centre, Level One, 25 Ward St, Hamilton. A meal follows at a local restaurant for those who would like to stay and carry on the discussion.	**Contact:** Cynthia Roberts, email: croberts@doc.govt.nz, ph: 07 8581034 (day) or 07 849 4935 (evening).

Rotorua Botanical Society

Field trip: Sunday 11 September to Puketoki Scenic Reserve, Whakamarama. Meet: the car park, Rotorua at 8.00 a.m., on Barrett Road at junction with SH2 (Whakamarama Shops) at 9.15 a.m. or at Puketoki Reserve car park on Leyland Road at 9.30 a.m. **Grade:** Easy – Medium. 2.5 to 3 hrs.	**Leader:** Barbara McGillivary, ph: 07 5780040, email: w.bmcgillivray@xtra.co.nz
Field trip: Friday 30 September to Saturday 1 October – (Sunday 2 October optional) to East Cape (revisit number 5). **Meet:** the car park, Rotorua, at 7.30 a.m. or Opotiki DOC Office (cnr Elliot & St John Street) at 9.15 a.m. For those coming from a distance there is the option of going to Tim's bach on the Friday night. **Grade:** medium. **Cost:** $20 donation for accommodation for those staying Saturday night.	**Leader:** Tim Senior, ph: 0800 368 288 ext 6010 or 07 315 7371, email: tim.senior@envbop.govt.nz

Wanganui Museum Botanical Group

Meeting: Tuesday 6 September a talk by Jim and Diana Howard on their travels in Greece last year. **Venue:** Museum's Davis lecture theatre.	**Contacts:** Robyn and Colin Ogle, ph: 06 347 8547, email: robcol.ogle@xtra.co.nz
Field trip: Saturday 3 September to 'Paloma', Fordell. **Meet:** at 1.00 p.m. at 'Paloma', Denlair Rd, Fordell. **Leader:** Clive Higgie.	**Contacts:** Robyn and Colin Ogle, ph: 06 347 8547, email: robcol.ogle@xtra.co.nz

Wellington Botanical Society

Field trip: Saturday 3 September to Skull Gully, Wainuiomata Catchment. **Meet**: 9.00 a.m. at main gate, Reservoir Rd, off Whitcher Grove, off Moores Valley Rd, Holmdale, Wainuiomata. Booking essential by 1 September so we can report to Greater Wellington Regional Council. Help with the compilation of a plant list for this impressive, mature, podocarp-northern rātā/broadleaf forest.	**Leader:** Chris Hopkins, ph: 04 564 3980; **deputy-leader:** Chris Horne, ph: 04 475 7025.
Meeting: Monday 19 September at 7.30 p.m. a talk by Barry Wards, President, Forest and bird Protection Society titled 'Physical and social dimensions of ecological corridors—A Wellington perspective'.	**Venue:** lecture theatre MYLT101, ground floor Murphy Building, west side of Kelburn Parade. Enter building off Kelburn Parade about 20 m below pedestrian overbridge.

Nelson Botanical Society

Field trip: Sunday 18 September to Mt Duppa. **Meet:** at 9.00 a.m. at Selwyn place, between the gum tree and the Cathedral steps.	**Leader:** Diana Pittham, ph: 03 545 1985.
Meeting: Monday 19 September at 7.30pm which will be a Coprosma Workshop at the Jaycee Rooms, Founders Park, Nelson.	**Contact:** Cathy Jones, ph: 03 546 9499, email: jonesc@doc.govt.nz.

Canterbury Botanical Society

Meeting: Friday 2 September at 7.30 p.m. a talk by Jane Gosden, Canterbury university, titled 'Celmisia hybrids in the Craigieburn'.	**Contact:** Zuni Steer, email: mas210@uclive.ac.nz
Field trip: Saturday 10 September to Waiora Nursery, Smacks Creek and Styx Mill, Christchurch. **Meet:** at 10.00 a.m. at Waiora Nursery, 48 Watsons Rd, Harewood.	**Contact:** Gillian Giller, ph: 03 313 5315.

Botanical Society of Otago

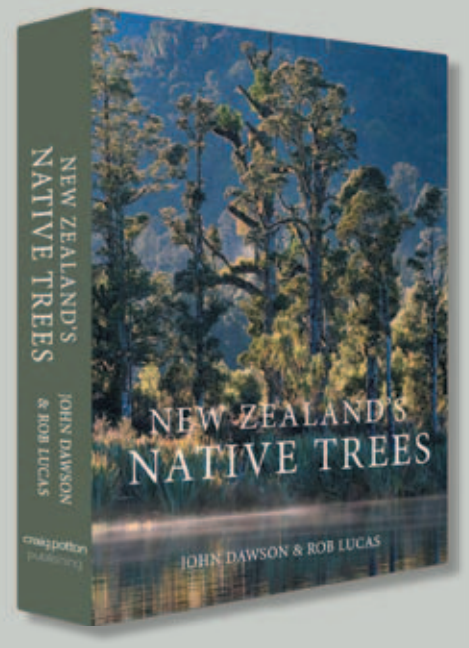
Meeting: Wednesday 14 September at 5.30 p.m. the 2011 Baylis Memorial Lecture by Dr Bill Lee, Landcare Research, titled 'Complex relationships with friends and foes: How native plants manage'.	**Contact:** David Lyttle, ph: 03 454 5470, email: djlyttle@ihug.co.nz

New Zealand's Native Trees

John Dawson & Rob Lucas

A landmark book

The most comprehensive book on the subject to be published in 30 years



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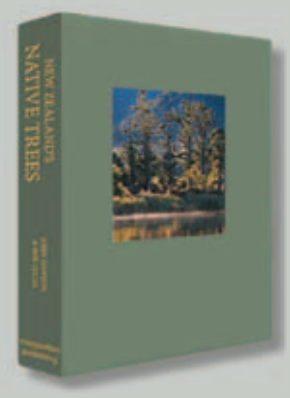

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All prices are inclusive of GST. Please use this order form to ensure you receive the special price. All orders will be delivered to your New Zealand address by 30 September 2011. Please return your order form and payment to:

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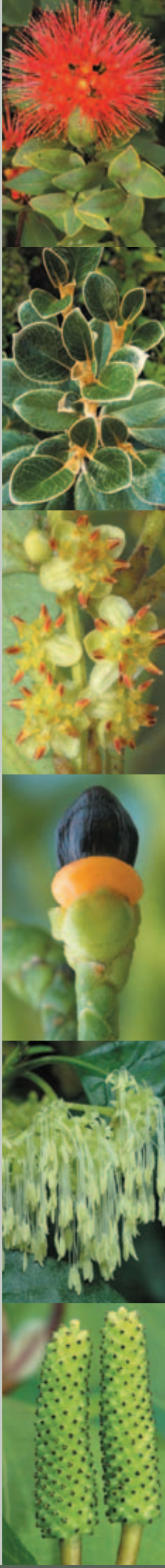
www.craigpotton.co.nz info@cpp.co.nz



David Given Threatened Plant Scholarship

To fund research into the biosystematics and conservation management, protection and recovery of New Zealand's threatened plant and fungi species[1] and their communities.

Objective

The scholarship will be granted for research that assists the protection and recovery of New Zealand's threatened plant species and communities.

Eligibility and conditions

Applicants must be New Zealand residents or citizens but the work could involve overseas researchers who collaborate with the principal researcher.

Threatened species and communities can be either nationally or regionally threatened.

Plant species include vascular plants, ferns, cryptograms. Fungi are also covered by this scholarship.

Application

Please address the following areas in any written application for the scholarship.

***Issue*:** Outline the issue to be investigated and why it is important to study this.

***Research methods*:** Outline the approach you intend to take.

***Impact*:** How will your research contribute to the better conservation of the threatened species or community?

***Uptake*:** How will your research be used by your or other organisations?

Researchers: Outline the skills the researchers involved in the project have to ensure it can be successfully completed? Include current CVs of applicants.

***Funding*:** Do you have other funding that is contributing to this project?

***Budget*: O**utline the main items in your budget including equipment, laboratory and field expenses, and personnel.

***Risks*:** Are there any factors that you consider could limit the success of your proposal? How will you mitigate these?

***Referees*:** List 2 referees who can be consulted for their opinion on the proposed research

Scholarship rules

1. One scholarship shall be awarded every 2 years and provide up to $5000 towards the cost of the research project
2. The scholarship is to be awarded by a selection committee, which shall comprise
   a. The President of the NZ Plant Conservation Network (NZPCN)
   b. One other member of the NZPCN Council
   c. An independent person appointed by the NZPCN Council
3. The selection committee may refrain from making an award if, in their opinion, there is no applicant of sufficient merit
4. There are no application forms for this scholarship. Written applications addressing each of the above subject areas should be sent to the New Zealand Plant Conservation Network, Box 16 102, Wellington (info@nzpcn.co.nz) and marked "David Given Scholarship".
5. Referee forms (see below) should be sent to the two nominated referees for completion and posting or email to the Network.
6. **Applications close 30 September 2011.**

1. "Species" is used here collectively to encompass all named ranks (species, subspecies, variety and forma) and also includes those entities believed to be threatened and as yet without formal rank.