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A Society visit to Motuora Island, Hauraki Gulf, 16 Oct 2010

Ewen K. Cameron, Helen Lindsay, Mike D. Wilcox

At 8.40am on 16 October 2010 the DoC (Department of Conservation) boat *Hauturu* departed Gulf Harbour with our ABS (Auckland Botanical Society) group of 33 people and four researchers aboard. It was the perfect day – clear skies and no wind. En route to Motuora Island flocks of fluttering shearwaters and gannets were common, and a few Buller's shearwaters were also spotted. Just after 10am we were anchored in calm water off Home Bay to be met by the local Motuora Island managers, Andrea Ravenscroft and Deane Williams, who ferried us ashore in their dinghy. Once ashore, Helen Lindsay, who has been involved with the island's management since 1997, gave us an outline of the major recent conservation projects occurring on the island (Fig. 1).



Fig. 1. Members being briefed by Helen Lindsay by the information centre, Home Bay. Photo: EC, 16 Oct 2011.

Mike and Peter headed off immediately to check the intertidal algae as the tide had already turned. After the briefing, most people followed Helen along the SW coast, inland via different-aged plantings and up to the trig for lunch where a 360 degree view of the Hauraki Gulf was enjoyed (Figs. 2, 3), including watching a pod of bottle-nosed dolphins on the east side of the island. After lunch we proceeded northwards along the main wide plateau looking at extensive plantings with Helen informing us of the different-aged stands. She explained that the kikuyu grass (*Pennisetum clandestinum*) paddocks were sprayed prior to planting and this provided an initial mat of thick dead grass which helped suppress weed growth in the first year and that plants needed to be very hardy to survive the first summer due to exposure. The initial species to colonise after planting were tall pasture weeds, including thistles (*Cirsium vulgare*), fleabane (*Conyza sumatrensis*) and



Fig. 2. View north from trig; the foreground forest was planted in 2004; the islands behind are Moturekareka, Motuketekete and Kawau. Photo: EC, 16 Oct 2011.



Fig. 3. Same view as Fig. 2 fourteen years earlier when the island was farmed. Photo: 1996.

particularly fireweeds (*Senecio* spp.), which gave a good shelter to the young plants. *Senecio bipinnatisectus* had been identified as the main fireweed species but ABS members also identified *S. esleri*, which was added to the species list. Where these were in large numbers they also helped to suppress the re-growth of kikuyu grass and so were being very effective as "nurse plants" (Fig. 4).

We reached the northern point where bone-seed (*Chrysanthemoides monilifera*) was locally common on the steep cliffs. Helen explained that, due to the abundance of this species on steep eroding cliffs, control to date has been limited to ensuring that it does not spread further, particularly into the planted areas. The strategy being employed is to contain its



Fig. 4. This young planting of 2009 is 'protected' by fireweeds and fleabane which are later shaded out by the planted forest. Photo: EC, 16 Oct 2011.

spread until the forest matures at the top of the cliffs, and then to control it along the margins, gradually working down the cliffs. This is to prevent the erosion that would be caused by large-scale clearance. Volunteers have played a large part in pulling seedlings of this species within the plantings and on cliff edges and the ABS members also made their contribution to this (Fig. 5). From this point people made their own leisurely way back to Home Bay, via some of the western plantings (Fig. 6) and by 4.20 pm we were all aboard *Hauturu* and heading back to Gulf Harbour.



Fig. 5. Members weeding bone-seed seedlings at the northern point. Photo: EC, 16 Oct 2011.

Participants: Chris & Noel Ashton, Tricia Aspin, Duncan Benzie, Ewen Cameron (organiser), Paul & Stella Christoffersen, Alex Davidson, Bev & Geoff Davidson, Alan Foubister, Nick Goldwater, Chris Green, Leslie Haines, Peter Hutton, Robin Ingram, Wendy John, Wolfgang Kanz, Mei Nee Lee, Helen Lindsay (guide), James Luty, Elaine Marshall, Caroline Murdoch, Suman Pancha, Juliet Richmond, Bernie Salmon, Malcolm Shaw, Val Tomlinson, Josh Salter,

Claire Stevens, Liesebeth van Kerckhoven, Alison Wesley, and Mike Wilcox.

Background

Motuora Island (85 ha) was farmed from 1853, and since 1987 has been managed by DoC. Since 1997 farming was down-scaled as the planting increased, and the last farm animals were removed in 2006. Remarkably, rats have never established there. The island was reduced to a few small forest remnants, mainly pohutukawa (*Metrosideros excelsa*), and a carpet of kikuyu grass. Over 250,000 native trees have been propagated and planted on the island since 1990. The Motuora Restoration Society was formed in 1995. Their goal is to re-establish self-sustaining ecosystems and to create a sanctuary for flora and fauna on Motuora.



Fig. 6. Looking west from just south of the northern point – the planting in the foreground was in 2008, and the taller planting behind was in 1996-97. Photo: EC, 16 Oct 2011.

To date, restoration activities have concentrated on planting hardy pioneer species such as kanuka (*Kunzea ericoides*), manuka (*Leptospermum scoparium*), flax (*Phormium tenax*) and *Coprosma* species to establish cover, and on the control of several species of invasive weeds in the forest remnants. The worst infestations of these included bone-seed, climbing asparagus (*Asparagus scandens*), boxthorn (*Lycium ferocissimum*) and lantana (*Lantana camara*), all of which have now been controlled to very low levels with the exception of bone-seed as explained above. Kikuyu grass was introduced to the island during the farming era and it has been a constant challenge to keep this invasive grass under control among the young trees. The pioneer planting is now almost complete and future plantings will concentrate on introducing canopy species as the shrubland develops the shade and shelter required for their establishment. Increasing plant diversity is a priority to establish all tier levels and there will also be a focus on attempting to establish populations of regionally threatened plants that once may have occurred on the island.

We observed the oldest planted vegetation, with ngaio (*Myoporum laetum*), karo (*Pittosporum crassifolium*) and taupata (*Coprosma repens*) to the fore, which has now become a dense, young forest 5-8m tall. Natural

coastal vegetation, with pohutukawa, karo, kawakawa (*Macropiper excelsum*), and rengarenga lily (*Arthropodium cirratum*) survives on some of the steep coastal cliffs.

Table 1. Additions and comments to the vascular flora of Heiss-Dunlop & Fillery (2006). (* = naturalised species)

Additions made during the Bot Soc visit (16 Oct 2010):	
<i>Anagallis arvensis</i> var. <i>caerulea</i> *	Locally common, open sites. Site record.
<i>Jacobaea vulgaris</i> *	Local, open bank, Home Bay. Site record.
<i>Lamium purpureum</i> *	Local, old cattle yard, Home Bay. AK 317955.
<i>Malva nicaeensis</i> *	Local, near nursery, Home Bay. AK 317945.
<i>Microtis</i> ? <i>unifolia</i>	2 young plants, track margin near summit. Site record.
<i>Polygonum arenastrum</i> *	Local, margin of main mown plateau track by recent plantings – may be the same as the <i>P. aviculare</i> record of Heiss-Dunlop & Fillery (2006). AK 327808.
<i>Sagina procumbens</i> *	Local, near nursery, Home Bay. Site record
<i>Senecio esleri</i> *	Locally abundant, especially central plateau, among plantings. AK 317946.
<i>Solanum nigrum</i> *	Occasional, S end Home Bay. AK 317942.
Confirmed earlier record not found in 2006:	
<i>Senecio hispidulus</i>	Occasional - locally common, track margins and N Point. Site record.
Other additions:	
<i>Cotoneaster glaucophyllus</i> *	Single plant, eradicated, Home Bay; <i>H.M. Lindsay, 21 Jan 2009</i> . AK 304353.
<i>Cymbalaria muralis</i> *	Local, by tap, attempted eradication, Home Bay; <i>H.M. Lindsay, 28 Aug 2011</i> . AK 327171. Washed off a visitors boot?
<i>Ehrharta erecta</i> *	Single locality, attempted eradication, N end (E side); <i>H.M. Lindsay, Sep 2008</i> . AK 303652.
<i>Lagenifera pumila</i>	Accidentally left off the original species list (S. Heiss-Dunlop pers. comm.). Evidently it was present in 2006 above Pohutukawa Bay on steep slopes
<i>Zantedeschia aethiopica</i> *	Local, 5 youngish plants, sandy bank by beach, attempted eradication, Home Bay; <i>H.M. Lindsay, 28 Aug 2011</i> . AK 327173.
Deletion:	
<i>Cakile edentula</i> *	Correction. Specimen actually <i>C. maritima</i> with hornless fruit. AK 294990.

A comprehensive plan for the introduction of fauna and flora species is in place (Gardiner-Gee et al. 2007) and since 2007 Duvaucel geckos, shore skinks, common geckos, whiteheads and Little Barrier wetapunga have been translocated to the island. The restoration plan has a strong focus on encouraging the re-colonisation of lost seabird populations as these are considered to be an important component of island biodiversity and ecosystem function (Bellingham et al. 2010). Three translocations of northern diving petrels from Wooded Island to Motuora took place between 2007 and 2009. Since then at least two of these birds have returned to breed on Motuora and there is a confirmed record of one island born chick. Model gannets have been placed in the open on a grassy north-western cliff top and sound recordings are played to try and entice the gannets to create a rookery. We certainly observed passing gannets taking an interest in the area. Burrows of suitable size for Buller's shearwaters have

also been dug near to this site and the sound system plays gannet calls during the day and Buller's shearwater calls at night. There are plans to translocate Pycroft's petrels from Red Mercury Island in 2012.

In the past three years two Norway rat incursions have occurred on Motuora and both animals were caught. It is not known how these animals arrived but it is presumed that they came ashore from visiting boats.

Vascular flora

The vascular flora of Motuora Island has been well documented by Shelley Heiss-Dunlop & Jo Fillery (2006) who listed 288 species of which 57% were exotic. Our visit added nine more species, confirmed an older record, lists five other additions, and corrects an earlier error (Table 1). This brings the current

recorded wild vascular flora to 301 species (58% exotic). Except for one native orchid (*Microtis ?unifolia*) and a native herb (*Lagenifera pumila*) all the additions were exotic species which occur widely on the Hauraki Gulf islands, except for *Lamium purpureum* which is more of an urban weed (EKC pers. obs.).

Cultivated trees seen during our visit

Although few in number the following cultivated trees were seen during our visit: *Acacia mearnsii* (surprisingly no seedlings have been observed on the island), *Araucaria heterophylla*, *Bambusa oldhamii*, *Cupressus macrocarpa*, *Erythrina crista-galli*, *Erythrina* × *sykesii*, *Eucalyptus camaldulensis*, *Eucalyptus macarthurii*, *Ficus benjamina*, *Ficus carica*, *Laurus nobilis*, *Pinus radiata* and *Salix fragilis*.

Birds seen during the visit

Gannet (at one stage >40 circling by the gannet models), pied shag, mallard (1), brown teal (2), pukeko, variable oystercatcher, spur-winged plover, NZ dotterel, kingfisher, welcome swallow, grey warbler, blackbird, skylark, whitehead (heard only – 40 birds translocated from Tiritiri in April 2008), tui (common), chaffinch, and yellow hammer (common).



Fig. 7. Broad sandstone platforms, dominated by dense beds of *Hormosira banksii*. North-east coast. Photo: MW, 16 Oct 2011.

Seaweeds seen during the visit

The tide was generally unfavourable for observing seaweeds in the lower intertidal zone, but the middle and upper reaches of the shore were able to be studied by Mike Wilcox and Peter Hutton. The broad, mid-intertidal sandstone platforms had extensive populations of *Hormosira banksii* (Fig. 7), with its obligate epiphyte, *Notheia anomala*; beds of *Corallina officinalis*, with the epiphyte *Ulva* sp. "2"; and with *Scytothamnus australis*, *Ectocarpus siliculosus*, *Gelidium caulacanthum*, and *Leathesia marina* in reasonable abundance. In channels was observed *Pterocladia capillacea*, and with it *Jania verrucosa* forming turfs. *Cystophora torulosa* was the dominant large alga on the lowest visible shore level.



Fig. 8. Boulder beach at Pohutukawa Bay, with wash-up of *Ecklonia radiata*. Photo: MW, 16 Oct 2011.

Higher up on the shore were turfs of *Capreolia implexa*, brown tufts of *Bachelotia antillarum* in pools, and colonies of *Rhizoclonium africanum*. On the north-eastern side of the island the brown crust alga *Ralfsia verrucosa* was present in abundance on hard, grit rock, and there was also *Codium fragile* subsp. *fragile*, *Microdictyon mutabile* and the cyanobacterium *Lyngbya majuscula*. Shaded cliff bases with dripping freshwater had *Ulva* "green icicles", the small unconvoluted form of *Scytosiphon lomentaria*, and *Chaetomorpha ligustica*. *Chaetomorpha aerea* was found in a high-tidal rock pool. The boulder beach of

Table 2. Herbarium vouchers of seaweeds collected by Mike Wilcox.

Species	Herbarium Voucher Number
<u>Cyanobacteria</u>	
<i>Lyngbya majuscula</i>	AK 317894
<u>Red algae</u>	
<i>Aeodes nitidissima</i>	AK 317924
<i>Hymenena variolosa</i> (washed up in masses)	AK 317889
<u>Brown algae</u>	
<i>Ectocarpus siliculosus</i>	AK 317868
<i>Leathesia marina</i>	AK 317850
<i>Notheia anomala</i>	AK 317932
<i>Ralfsia verrucosa</i>	AK 317930
<i>Scytosiphon lomentaria</i>	AK 317927
<u>Green algae</u>	
<i>Chaetomorpha aerea</i>	AK 317925
<i>Rhizoclonium africanum</i>	AK 317888
<i>Ulva</i> "green icicles"	AK 326491
<i>Ulva</i> sp. "2"	AK 317929

Pohutukawa Bay had an extensive wash-up of seaweeds, the most abundant being *Ecklonia radiata*

(Fig. 8) and *Hymenena variolosa*. Vouchered algae collections are listed in Table 2.

Acknowledgements

Comment on a draft account by Shelley Heiss-Dunlop; Department of Conservation for providing affordable boat access (*Hauturu*) for the ABS visit, especially the skipper James Emslie; the island managers, Andrea and Deane, for ferrying us to and from *Hauturu*; and Rhys Gardner for comments on the *Polygonum* identification.

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Marunui Conservation Area, Mangawhai

Ewen K. Cameron

Background

On the 20 November 2010 the Auckland Botanical Society (ABS) re-visited Marunui, a privately-owned conservation area comprising 417 ha, on the southeast face of the Brynderwyns, near Mangawhai (Fig. 1). The first ABS visit was on 21 July 1990 when they recorded 180 native vascular species (Jones 1991). The property was purchased in 1987 and a company of 18 shareholders was formed – with each shareholder having the right to build a house on the property (so far 14 houses have been built). A QEII National Trust open-space covenant covers the whole property. The Marunui dwellings are centered on: 36°4' 52" S, 174° 31' 34" E, and the property ranges from c.20 m to 397 m asl. There is a track network of



Fig. 2. Looking due west up the tributary of the Tara Creek valley from one of the shareholders' houses. Photo: Josh Salter, 20 Nov 2010.

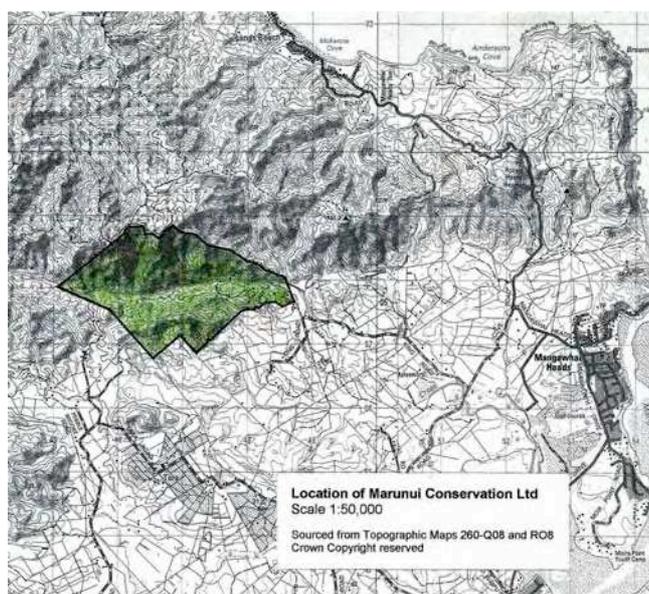


Fig. 1. Location of Marunui Conservation Area. Each square = 1 km². Map provided by John Hawley.

some 14 km so there are opportunities to explore different areas depending on time and fitness levels.

The vegetation is in various stages of regenerating forest: tea-tree scrub (*Leptospermum* and *Kunzea*), tall kanuka (*Kunzea ericoides*), broadleaf forest, mixed broadleaf-podocarp forest (most impressive in the tributary of the Tara Creek valley), and kauri (*Agathis australis*) is locally present. All are in various stages of regeneration since kauri logging ceased early last century. Different habitats and vegetation types occur on the ridges, slopes, gullies, valley bottoms, clearings, stream margins and in small wetlands. Much of the forest is within the Department of Conservation's Schedule of Sites of Biological Interest, identified as being of high national importance. It is part of the Brynderwyn Hills Forest



Fig. 3. Going up Pa Hill through the open shrubland (good orchid habitat), with one of the shareholders, Nigel Prickett. Photo: EKC, 20 Nov 2010.

Complex recorded in the Natural Areas of Waipu Ecological District (Anon. 2007) as being home to three threatened and eleven regionally significant plant species. It is also a habitat for ten threatened and five regionally significant fauna, e.g. Hochstetter's frog, tomtit, kukupa, with kaka, bellbird and red-crowned kakariki all visiting.

Since the initial indigenous vascular plant list (Jones 1991) the shareholders have added another 43 native species, bringing the list before our 'recce' and visit in 2010 to a total of 216 species (excluding the unlikely record of *Ackama rosifolia* south of its accepted southern limit). Many of these plants are also included in the *Flora of Marunui*, written and illustrated by past shareholders, John and Pat Morton (1998).

ABS Visit - participants

ABS and visitors: Enid & Paul Asquith, Jan Butcher, Ewen Cameron (leader), Lisa Clapperton, Brian Cumber, Bev & Geoff Davidson, Neil Davies, Frances Duff, Carol Fielding (Whangarei), Leslie Haines, Richard Hursthouse, John Kendrick (Waipu), Elaine Marshall, Josh Salter, Doug Shaw, Greg and Heather Stump (Waipu), Val Tomlinson, Alison Wesley, Mike Wilcox, Philip Wrigley, and Maureen Young.

Marunui shareholders: Joe & Rita Barber, Cathy & John Hawley, Bruce & Margaret Paine, Kath & Nigel

Prickett, Robert Raine, Robyn Hamilton, and Steve Tonnies.

We all met up at 9.30 am outside the Marunui gate at 300 King Road, and then further carpooled and drove in for c.1 km to near the Marunui dwellings. Cathy welcomed us and outlined the three track options they had chosen for the day, each with varying degrees of difficulty. After admiring the view westwards up the valley (Fig. 2) we all set out at 10.30 am with a shareholder leading each trip.

Option 1: Pa Hill – the most popular option. We climbed up through young manuka (*Leptospermum scoparium*) scrub and open sedgeland (Fig. 3) to the southwest of the settlement area to a flat hill-top (c.220 m asl). Good views across the forested valley were obtained (Fig. 4). The manuka in the open clay areas on the way up had attractive pale-pink petals, and sun orchids (*Thelymitra* spp.) were locally common. It was a treat to see such fine specimens of *T. aemula* in flower (Fig. 5), occurring with *T. longifolia* and a few *T. tholiformis*. (The *T. pauciflora* was observed elsewhere on the day). This former pa site, Pa Hill, featured ditches and numerous pits (c.6 x 3m by 1-1.5m deep) shaded by young regenerating forest above our heads. The tiny fern, *Grammitis ciliata*, was discovered on the bank of one of these pits. Two different taxa of *Alseuosmia* were observed on Pa Hill and they were quite consistent: small upright shrubs (<1m tall) of *A. banksii* var. *linariifolia* (Fig. 6) with narrow leaves (40-60mm long x 6-9 mm wide) but with "leaves larger than the type" (Rhys Gardner pers. comm.); and slightly taller, wider shrubs of an attractive form of *A. quercifolia* (Fig. 7), with lobed-angled leaves and bright red petioles. Interestingly *A. macrophylla* was not observed on the property.



Fig. 4. Looking north from ridge going up Pa Hill, across at the Marunui south-facing escarpment of regenerating forest, with a pine plantation topping the ridge from the north. Photo: EKC, 20 Nov 2010.



Fig. 5. *Thelymitra aemula* – sturdy blue-flowering, glaucous plants were locally common in the open manuka shrubland going up Pa Hill. Photo: Josh Salter, 20 Nov 2010.

Remaining in the regenerating forest we headed down to the south, looped west and finally north, back into the headwaters of the Tara Creek valley with over 25 m-tall podocarp-broadleaf forest, and joined up with the Option 2 group in time to see the 'kiwi probes' (but see Fauna section below).

Option 2: Valley Track – this route followed an old bulldozed track westwards above a tributary of the Tara Creek through regenerating forest to the grassy Upper Meadow, a former logging clearing. This marks the watershed between the Mangawhai and Kaipara Harbour catchments (Tara Creek tributary draining to the east and Hakaru River to the south). Points of interest included a stand of large northern rata (*Metrosideros robusta*) (Fig. 8) with totara (*Podocarpus totara*), matai (*Prumnopitys taxifolia*), kauri, kahikatea (*Dacrycarpus dacrydioides*), puriri (*Vitex lucens*) and nikau (*Rhopalostylis sapida*) (Fig. 9) with a diverse understorey, including *Alseuosmia banksii* var. *linariifolia*. Epiphytic ferns were common (Fig. 10). Returning via the Kahikatea Track, numerous holes which looked like 'kiwi probes' were seen in a damp area. These generated excitement but were later considered to be dragonfly nymph tunnels.



Fig. 6. *Alseuosmia banksii* var. *linariifolia*, Pa Hill. Photo: EKC, 20 Nov 2010.



Fig. 7. *Alseuosmia quercifolia*, Pa Hill. Photo: Josh Salter, 20 Nov 2010.

Option 3: Settlement Loop – a short loop through stands of quite different types of regenerating bush in the settlement area for those who wanted an easy option. Much of the kanuka on the upper slopes of this area was a hybrid (Fig. 11) between the tall robust form (*Kunzea ericoides*) in the valley bottom and the smaller coastal form (*K. ericoides* var. *linearis*).

Vascular Flora

The naturalised vascular species were also recorded this time and a relative abundance also given for all taxa seen (Table 1; Appendix). We added 26 native taxa and recorded 42 naturalised species, bringing the total recorded flora for the property to 285 taxa – 85 % being indigenous. Forty-three previously recorded indigenous species were unconfirmed by the 2010 visit. This is partly explained by the fact that the 1990 visit and the shareholders additions came from some areas being different from those visited in 2010, e.g. including higher altitude forest and wetlands.

Localities and abundance of selected natives (from John Hawley)

Fuchsia excorticata – local along Tara Creek tributary
Hoheria populnea – one or two along Tara Creek tributary adjacent to pasture

Laurelia novae-zelandiae – one or two along Hakaru River tributary

Libocedrus plumosa – only one (seedling 0.5m), on Ridge Track at c.200m asl

Lophomyrtus bullata – scarce, one on Stump Track

Peperomia urvilleana – only known from the small amount on the 'Puriri Bridge' over Tara Creek tributary

Pittosporum crassifolium – one only at main entrance gate

Solanum aviculare – a few along Tara Creek tributary

Sophora tetraptera – a few planted by shareholders around buildings and road from seed collected on adjacent farm (omitted from Appendix 1 because it is planted).

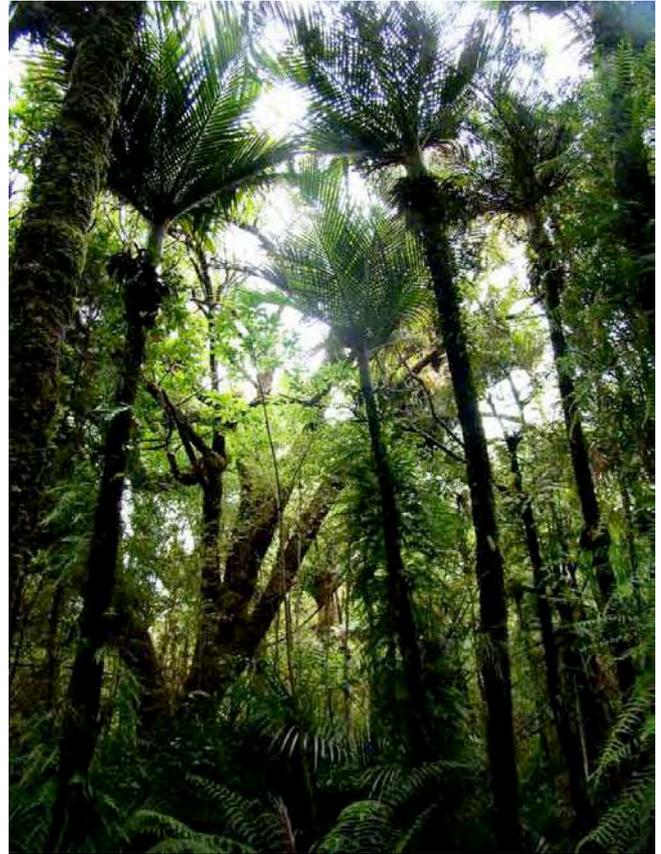


Fig. 9. Broadleaf-podocarp valley bottom forest, rich in nikau. Photo: Josh Salter, 20 Nov 2010.



Fig. 8. One of several northern tree ratas, c.2m diameter, in the tributary of the Tara Creek valley. Photo: Josh Salter, 20 Nov 2010.

Naturalised species

Environmental weed species were generally absent or quite local in the native-dominated regenerating native forest –indicated as only being 12% of the species present. Five woody naturalised species were Recorded in the Pa Hill scrubland: gorse (*Ulex europaeus*), hakea (*Hakea sericea*), pultenaea (*Pultenaea daphnoides*), pine (*Pinus ?radiata*) and



Fig. 10. *Loxogramme dictyopteris*, on a nikau by the Valley Track, with larger sterile fronds of *Microsorium pustulatum* above. Photo: Josh Salter, 20 Nov 2010.

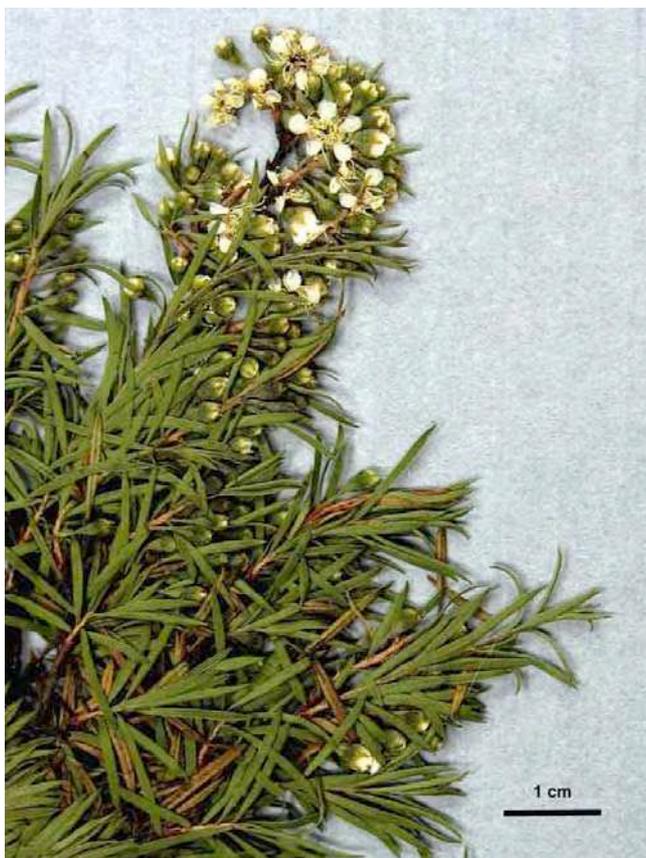


Fig. 11. Hybrid kanuka (*Kunzea ericoides* var. *ericoides* × var. *linearis*) common around the upper settlement area and just starting to flower (20 Nov 2010) – the true *K. ericoides* var. *linearis* is present closer to the Mangawhai coast. Herbarium specimen: AK 327814. Photo: Ewen Cameron.

two wattle species (*Acacia longifolia*, *A. mearnsii*). Some of these are being partly managed by the shareholders, especially the pultenaea, and all these species should generally drop out of the system by shading as the young forest areas regenerate further.

The more serious weed, and a harder one to control, was the Australian bordered panic grass (*Entolasia marginata*) which was present for c.2.5 km, from by the settlement buildings and scattered along the main valley tracks under the tall kanuka and on margins of forest openings. In places this grass was scrambling up vegetation for 1.5 m and smothering low native species.

Fauna

Birds seen during the trip: pheasant (nr. buildings), kukupa, eastern rosella, shining cuckoo (heard), kingfisher, silveryeye, grey warbler, fantail, tomtits (common), tui and chaffinch. The suspected kiwi probe holes (c.1cm across and to 15cm deep) in the wet, spongy, peaty soil under tall forest in the valley bottom were most likely dragonfly nymph (*Uropetala carovei*) exit tunnels (J. Early & G. Taylor pers. comm.). Pig rootings were observed on Pa Hill. Marunui has been carrying out comprehensive pest control since 2004 and has an extensive network of bait stations (rats) and traps (mustelids), which are regularly maintained. Possums are controlled with poisons on an annual basis. Pigs, cats, hedgehogs and magpies are also targeted. These efforts have resulted in increased numbers of native birds seen and heard.

Conclusion

It was a privilege to visit this privately owned, outstanding forested catchment that is clothed in advanced regenerating forest which is virtually weed-free and mammalian pest-free thanks to the efforts of the small dedicated band of shareholders. Hopefully ABS will not take another 20 years before returning to Marunui for a third field trip.

Table 1. Vascular flora totals for the Marunui Conservation Area for the two Bot Soc visits and the combined totals, including additions by the shareholders.

* from Column 1 (Appendix); ** combined totals from Columns 2 & 3 (Appendix)

Plant Group	1990*	2010**	Combined totals
Native lycopods & ferns	55	49	59
Native conifers	9	8	9
Native dicots	98	87	107
Native monocots	54	55	67
Naturalised conifers	-	1	1
Naturalised dicots	-	28	28
Naturalised monocots	2	13	13
Totals	218	241	284
(% native)	-	82	85

Acknowledgements

I thank the Marunui shareholders, especially Cathy and John Hawley for inviting the Society for another visit; John Hawley for additional information, providing the map and commenting on a draft of this article; Bruce and Margaret Paine for hosting a lovely afternoon tea; and other shareholders as guides on the day; John Early and Graeme Taylor for resolving the "kiwi probes"; John Hawley & Sandra Jones for the updated, electronic, base species list; Rhys Gardner for commenting on the *Alseuosmia*; Peter de Lange for commenting on *Kunzea*; Josh Salter for providing many images; and all attendees for their comments and observations on the day.

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 Morton, John & Pat 1998: *Flora of Marunui*. Unpublished. 48p.

Appendix: Vascular Plant List for Marunui Conservation Area for the separate ABS visits.

Symbols

Col. 1 – based on species list compiled during the June 1990 'recce' and the July 1990 ABS visit compiled by Jones (1991) (marked: ✓), with 45 later additions by the shareholders (marked: ✓✓)

Col. 2 – species recorded on 27 Feb 2010 during a 'recce' by Ewen Cameron and Sandra Jones

Col. 3 - species recorded on 20 Nov 2010 during the second ABS field trip

Vouchers – herbarium vouchers in Auckland Museum (AK)

B – confined to around the buildings/road area

✓ – present

✓✓ – addition to the list of Jones (1991) by the shareholders from 1991 to 2010

a – abundant

c – common

l – local

lc – locally common

o – occasional

s – scarce (<5 plants seen)

* – naturalised species

Plant taxa (native + adventive)	Col. 1 (1990)	Col. 2 (Feb 2010)	Col. 3 (Nov 2010)	AK voucher
LYCOPODS (4 + 0)				
<i>Huperzia varia</i>	✓	✓	o	
<i>Lycopodiella cernua</i>	✓	✓	lc	
<i>Lycopodium deuterodensum</i>		✓	l	
<i>Lycopodium volubile</i>	✓	✓	l	
FERNS (55 + 0)				
<i>Adiantum cunninghamii</i>	? ✓		l	
<i>Adiantum diaphanum</i>	✓			
<i>Adiantum hispidulum</i>	✓			
<i>Asplenium bulbiferum</i>	✓	✓	l	
<i>Asplenium flaccidum</i>	✓	✓	lc	
<i>Asplenium oblongifolium</i>	✓	✓	o	
<i>Asplenium polyodon</i>	✓	✓	l	
<i>Blechnum chambersii</i>	✓			
<i>Blechnum discolor</i>	✓	✓	l	
<i>Blechnum filiforme</i>	✓	✓	c	
<i>Blechnum fluviatile</i>	✓			
<i>Blechnum fraseri</i>	✓	✓	l	
<i>Blechnum membranaceum</i>	✓	✓	l	
<i>Blechnum novae-zelandiae</i>	✓	✓	c	
<i>Cardiomanes reniforme</i>	✓	✓		
<i>Cyathea dealbata</i>	✓	✓	c	

Plant taxa (native + adventive)	Col. 1 (1990)	Col. 2 (Feb 2010)	Col. 3 (Nov 2010)	AK voucher
<i>Cyathea medullaris</i>	✓	✓	o-lc	
<i>Cyathea smithii</i>	✓✓			
<i>Deparia petersenii</i>	✓	✓	lc	
<i>Dicksonia squarrosa</i>	✓	✓	o	
<i>Doodia australis</i>	✓	✓	lc	
<i>Doodia mollis</i>	✓✓			
<i>Gleichenia dicarpa</i>	✓		lc	
<i>Gleichenia microphylla</i>		✓	l	
<i>Grammitis ciliata</i>	✓		l	
<i>Histiopteris incisa</i>	✓			
<i>Hymenophyllum demissum</i>	✓	✓	lc	
<i>Hymenophyllum dilatatum</i>	✓		l	
<i>Hymenophyllum flabellatum</i>	✓	✓	lc	
<i>Hymenophyllum revolutum</i>	✓	✓	l	
<i>Hymenophyllum sanguinolentum</i>	✓		l	
<i>Hypolepis ambigua</i>			l, B	
<i>Lastreopsis glabella</i>	✓			
<i>Lastreopsis hispida</i>	✓	✓	lc	
<i>Leptopteris hymenophylloides</i>	✓	✓	l	
<i>Lindsaea linearis</i>	✓✓		l	
<i>Lindsaea trichomanoides</i>	✓	✓	l	
<i>Loxogramme dictyopteris</i>	✓	✓	lc	
<i>Lygodium articulatum</i>	✓	✓	o	
<i>Microsorium pustulatum</i>	✓	✓	o	
<i>Microsorium scandens</i>	✓	✓	lc	
<i>Paesia scaberula</i>	✓	✓	o-lc	
<i>Pneumatopteris pennigera</i>	✓	✓	o	
<i>Pteridium esculentum</i>	✓	✓	lc	
<i>Pteris macilenta</i>	✓	✓		
<i>Pteris tremula</i>	✓	✓	o, B	
<i>Pyrrosia eleagnifolia</i>	✓	✓	l	
<i>Sticherus cunninghamii</i>	✓✓	✓	l	
<i>Tmesipteris elongata</i>	✓	✓	lc	
<i>Tmesipteris lanceolata</i>	✓	✓	l	
<i>Tmesipteris sigmatifolia</i>	✓		s	
<i>Tmesipteris tannensis</i>	✓			
<i>Trichomanes elongatum</i>	✓		l	
<i>Trichomanes endlicherianum</i>	✓			
<i>Trichomanes venosum</i>		✓		
CONIFERS (9 + 1)				
<i>Agathis australis</i>	✓	✓	l	
<i>Dacrycarpus dacrydioides</i>	✓	✓	o-lc	
<i>Dacrydium cupressinum</i>	✓	✓	o	
<i>Libocedrus plumosa</i>	✓✓			
<i>Phyllocladus trichomanoides</i>	✓	✓	c	
<i>Pinus ?radiata*</i>			l	
<i>Podocarpus cunninghamii</i>	✓		lc	
<i>Podocarpus totara</i>	✓	✓	c	
<i>Prumnopitys ferruginea</i>	✓	✓	o	
<i>Prumnopitys taxifolia</i>	✓	✓	l	
DICOTYLEDONS (107 + 28)				
<i>Acacia longifolia*</i>			l	AK327811
<i>Acacia mearnsii*</i>			l	AK327812
<i>Acaena novae-zelandiae</i>	✓		l	
<i>Alectryon excelsus</i>	✓✓	✓	s	
<i>Alseuosmia banksii</i> var. <i>linariifolia</i>	✓✓	✓	lc	AK327810
<i>Alseuosmia quercifolia</i>	✓	✓	lc	
<i>Anagallis arvensis</i> subsp. <i>coerulea*</i>			l, B	

Plant taxa (native + adventive)	Col. 1 (1990)	Col. 2 (Feb 2010)	Col. 3 (Nov 2010)	AK voucher
<i>Aristolelia serrata</i>	✓			
<i>Beilschmiedia tarairi</i>	✓	✓	o-lc	
<i>Beilschmiedia tawa</i>	✓	✓	l	
<i>Brachyglottis kirkii</i> var. <i>angustior</i>	✓✓		s	
<i>Brachyglottis repanda</i>	✓	✓	l	
<i>Callitriche muelleri</i>	✓	✓	lc	
<i>Calystegia marginata</i>	✓✓		s	AK288708
<i>Calystegia sepium</i> subsp. <i>roseata</i>	✓		lc	
<i>Carmichaelia australis</i>	✓	✓	o	
<i>Carpodetus serratus</i>	✓	✓	o-lc	
<i>Centaurium erythaea</i> *			l, B	
<i>Centella uniflora</i>	✓	✓	lc	
<i>Clematis cunninghamii</i>	✓	✓	o	
<i>Clematis paniculata</i>	✓	✓	o	
<i>Clinopodium vulgare</i> *		✓		AK310473
<i>Conyza sumatrensis</i> *			o, B	
<i>Coprosma arborea</i>	✓	✓	o-lc	
<i>Coprosma areolata</i>	✓	✓	l	
<i>Coprosma grandifolia</i>	✓	✓	l	
<i>Coprosma lucida</i>		✓	o	
<i>Coprosma rhamnoides</i>	✓	✓	c	
<i>Coprosma robusta</i>	✓	✓	o	
<i>Coprosma C. propinqua</i> × <i>C. robusta</i>	✓✓			
<i>Coprosma spathulata</i>	✓	✓	l	
<i>Coriaria arborea</i>	✓✓			
<i>Corokia buddleioides</i>	✓✓		s	
<i>Corynocarpus laevigatus</i>	✓	✓	l	
<i>Dichondra repens</i>	✓	✓	l	
<i>Digitaria purpurea</i> *			l	
<i>Dracophyllum latifolium</i>	✓		l	
<i>Drosera auriculata</i>	✓	✓	lc	
<i>Dysoxylum spectabile</i>	✓	✓	l	
<i>Elaeocarpus dentatus</i>	✓	✓	o	
<i>Elatostema rugosum</i>	✓	✓	lc	
<i>Epilobium</i> sp. (1)	✓			
<i>Epilobium</i> sp. (2)	✓			
<i>Euchiton collinus</i>	✓			
<i>Euchiton limosus</i>	✓			
<i>Facelis retusa</i> *			l, B	AK327813
<i>Fuchsia excorticata</i>	✓			
<i>Galium divaricatum</i> *			o, B	
<i>Gamochaeta coarctata</i> *			o, B	
<i>Gamochaeta simplicaulis</i> *			l, B	
<i>Gamochaeta subfalcata</i> *			l, B	
<i>Gaultheria antipoda</i>	✓✓			
<i>Geniostoma ligustrifolium</i>	✓	✓	c	AK310480
<i>Geranium dissectum</i> *			l, B	
<i>Geranium homeanum</i>	✓	✓	s	
<i>Gonocarpus incanus</i>	✓		lc	
<i>Griselinia lucida</i>	✓	✓	s	
<i>Hakea sericea</i> *			l	
<i>Haloragis erecta</i>	✓		s	
<i>Hebe macrocarpa</i>	✓✓	✓	o	
<i>Hebe stricta</i>	✓			
<i>Hedycarya arborea</i>	✓	✓	o	
<i>Hoheria populnea</i>	✓			
<i>Helminthotheca echioides</i> *			l, B	
<i>Hydrocotyle moschata</i>		✓		
<i>Hydrocotyle novae-zelandiae</i>	✓		lc	
<i>Knightia excelsa</i>	✓	✓	o	
Plant taxa (native + adventive)	Col. 1	Col. 2	Col. 3	AK voucher

	(1990)	(Feb 2010)	(Nov 2010)	
<i>Kunzea ericoides</i> var. <i>ericoides</i>	✓	✓	a	
<i>Kunzea ericoides</i> var. <i>ericoides</i> x var. <i>linearis</i>			lc	AK327814
<i>Laurelia novae-zelandiae</i>	✓			
<i>Leptecophylla juniperina</i>	✓		s	
<i>Leptospermum scoparium</i>	✓	✓	lc	
<i>Leucopogon fasciculatus</i>	✓	✓	o	
<i>Linum bienne</i> *			l, B	
<i>Lobelia anceps</i>	✓	✓	l	
<i>Lophomyrtus bullata</i>	✓			
<i>Lotus pedunculatus</i> *			l	
<i>Macropiper excelsum</i>	✓	✓	l	
<i>Melicytus macrophyllus</i>	✓	✓	lc	
<i>Melicytus micranthus</i>	✓✓	✓	lc	
<i>Melicytus ramiflorus</i>	✓	✓	o-lc	
<i>Metrosideros diffusa</i>	✓	✓	o	
<i>Metrosideros fulgens</i>	✓	✓	l	
<i>Metrosideros perforata</i>	✓	✓	c	
<i>Metrosideros robusta</i>	✓	✓	l	
<i>Mida salicifolia</i>	✓		s	
<i>Muehlenbeckia australis</i>	✓	✓		
<i>Myrsine australis</i>	✓	✓	o-lc	
<i>Myrsine salicina</i>	✓✓		s	
<i>Nertera depressa</i>	✓			
<i>Nertera dichondrifolia</i>	✓	✓	lc	
<i>Nestegis lanceolata</i>	✓	✓	o	
<i>Oenanthe pimpinelloides</i> *			l, B	
<i>Olearia furfuracea</i>	✓	✓	lc	
<i>Olearia rani</i>	✓	✓	lc	
<i>Parentucellia viscosa</i> *			o, B	
<i>Parsonia capsularis</i>	✓✓			
<i>Parsonia heterophylla</i>	✓		l	
<i>Peperomia urvilleana</i>	✓✓	✓	s	
<i>Pittosporum cornifolium</i>		✓		
<i>Pittosporum crassifolium</i>	✓✓	✓	s, B	
<i>Pittosporum eugenioides</i>	✓	✓	l	
<i>Pittosporum tenuifolium</i>	✓	✓	s	
<i>Plantago lanceolata</i> *			o, B	
<i>Pomaderris amoena</i>	✓		o	
<i>Pomaderris kumeraho</i>	✓	✓	o-lc	
<i>Prunella vulgaris</i> *			lc	
<i>Pseudognaphalium luteoalbum</i>			l, B	
<i>Pseudopanax arboreus</i>	✓	✓	o	
<i>Pseudopanax crassifolius</i>	✓	✓	l	
<i>Pseudopanax crassifolius</i> × <i>P. lessonii</i>		✓	lc	
<i>Pultenaea daphnoides</i> *		✓	lc, B	AK242551 & 313126
<i>Quintinia serrata</i>	✓✓			
<i>Ranunculus reflexus</i>	✓	✓	l	
<i>Ranunculus repens</i> *			o, B	
<i>Rhabdothamnus solandri</i>	✓	✓		
<i>Rubus australis</i>	✓	✓	o	
<i>Rubus cissoides</i>	✓	✓	o	
<i>Schefflera digitata</i>	✓	✓	lc	
<i>Senecio hispidulus</i>	✓		l	
<i>Senecio minimus</i>	✓			
<i>Solanum aviculare</i>	✓			
<i>Solanum nodiflorum</i>		✓		
<i>Sonchus asper</i> *			lc, B	
<i>Sonchus oleraceus</i> *			o, B	
<i>Stellaria parviflora</i>			l	
<i>Streblus heterophyllus</i>	✓✓	✓	o	
Plant taxa (native + adventive)	Col. 1 (1990)	Col. 2 (Feb)	Col. 3 (Nov)	AK voucher

	2010)	2010)		
<i>Toronia toru</i>	✓			
<i>Trifolium pratense*</i>			l, B	
<i>Ulex europaeus*</i>			lc	
<i>Verbena bonariensis*</i>			o, B	
<i>Veronica plebeia</i>		✓		
<i>Vitex lucens</i>	✓	✓	o-lc	
<i>Wahlenbergia violacea</i>	?✓	✓	l	
<i>Weinmannia silvicola</i>	✓	✓	o	
MONOCOTS (excl. grasses & orchids) (36 + 1)				
<i>Astelia solandri</i>	✓	✓	o	
<i>Astelia trinervia</i>		✓	o	
<i>Baumea juncea</i>		✓	lc	AK310484
<i>Carex dissita</i>	?✓	✓	s	AK327817
<i>Carex lambertiana</i>	✓✓	✓	o	
<i>Carex solandri</i>		✓	o-lc	
<i>Carex virgata</i>	✓			
<i>Collospermum hastatum</i>	✓	✓	o	
<i>Cordyline australis</i>	✓	✓	o	
<i>Cordyline banksii</i>	✓	✓	l	
<i>Cordyline pumilio</i>	✓	✓	o	
<i>Cyperus ustulatus</i>	✓✓			
<i>Dianella latissima/nigra</i>	✓	✓	o	
<i>Eleocharis gracilis</i>	✓			
<i>Freycinetia banksii</i>	✓	✓	l	
<i>Gahnia lacera</i>	✓✓	✓	l	
<i>Gahnia pauciflora</i>		✓		
<i>Gahnia setifolia</i>	✓	✓	o-lc	
<i>Gahnia xanthocarpa</i>	✓	✓	o	
<i>Isolepis inundata</i>	✓			
<i>Isolepis reticularis</i>		✓		
<i>Juncus edgariae</i>	✓✓	✓	l	
<i>Juncus effusus*</i>	✓✓	✓	l	
<i>Juncus planifolius</i>	✓			
<i>Juncus prismatocarpus</i>		✓		
<i>Juncus sarophorus</i>	✓✓			
<i>Lepidosperma australe</i>			l	
<i>Lepidosperma laterale</i>	✓	✓	o	
<i>Libertia ixioides</i>	✓✓	✓	l	
<i>Morelotia affinis</i>	✓✓		l	
<i>Phormium tenax</i>	✓✓	✓	l	
<i>Rhopalostylis sapida</i>	✓	✓	lc	
<i>Ripogonum scandens</i>	✓	✓	l	
<i>Schoenus maschalinus</i>	✓	✓	lc	
<i>Schoenus tendo</i>	✓	✓	lc	
<i>Uncinia banksii</i>	✓	✓	l	
<i>Uncinia uncinata</i>	✓	✓	o	
ORCHIDS (24 + 0)				
<i>Acianthus sinclairii</i>	✓		l	
<i>Anzybas rotundifolius</i>	✓			
<i>Corybas cheesemanii</i>	✓		l	
<i>Dendrobium cunninghamii</i>			s	
<i>Diplodium alobulum</i>	✓		l	
<i>Diplodium trullifolium</i>	✓		l	
<i>Drymoanthus adversus</i>	✓	✓	s	
<i>Earina autumnalis</i>	✓	✓		
<i>Earina mucronata</i>	✓	✓	l	
<i>Ichthyostomum pygmaeum</i>	✓		l	
<i>Microtis unifolia</i>	✓		l	
Plant taxa (native + adventive)	Col. 1 (1990)	Col. 2 (Feb	Col. 3 (Nov	AK voucher

	2010)	2010)	
<i>Nematoceras trilobum</i>	✓		
<i>Orthoceras novae-zelandiae</i>	✓		s
<i>Petalochilus alatus</i>	✓✓		
<i>Petalochilus chlorostylus</i>	?✓✓		lc
<i>Pterostylis agathicola</i>	✓		lc
<i>Pterostylis banksii</i>	✓✓		o
<i>Pterostylis graminea</i>	✓✓		
<i>Simpliglottis cornuta</i>	✓✓		
<i>Singularybas oblongus</i>	✓✓		l
<i>Thelymitra aemula</i>			lc
<i>Thelymitra longifolia</i>	✓		lc
<i>Thelymitra pauciflora</i>	✓✓		l
<i>Thelymitra tholiformis</i>			s
GRASSES (7 + 12)			
<i>Aira caryophylla</i> subsp. <i>caryophylla</i> *			lc, B
<i>Anthoxanthum odoratum</i> *			la
<i>Briza minor</i> *			l, B
<i>Dactylis glomerata</i> *			lc
<i>Danthonia decumbens</i> *			lc
<i>Entolasia marginata</i> *		✓	o-la
<i>Holcus lanatus</i> *			la
<i>Isachne globosa</i>	✓		
<i>Lachnagrostis filiformis</i>			l, B
<i>Microlaena avenacea</i>	✓	✓	o
<i>Microlaena stipoides</i>			lc
<i>Oplismenus hirtellus</i>	✓	✓	l
<i>Paspalum dilatatum</i> *		✓	
<i>Pennisetum clandestinum</i> *		✓	lc
<i>Poa trivialis</i> *			lc, B
<i>Polypogon monspeliensis</i> *			l, B
<i>Rytidosperma biannulare</i>			lc
<i>Rytidosperma gracile</i>	✓	✓	
<i>Schedonorus arundinaceus</i> *	✓✓		l

Trip Report: Upper Nihotupu Reservoir, Waitakere Ranges, Auckland, 16 April 2011

Peter Hutton

Participants: Romily Atkinson (recorder), Lisa Clapperton, Brian Cumber, Neil Davies, Frances Duff, Leslie Haines, Richard Hursthouse, Peter Hutton (leader), Margi Keys, Christine Major, Josh Salter, Val Tomlinson, Alison Wesley, Mike Wilcox.

From the carpark on the Piha Road (1 km west of Waiatarua) we crossed a little bridge over the Nihotupu Stream into kanuka (*Kunzea ericoides*) second growth. The impression that this area had been farmland perhaps 100 years ago was reinforced by finding the weedy woody vine *Elaeagnus × reflexa*, used then as a cattle hedge. Of interest was an abundant divaricating shrub, *Raukaua anomalus*. A steady drizzle commenced, making it difficult to take notes. The track joined the access road to the dam.

We passed into a wet, higher-altitude (280 m asl) type of forest with rimu (*Dacrydium cupressinum*), thin-barked totara (*Podocarpus cunninghamii*), miro (*Prumnopitys ferrugineus*) prominent, together with tawa (*Beilschmiedia tawa*), hinau (*Elaeocarpus dentatus*), and rewarewa (*Knightia excelsa*) all in good numbers. A giant northern rata (*Metrosideros robusta*) was much admired. Lacebark (*Hoheria populnea*) was common and in flower. Other trees and shrubs of note were *Alseuosmia macrophylla*, *Corokia buddleioides*, neinei (*Dracophyllum latifolium*), kohuhu (*Pittosporum tenuifolium*), heketara (*Olearia rani*), tawari (*Ixerba brexioides*), toro (*Myrsine salicina*), lancewood (*Pseudopanax crassifolius*), mangeao (*Litsea calicaris*), ramarama (*Lophomyrtus bullata*), wineberry (*Aristotelia serrata*), *Quintinia serrata* and swamp maire (*Syzygium maire*). Parataniwha (*Elatostema rugosum*) was locally abundant, forming a ground cover in damp, shady spots. Tree ferns were particularly common, and we saw four species: *Cyathea dealbata*, *C. medullaris*, *C. smithii*, and *Dicksonia squarrosa*. The access

road runs beside a number of cascades (Fig. 1) to the head of the reservoir, where the Nihotupu Stream falls directly into the lake. The road then skirts around the lake, with kowhai (*Sophora chathamica*) common. River daisy (*Anaphalioides trinervis*) taurepo (*Rhabdothamnus solandri*), tuhara (*Machaerina sinclairii*) and *Arthropodium cirratum* were abundant on the roadside cliff, as well as the exotics Mexican daisy (*Erigeron karvinskianus*), *Selaginella kraussiana* and pearlwort (*Sagina procumbens*).



Fig. 1. Nihotupu Stream from the access road. Photo: Peter Hutton, 16 April 2011.

At this stage a few members (including our Recorder) became too cold and retreated to their cars. The others continued (in brightening conditions) to a convenient shelter beside the dam for lunch. We walked down to the base of the dam, up its face on very steep steps and back to the cars. As a final excursion we drove to the end of Quinn's Road then walked to the nearest repeater tower (380 m asl). The final treat for the day was finding *Raukaua edgerleyi*, with its distinctive entire glossy adult leaves.

Native plant species list recorded during the field trip to Upper Nihotupu Dam:

Ferns and Lycopods

Adiantum cunninghamii
Asplenium bulbiferum
Asplenium flaccidum
Asplenium polyodon
Blechnum chambersii
Blechnum discolor
Blechnum fluviatile
Blechnum fraseri
Blechnum novae-zealandiae
Cyathea dealbata
Cyathea medullaris
Cyathea smithii
Dicksonia squarrosa
Huperzia varia
Hymenophyllum spp.
Loxogramme dictyopteris
Lygodium articulatum
Microsorium pustulatum
Microsorium scandens
Paesia scaberula
Pneumatopteris pennigera
Pteridium esculentum
Rumohra adiantiformis
Tmesipteris sp.
Trichomanes venosum

Gymnosperms

Agathis australis
Dacrycarpus dacrydioides
Dacrydium cupressinum
Podocarpus cunninghamii
Prumnopitys ferrugineus

Dicotyledons

Alseuosmia macrophylla
Anaphalioides trinervis
Aristotelia serrata
Beilschmiedia tawa
Brachyglottis repanda
Carmichaelia australis
Centella uniflora
Clematis paniculata
Coprosma grandifolia
Coprosma lucida
Coriaria arborea
Corokia buddleoides
Dracophyllum latifolium
Elaeocarpus dentatus
Elatostema rugosum
Epilobium rotundifolium
Euchiton collinus

Geniostoma ligustrifolium
Hebe stricta
Hedycarya arborea
Hoheria populnea
Hydrocotyle sp.
Ixerba brexioides
Knightia excelsa
Kunzea ericoides
Leucopogon fasciculatus
Litsea calicaris
Lophomyrtus bullata
Melicytus macrophylla
Metrosideros robusta
Metrosideros diffusa
Muehlenbeckia australis
Myrsine salicina
Nertera depressa
Nertera dichondrifolia
Nestegis lanceolata
Nestegis montana
Olearia rani
Pittosporum tenuifolium
Pseudopanax crassifolium
Quintinia serrata
Ranunculus reflexus
Raukiau anomalous
Rhabdothamnus solandri
Rubus cissoides
Schefflera digitata
Sophora chathamica
Syzygium maire

Monocotyledons

Arthropodium cirratum
Astelia trinervia
Cordyline australis
Cordyline banksii
Cordyline pumilio
Dianella nigra
Earina mucronata
Freycinetia banksii
Gahnia lacera
Gahnia setifolia
Machaerina sinclairii
Phormium tenax
Pterostylis banksii
Rhopalostylis sapida
Uncinia uncinata

Botany of some native bush reserves in southern Auckland

Helen Preston Jones, Chris Ashton, Christine Major, Nicky Reynolds, Elaine Marshall, Mike Wilcox

Very threatening weather overnight miraculously cleared for this field trip, held on 18 June 2011. Those attending were: Bev Davidson, Chris Ashton, Christine Major, Elaine Marshall, Frances Duff, Geoff Davidson, Helen Preston Jones, James Luty, Jan Butcher, John Lambert, Josh Salter, Juliet Richmond, Leslie Haines, Margi Keys, Mike Wilcox (leader), Nicky Reynolds, Peter Hutton, Philip Moll, Sharon Osman, Tony Williams. The idea of this trip was to investigate the composition, structure and condition of five of the small native bush reserves in the suburbs of The Gardens, Manurewa, and Goodwood Heights (Fig. 1).



Fig. 1. Map showing location of the reserves visited. A: Peretao Rise, B: Hillcrest Grove, C: Everglade Drive, D: Banyan Drive, E: Eugenia Rise (based on www.wises.co.nz).

Peretao Rise Reserve, Charles Prevost Drive, The Gardens (1.7 ha)

Helen Preston Jones

This was the first of the five reserves we visited – an area partly in grass and partly remnant totara-dominant bush, centred around the residual gully form of the old farmland. The area was very wet underfoot, due to recent rains, and the stream was piped underground on either side of the reserve. This was a typical pattern of the bush patches in the area, when land was provided as reserve contribution on subdivision, donating the least desirable building plot! Thus local stands of bush have remained, surrounded by house sections, with short sections of frontage to the local street, or approached by narrow pathways between houses.

The tree stock was primarily totara (*Podocarpus totara*), of even age, set close together and narrow in form, except on the open edge of the grassland, with an understorey or subcanopy of mamangi (*Coprosma arborea*), kawakawa (*Macropiper excelsum*), karaka (*Corynocarpus laevigatus*), mapou (*Myrsine australis*), and rarely, pigeonwood (*Hedycarya arborea*). Amongst the totara were occasional kahikatea (*Dacrydium dacrydioides*), rimu (*Dacrydium cupressinum*), matai (*Prumnopitys taxifolia*), miro (*P. ferruginea*), tanekaha (*Phyllocladus trichomanoides*) and kanuka (*Kunzea ericoides*). The presence of a few well-established seedlings of taraire (*Beilschmiedia taraire*), tawa (*B. tawa*) and titoki (*Alectryon excelsa*) may indicate that the bush has potential to develop a more complex composition, perhaps to a karaka/tawa/taraire broadleaf forest.

Epiphytes were absent, but lianes present were native passion vine (*Passiflora tetrandra*), akakiore (*Parsonia heterophylla*) and pohuehue (*Muehlenbeckia australis*). Few ferns, other than *Pyrrosia eleagnifolia*, *Doodia australis* and the ubiquitous silver fern (*Cyathea dealbata*), were growing here. Small-leaved mahoe (*Melicactus micranthus*), was an interesting find, with its variable leaf shape, as well as mahoe (*M. ramiflorus*) being present. Forest native monocots noted were *Uncinia distans*, *U. uncinata*, *Oplismenus hirtellus* and *Carex lambertiana*, and a wet area had a good patch of *Isolepis inundata*.



Fig. 2. *Meryta sinclairii*, Peretao Rise Reserve, The Gardens, 1 April 2011. Photo: Mike Wilcox.

Viability of these small areas as good quality forest is in doubt, as they are exposed to weed invasion, wind effects and openness on the perimeter, uncoordinated pest management, and neighbours activities. In this small reserve, we saw evidence of weed spread from

garden rubbish, but also unexpected evidence of native species, naturalising where one would not expect them. Several coastal species were identified, self-sown, presumably indicative of bird movement through the city. These included puka (*Meryta sinclairii*) – see Fig. 2, karo (*Pittosporum crassifolium*), taupata (*Coprosma repens*), and houpara (*Pseudopanax lessonii*).

Garden escapes and discards also provided sub-tropical notes, including a bank of spider plant (*Chlorophytum comosum*), stinking iris (*Iris foetidissima*), Swiss cheese plant (*Monstera deliciosa*), bear's britches (*Acanthus mollis*), palm grass (*Setaria palmifolia*), veld grass (*Ehrharta erecta*), wandering jew (*Tradescantia fluminensis*), climbing asparagus (*Asparagus scandens*), agapanthus (*Agapanthus orientalis*), hedge woundwort (*Stachys sylvatica*) and forest forget-me-not (*Myosotis sylvatica*). Creeping buttercup (*Ranunculus repens*) was abundant in open damp places.

Woody weeds also had a significant presence, ones we noted on the bush edge or open understorey being loquat (*Eriobotrya japonica*), Chinese privet (*Ligustrum sinense*), Japanese hill cherry (*Prunus serrulata*), monkey apple (*Syzygium smithii*), Brazilian pepper tree (*Schinus terebinthifolius*), blackberry (*Rubus fruticosus*), Cape honeysuckle (*Tecoma capensis*), leadwort (*Plumbago auriculata*), and macadamia nut (*Macadamia tetraphylla*). And there were naturalised palms, too – phoenix palm (*Phoenix canariensis*) and Chinese windmill palm (*Trachycarpus fortunei*).

The reserve would benefit from weed control, around its margins, and positive community action to deter the dumping of garden refuse. The natural introduction of "out of zone" species is of interest.

Hillcrest Grove Reserve, Hill Road, Hillpark, Manurewa (2.1 ha)

Chris Ashton and Christine Major

This reserve is one of the most attractive in the Hillpark group of bush remnants, and has a well-constructed pathway through it. The forest is tall and very dense, reaching 25 m in height, with totara dominant, together with kanuka, kahikatea, kohekohe (*Dysoxylum spectabile*), mamangi, pukatea (*Laurelia novae-zelandiae*), puriri (*Vitex lucens*), rewarewa (*Knightia excelsa*), rimu and tawa, and rarely, tanekaha, matai, white maire (*Nestegis lanceolata*) and milk tree (*Streblus heterophyllus*) (see Appendix). By the size and diversity of the trees, density of the understorey, and presence of epiphytes and ground ferns, this bush is a good deal older than the other blocks we visited.

Pest control has been carried out intensively and has no doubt contributed to the most remarkable feature of this forest – its dense understorey of regenerating kohekohe (Fig. 3), and also karaka, mamangi and puriri. Other small trees or shrubs noted in the understorey or subcanopy were *Coprosma spathulata*, kaikomako (*Pennantia corymbosa*), hangehange (*Geniostoma ligustrifolium*), lemonwood (*Pittosporum eugenioides*), milk tree, mapou, lancewood (*Pseudopanax crassifolius*), kawakawa, mahoe, small-leaved mahoe, karamu (*Coprosma robusta*) and lacebark (*Hoheria populnea*). Tawapou (*Planchonella costata*) was found not far inside the bush from the narrow Hillcrest Grove entrance - we suspect it was either planted or was bird-dispersed from a nearby seed source. Silver tree fern, mamaku (*Cyathea medullaris*) and nikau palm (*Rhopalostylis sapida*) were also common.



Fig. 3. Totara forest with understorey of kohekohe, Hillcrest Grove Reserve, 18 June 2011. Photo: Mike Wilcox.

Climbers present were kiekie (*Freycinetia banksii*), white rata vine (*Metrosideros perforata*), akakiore, native passion vine and the ferns *Blechnum filiforme*, *Microsorium scandens* and *Pyrrosia eleagnifolia*. Tank lily (*Collospermum hastatum*) was a frequent high epiphyte on totara.

As with each of these reserves visited, the ground fern flora was rather limited, comprising here only *Asplenium bulbiferum*, *A. oblongifolium*, *A. polyodon*, *Doodia australis*, *Lastreopsis glabella*, and *L. microsora*. Forest floor monocots were in evidence beside the tracks, and ones we recorded were dwarf cabbage tree (*Cordyline pumilio*), bush rice grass (*Microlaena avenacea*), bush panic grass (*Oplismenus hirtellus*), cutty grass (*Carex dissita*, *C. lambertiana*), and hook grass (*Uncinia distans*, *U. uncinata*). The only native herb we saw was *Haloragis erecta*.

Whilst the bush is in remarkably good condition considering its urban location, there were several exotic weeds present, some marginal and sparse, others more pervasive. By far the worst woody weed

in this reserve is *Elaeagnus ×reflexa*, present along the tracks and well established in the understorey. The seed of this scrambling shrub is spread by birds. Other woody exotics recorded were Japanese spindle tree (*Euonymus japonicus*), tree privet (*Ligustrum lucidum*), Chinese privet, ivy (*Hedera helix*), Japanese hill cherry, Mickey mouse bush (*Ochna serrulata*) and bay laurel (*Laurus nobilis*). In bush on private property near the Hillcrest Grove entrance to the reserve we saw Brazilian flame vine (*Pyrostegia venusta*) in flower in the top of a tall totara tree. Chinese windmill palm and bangalow palm (*Archontophoenix cunninghamiana*), Swiss cheese plant, climbing asparagus, spider plant, taro (*Colocasia esculenta*), *Cyperus eragrostis*, wild ginger (*Hedychium gardnerianum*) were the monocot exotics we recorded. Selaginella (*Selaginella kraussiana*) was common in places, and there were patches of inkweed (*Phytolacca octandra*), plectranthus (*Plectranthus ciliatus*, *P. ecklonii*) to complete our tally of introduced plants.

Everglade Drive Reserve Block A, Everglade Drive, Goodwood Heights (0.7 ha)

Nicola Reynolds

Everglade Drive, Goodwood Heights, represents a typical New Zealand urban development on farmland of the late 1970s to early 80s. The remaining bush remnants, like this one, albeit somewhat more weed-ridden, offer a timely reminder of how this landscape would once have looked. The bush runs from Everglade Drive down to the very edge of the Southern Motorway. The understorey is quite poor in places, making this a somewhat open remnant due in part to prior farming practices and possibly more, latterly, due to the reserve being used as a pedestrian thoroughfare between Everglade and Orams Road. The west-facing area of this reserve acts as the run off for part of the subdivision. The modern day addition of the high tensile power pylon made a good lunch spot during our urban exploration!

The dominant trees were kahikatea, together with totara, and a few mamangi, milk tree and kanuka. Damper places near a stream had taraire, kohekohe, puriri, pukatea and lemonwood. Prevalent in the understorey or gaps were silver tree fern, nikau, karaka, mahoe, mapou, small-leaved mahoe, hangehange, kawakawa and lacebark. We also recorded coastal karamu (*Coprosma macrocarpa*) and *Haloragis erecta*.

Naturalised woody exotics recorded were fatsia (*Fatsia japonica*), mountain pawpaw (*Vasconcellea pubescens*, syn. *Carica pubescens*), woolly nightshade (*Solanum mauritianum*), monkey apple, Japanese hill cherry, Chinese privet and ivy. There were also several naturalised native shrubs, seeded in from

surrounding gardens: taupata, karo and houpara (including the form known as *Pseudopanax lessonii* 'Cyril Watson').

A highlight of this reserve was a spectacular, massive vine of native passion flower – perhaps the biggest any of us had ever seen (Fig. 4). Akakiore was also present, and notable was a gully full of supplejack (*Ripogonum scandens*).



Fig. 4. *Passiflora tetrandra*, Everglade Drive Reserve, Goodwood Heights, 18 June 2011. Photo: Mike Wilcox.

The fern flora was rather meagre, with, apart from silver fern, only *Asplenium flaccidum*, *A. oblongifolium*, *Blechnum chambersii*, *Diplazium australe*, *Microsorium pustulatum*, *Pneumatopteris pennigera* and *Pyrrosia eleagnifolia* being recorded.

Naturalised monocots recorded were elephants ear (*Alocasia brisbanensis*), onion weed (*Allium triquetrum*), spider plant, ginger, wandering jew, and paspalum (*Paspalum dilatatum*), while other naturalised dicots seen were inkweed, black nightshade (*Solanum nigrum*), and lilac oxalis (*Oxalis incarnata*).

Banyan Drive Reserve, Everglade Drive, Goodwood Heights (3.9 ha)

Elaine Marshall

The geology of the area has a sedimentary bedrock of Waitemata mudstone and siltstone, forming a clay soil of good fertility. This reserve is long and narrow, running E, NE to W, SW along a low ridge which gently slopes to the south to a small stream that runs near the southern edge. The stream is culverted at the western boundary of the bush, and receives piped stormwater from the nearby streets. It is a tributary of the Puhinui Stream. Housing backs on to the reserve along the northern boundary and part of the eastern boundary. Mown grassy areas bound the

western end and along the western southern boundary. The bush was reserved as part of the conditions for subdivision of the land by Broadland Properties Ltd from 1979 to 1985.

It was originally farm land and the canopy is almost exclusively clean-boled pole totara 18 to 20 m high, forming a closed canopy, with just a few other tree species present in small numbers, namely tanekaha and kanuka. Some older much-branched totara with diameters of around 1 m occur in places – this low branching habit indicating the previous open nature of the bush in grazed pasture. Two large kahikatea trees of c. 1 m diameter occur near the stream. A large puriri, which has fallen over and resprouted, was seen in the eastern end of the reserve.



Fig. 5. Totara forest with *Coprosma* understory, Banyan Drive Reserve, Goodwood Heights, 18 June 2011. Photo: Mike Wilcox.

There is virtually no subcanopy except near the stream where tree ferns (predominantly *Cyathea dealbata* and a few *C. medullaris*) and some nikau (*Rhopalostylis sapida*) form a scattered, intermittent low subcanopy 6-7 m high. The dominance of totara in the canopy and lack of subcanopy species indicates past pastoral heavy browsing of cattle (Fig. 5). There is much regeneration in the understory shrub layer, 2-4 m high, at times very dense. *Coprosma spathulata* is the dominant shrub on the ridge top along with hangehange, mapou, mahoe, mamangi, houpara, kohuhu (*Pittosporum tenuifolium*), karaka, and some

pigeonwood, seedling nikau, and kawakawa. Occasional seedlings of taraire, tawa, titoki, lancewood (*Pseudopanax crassifolius*), putaputaweta (*Carpodetus serratus*) and mingimingi (*Leucopogon fasciculatus*) are also present. We also found a sapling of tawapou. Lianas recorded were bush lawyer (*Rubus cissoides*), *Parsonsia heterophylla*, *Muehlenbeckia australis*, passion vine and clematis (*Clematis paniculata*), and there were some vigorous areas of kiekie towards the stream. *Parsonsia heterophylla* was particularly common in openings or gaps.

In the western end the dominant shrub is kawakawa, forming an almost pure dense shrub layer (Fig. 6), and there are here near the stream some larger broadleaved trees, notably puriri, taraire and titoki. At the eastern end of the reserve silver fern is abundant in the understorey. There the broadleaf shrubs are less common due to the dense frond litter and dense subcanopy layer. Small open areas are densely covered with the grass *Oplismenus hirtellus*, and the sedges *Carex lambertiana* and *Uncinia distans* occur in patches. Ferns are common especially rasp fern (*Doodia australis*) which in areas near the stream become locally dense. Other common ferns near the stream include *Lastreopteris glabella*, *L. hispida*, *Adiantum raddianum*, *Deparia petersenii*, and also *Blechnum membranaceum* and rarely, *Adiantum cunninghamii*. Further from the stream on the slopes,



Fig. 6. Totara forest with kawakawa understory, Banyan Drive Reserve, 21 July 2011. Photo: Mike Wilcox.

Asplenium oblongifolium and rasp fern are common, with some *Adiantum hispidulum*.

Weeds are minimal within the reserve which indicates it is being well managed as most of the weeds are just seedlings or small saplings, the main woody ones being loquat (*Eriobotrya japonica*), Jerusalem cherry (*Solanum pseudocapsicum*) and monkey apple (*Syzygium smithii*), though we did come across a large *Acacia longifolia* in the canopy. There were marginal patches of ladder fern (*Nephrolepis cordifolia*), and shrub balsam (*Impatiens sodenii*), while Queen of the night (*Cestrum nocturnum*) and arum lily (*Zantedeschia aethiopica*) occurred in the easternmost stream gully. There are some small local patches of wandering jew in the reserve. Most of the weeds and dumped rubbish occur at the northern and eastern edges near dwellings. Some dumping of garden refuse has resulted in the establishment of these weeds.

Several of the native shrubs in the understorey can be regarded as naturalised plants in this reserve, notably the coastal species karo, taupata, houpara, and tawapou.

All in all a very nice piece of well-maintained remnant pastoral totara forest, with a moderately good representation of native species (66) (see Appendix). Over time more native species will eventually re-establish in the reserve due to its close proximity to the large bush area of Totara Park just to the south. The presence of seedling kohekohe, taraire and tawa is testament to this. With ongoing vigilance and maintenance it should be possible to keep this reserve free of exotic weeds.

Acknowledgements

Michael Ngatai, Auckland Council, South Auckland, informed us that weed and pest control is undertaken in these reserves. Pest animal control (for rodents and possums) occurs at Hillcrest Grove Reserve and across the road at Nathan Homestead Reserve (there are a handful of bait stations that are topped up monthly). A local resident looks after the possum control at Banyan Drive Reserve (MCC Parks donated a few Timms traps last year to one of the locals who wanted to control possums in there). Weeds are managed in most of these reserves. Jeremy Froger, Principal Policy Analyst Parks and Open Spaces, Community & Cultural Policy South, Auckland Council, kindly provided historical information about Banyan Drive Reserve.

Appendix: Species lists for two of the South Auckland reserves.

Hillcrest Grove Reserve

Ferns & lycopods: 8 native, 1 exotic*

Asplenium oblongifolium
A. polyodon
Blechnum filiforme
Cyathea dealbata
Doodia australis
Lastreopsis glabella
L. microsora
Microsorium scandens
*Selaginella kraussiana**

Conifers: 5 native

Dacrycarpus dacrydioides

Eugenia Rise Reserve, Eugenia Rise, Goodwood Heights (5.8 ha)

Mike Wilcox

Our last port of call for the day was Eugenia Rise Reserve, the largest of the Goodwood Heights bush remnants. This is an extensive totara forest with a minor admixture of tanekaha, kanuka, miro, rewarewa, and mamangi on the upper slopes, with broadleaved forest of tawa, taraire, kohekohe, karaka, and puriri, together with kahikatea, in the gullies and on the lower slopes. The understorey in the totara forest was dominated by mapou, mahoe, and hangehange, and with several puka naturalised, while nikau, kiekie, milk tree, kawakawa and pigeonwood were common on the damper sites. Native passion vine was common in places as a sprawling terrestrial creeper in the totara forest, while panic grass was common in patches.

The fern flora was reasonably diverse, and we recorded *Asplenium bulbiferum*, *A. oblongifolium*, *Blechnum chambersii*, *B. filiforme*, *B. membranaceum*, *Cyathea dealbata*, *C. medullaris*, *Lastreopsis glabella*, *Microsorium pustulatum*, *M. scandens*, *Pneumatopteris pennigera*, *Pteridium esculentum* and *Pteris comans*. Woody weeds recorded were barberry (*Berberis glaucocarpa*) and fatsia.

Conclusions

The main ecological features of these reserves were the abundance of totara, consistent presence of *Passiflora tetrandra* and *Melicytus micranthus*, variable composition of the understories, absence of filmy ferns, absence of native herbs, and scarcity of epiphytes.

Dacrydium cupressinum

Podocarpus totara

Phyllocladus trichomanoides

Prumnopitys taxifolia

Dicots: 30 native, 11 exotic*

Beilschmiedia tarairi

B. tawa

Coprosma arborea

C. spathulata

C. robusta

Corynocarpus laevigatus

Dysoxylum spectabile

*Elaeagnus × reflexa**
*Euonymus japonica**
Geniostoma ligustrifolium
Haloragis erecta
*Hedera helix**
Hedycarya arborea
Hoheria populnea
H. sexstylosa
Knightia excelsa
Kunzea ericoides
Laurelia novae-zelandiae
*Laurus nobilis**
*Ligustrum lucidum**
*L. sinense**
Macropiper excelsum
Melicytus micranthus
M. ramiflorus
Metrosideros perforata
Myrsine australis
Nestegis lanceolata
*Ochna serrulata**
Parsonsia heterophylla
Passiflora tetrandra
Pennantia corymbosa
*Phytolacca octandra**
Pittosporum eugenioides
Planchonella costata
*Plectranthus ciliatus**

*P. ecklonii**
*Prunus serrulata**
Pseudopanax crassifolius
P. lessonii
Streblus heterophyllus
Vitex lucens

Monocots: 8 native, 7 exotic*

*Archontophoenix cunninghamiana**
*Asparagus scandens**
Carex dissita
C. lambertiana
*Chlorophytum comosum**
Collospermum hastatum
*Colocasia esculenta**
Cordyline pumilio
*Cyperus eragrostis**
Freycinetia banksii
*Hedychium gardnerianum**
Microlaena avenacea
*Monstera deliciosa**
Oplismenus hirtellus
Rhopalostylis sapida
*Trachycarpus fortunei**
Uncinia distans
U. uncinata

Banyan Drive Reserve

Ferns: 18 native, 2 exotic*

Adiantum cunninghamii
A. hispidulum
*A. raddianum**
Asplenium flaccidum
A. oblongifolium
A. polyodon
Blechnum filiforme
B. membranaceum
B. novae-zelandiae
Cyathea dealbata
C. medullaris
Dicksonia squarrosa
Deparia petersenii
Lastreopsis glabella
L. hispida
Microsorium scandens
*Nephrolepis cordifolia**
Pellaea rotundifolia
Pteris tremula
Pyrrosia eleagnifolia

Conifers: 3 native

Dacrycarpus dacrydioides
Phyllocladus trichomanoides
Podocarpus totara

Dicots: 36 native, 12 exotic*

*Acacia longifolia**
Alectryon excelsus
Beilschmiedia tarairi
B. tawa
Carpodetus serratus
*Cestrum nocturnum**
Clematis paniculata
Coprosma arborea
C. repens
C. robusta
C. spathulata
Corynocarpus laevigatus
*Crassula multicava**
Dysoxylum spectabile
*Eriobotrya japonica**
*Fatsia japonica**
Geniostoma ligustrifolium
Haloragis erecta
*Hedera helix**
Hedycarya arborea
Hoheria populnea
*Homalanthus populifolius**
*Impatiens sodenii**
*Jasminum polyanthum**
Kunzea ericoides
Leucopogon fasciculatus

Macropiper excelsum
Melicytus micranthus
M. ramiflorus
Muehlenbeckia australis
Myrsine australis
Nestegis lanceolata
Parsonsia heterophylla
Passiflora tetrandra
Pittosporum crassifolium
P. eugenioides
P. tenuifolium
Planchonella costata
*Prunus campanulata**
Pseudopanax crassifolius
P. crassifolius x *P. lessonii*
P. lessonii
Rubus cissoides
Schefflera digitata
*Solanum pseudocapsicum**
Streblus heterophyllus
*Syzygium smithii**
Vitex lucens

Monocots: 9 native, 11 exotic*

*Agapanthus orientalis**
*Asparagus asparagoides**
Carex lambertiana
*Chlorophytum comosum**
*Clivia miniata**
*Ehrharta erecta**
Cordyline australis
Gahnia lacera
*Hedychium gardnerianum**
Isolepis inundata
Microlaena stipoides
*Monstera deliciosa**
Oplismenus hirtellus
*Pennisetum clandestinum**
*Phoenix canariensis**
Rhopalostylis sapida
Schoenus maschalinus
*Tradescantia fluminensis**
Uncinia distans
*Zantedeschia aethiopica**

Trip report: Titirangi - Atkinson Reserve and the Titirangi Primary School bush, 20 August 2011

Sandra Jones and Mike Wilcox

Attendance (34): Chris Ashton, Jan Butcher, Ewen Cameron, Liz Collison (graduate student visitor from UK), Brian Cumber, Pam Dale, Melanie Dixon, Gael Donaghy, Frances Duff, Rhys Gardner, Anne Gaskett, Leslie Haines, Richard Hursthouse, Peter Hutton, Graeme Jane, Sandra Jones (leader), John Lambert, Mei Nee Lee, Christine Major, Elaine Marshall, Phillip Moll, Sharon Osman, Joanne Peace, Margaret Peart, Juliet Richmond, Lance Salt, Josh Salter, Matthew Swinburne, Shirley Tomlinson, Val Tomlinson, Alison Wesley, Mike Wilcox, Tony Williams, Maureen Young.

At the Titirangi School: Teachers: Don Morrison, Carol Yates. Neighbourhood care person: Karen Mann. Bot Soc: our group plus Melissa Marler. Year 5 children: Carlos Brown, Brook Harper, Summerose Kennedy, Joe Smith, Isobel Turenhout, Tyrone Wood.

The original plan, as it was announced in the News-sheet, had to be modified on the day because time, and the logistics of ferrying 35 people between locations, got the better of us. Unfortunately our planned visit to Rahui Kahika Reserve had to be abandoned. We began the day at the top of the Zig Zag Track in Atkinson Reserve (Fig. 1) and botanized our way down to the end of the formed track where it

meets Titirangi Beach Road. From here we walked 5 minutes along the road to the beach picnic area for lunch (Fig. 2), before heading back up the hill to meet some pupils and their teachers at the Titirangi Primary School in Atkinson Road at 1pm. By 2.30pm we were back down on Titirangi Beach Road at the bottom end of Zig Zag Track to continue our walk through the eastern section of the reserve down to the beach. This track is not marked on maps and although it is easy to follow it is very muddy in parts.

Atkinson Reserve

The Titirangi Botanic Reserve (later to become known as the Atkinson Reserve) was gifted by Henry Atkinson to the city of Auckland as a public park in 1901, although it was not formally opened until 1914. The reserve runs down a valley from Park Road to Paturoa Bay/Titirangi Beach.

This bush reserve is one of twenty-one areas recommended for protection as a Priority Vegetation Site in the Waitakere Ecological District Survey Report for the Protected Natural Areas Programme (ARC 1993). The lowland kauri-kanuka (*Agathis australis-Kunzea ericoides*) forest on the lower slopes, where kauri is emerging through kanuka, is classified as the "Best and only" example of this ecology unit

surveyed. The puriri (*Vitex lucens*) composite forest further up the valley is classified as "Best in District". Fortunately, conservation protection status was already high because the Reserve was part of the ARC's Centennial Memorial Park, and it is now part of the greater Auckland Council's Reserves network.

The snail fauna of the reserve was surveyed by Jim Goulstone in the early 1980s and he recorded a "particular richness of species in that small gully leading down to Titirangi Beach". Forty seven species in total, many only 1-2mm in size, were recorded from five collection sites. Twenty seven of these species were found in just two litres of leaf mould from under a very old rimu (Goulstone 1983).



Fig. 1. Descending the Zigzag Track, Atkinson Reserve. Photo: Philip Moll, 20 Aug 2011.

The majority of this reserve is in as near to its original (pre-European) state as one could expect to find any small remnant of forest close to habitation, surrounded by housing, and in an area heavily milled before and at the turn of the twentieth century. In fact, in the early 1900s much of Titirangi had been converted from forest to farmland. It is therefore both a surprise and pleasure to come upon a number of large old rimu (*Dacrydium cupressinum*) and fine stands of kahikatea (*Dacrycarpus dacrydioides*) along the track that follows the stream as it wends its way down to the beach. The larger trees, rimu in particular, are covered in epiphytes, such as puka (*Griselinia lucida*), *Pittosporum cornifolium*, an elegant shrub that hangs from the branches or forks of large forest trees, and a number of species of perching orchids (*Winika cunninghamii*, *Earina mucronata*, *Drymoanthus adversus* (Fig. 3), and not forgetting one of the tiniest orchids of all, *Ichthyostomum pygmaeum*). Other forest trees are well represented, including tawa (*Beilschmiedia tawa*), miro (*Prumnopitys ferruginea*), tanekaha (*Phyllocladus trichomanoides*), puriri and, of course, kauri. *Metrosideros carminea*, which, in 1980, was considered to be a threatened species New Zealand-wide (Given 1981) but is now classified as 'Non Threatened', is found in a number of bush locations

around the Titirangi area, and it occurs in Atkinson Reserve on the track side and off-track in the lower section of the valley. (Fig 4)

Although the track is well-graded and metalled, the damp and humid rain forest environment creates a great habitat for ferns, mosses, liverworts and native plants that like wet places, such as parataniwha (*Elatostema rugosum*), a member of the nettle family but one which doesn't have stinging hairs (Fig.5). It forms solid masses of large pink and brown leaves on the stream banks (Fig.6 JS 8541waterfall). Pukatea (*Laurelia novae-zelandiae*), a tall forest tree that likes to have its roots in water-logged soil, can be found in good numbers towards the bottom end of the valley. Other smaller trees and shrubs of interest include the tree fuchsia (*Fuchsia excorticata*) (Fig.7), kohekohe (*Dysoxylum spectabile*), the terrestrial variety of Kirk's daisy (*Brachyglottis kirkii* var. *angustior*), mida (*Mida salicifolia*), milk tree (*Streblus heterophylla*) (Fig.8), kowhai (*Sophora microphylla*), nikau palm (*Rhopalostylis sapida*), rewarewa (*Knightia excelsa*) and tree ferns. Another shrub, easily overlooked until Spring, when its flowers draw the passer-by's attention by the sheer strength of its beautiful perfume, is *Alseuosmia macrophylla*.



Fig. 2. Lunch on the grass, near Titirangi Beach. Photo: Joshua Salter, 20 Aug 2011.

Two-thirds of the way down the valley the reserve extends across the road and the track soon enters an entirely different habitat. This is regenerating forest, and is in significant part dominated by kauri rickers. Mosses, particularly the milk moss (*Leucobryum candidum*), carpet the forest floor in some places. Ground orchids favour this habitat (Figs. 9 & 10). In season, a number of species of *Pterostylis* and *Diplodinium* (the hooded orchids), *Nematoceras*, *Singularlybas* and *Corybas* (the spider orchids), *Acianthus*, *Caladenia* and *Simpliglottis* may be found here. Two species of the delicate *Lindsaea* genus and the comb ferns (*Schizaea*) are typically associated with kauri forest so it is no surprise to come upon them here. Of particular interest is a well-established

'pohutu-rata' (*Metrosideros excelsa* × *M. robusta*) using a nikau as its host. It is already over-topping the nikau in its quest for light above the surrounding forest. (Figs. 11 & 12). The uncommon fork fern, *Tmesipteris sigmatifolia*, is also found in this part of the reserve, where it occurs on tree fern trunks. (Fig.13).

Weeds present a management problem, particularly around the edges of the reserve, and in the medium to long term pose a serious threat to the quality of the bush. In common with the rest of Titirangi, the worst of the offenders are Kahili ginger (*Hedychium gardnerianum*) and wandering Jew (*Tradescantia fluminensis*). Along the tracksides the ubiquitous African club moss, *Selaginella kraussiana*, a fern ally from the African continent, is well-established. Climbing asparagus (*Asparagus scandens*) is stealthily creeping in at various spots around the periphery of the bush and *Bartlettina sordida* is a problem in a couple of areas. Particularly in the lower eastern section of the reserve there are many seedling and some juvenile loquats (*Eriobotrya japonica*) and, more recently, Taiwan cherry (*Prunus campanulata*) seedlings are appearing in large numbers beneath the canopy.



Fig. 15. *Passiflora tetrandra* vines on a nikau trunk, Titirangi Primary School Bush. Photo: Joshua Salter, 20 Aug 2011.

Tirirangi Primary School bush

Mike Wilcox

We were very impressed with the children's enthusiasm (Fig. 14) and the work Don Morrison has been doing with the weeds. The highlight of this bush is the piece of swamp forest containing a splendid grove of swamp maire (*Syzygium maire*), pukatea and, in places, kahikatea. Other trees of note are numerous large kanuka, some rimu and puriri, a good number of five-finger (*Pseudopanax arboreus*), karaka (*Corynocarpus laevigatus*) and pigeonwood (*Hedycarya arborea*), and a nice specimen of tree fuchsia. Two 5m tall kawaka (*Libocedrus plumosa*) appeared to be natural, although in the school ground itself there were several obviously planted ones.

Some very robust lianes were determined to be native jasmine (*Parsonsia heterophylla*), though native passion vine (*Passiflora tetrandra*) was also present (Fig. 15).

The weed situation in this bush is severe. In places the ground is carpeted with wandering Jew, African club-moss and plectranthus (*Plectranthus ciliatus*), and damp gullies have a good deal of Kahili ginger with clumps of bartlettina. Lilly pilly or acmena (*Syzygium smithii*) was common throughout as seedlings and advancing saplings, and one was found growing epiphytically on a ponga (*Cyathea dealbata*).

References

- Given, David R. 1981: *Rare and Endangered Plants of New Zealand*. A.H. & A.W. Reed Ltd, Wellington. p.59.
 Goulstone, J.F. 1983: Waitakere Landsnails. Poirieria, Conchology Section, Auckland Institute and Museum 13: 1-69.



Fig. 3. *Drymoanthus adversus* with bud stem. Photo: Philip Moll, 20 Aug 2011.



Fig. 4. *Metrosideros carminea*. Note hairs. Photo: Sandra Jones, 20 Aug 2011.



Fig. 5. *Elatostema rugosum* flowers. Photo: Joshua Salter, 20 Aug 2011.

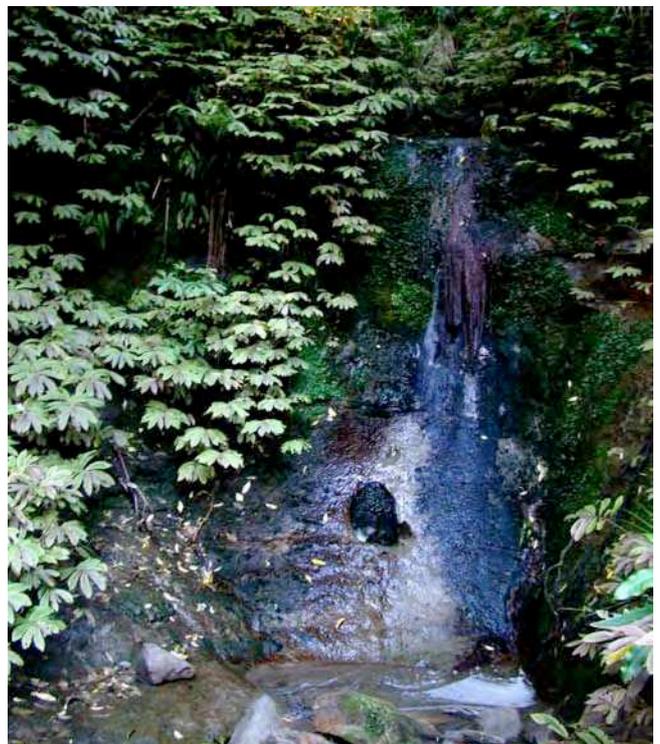


Fig. 6. *Elatostema rugosum* beside waterfall on Zigzag Track. Photo: Joshua Salter, 20 Aug 2011.



Fig. 7. *Fuchsia excorticata*. Photo: Philip Moll, 20 Aug 2011.



Fig. 8. *Streblus heterophyllus*, juvenile leaves. Photo: Philip Moll, 20 Aug 2011.



Fig. 9. *Diplodium trullifolium* and *Acianthus sinclairii*. Photo: Joshua Salter, 20 Aug 2011.



Fig. 10. *Diplodium alobulum* Photo: Joshua Salter, 20 Aug 2011.



Fig. 11. *Metrosideros excelsa* x *M. robusta* and its nikau host, in 1982. Photo: Sandra Jones.

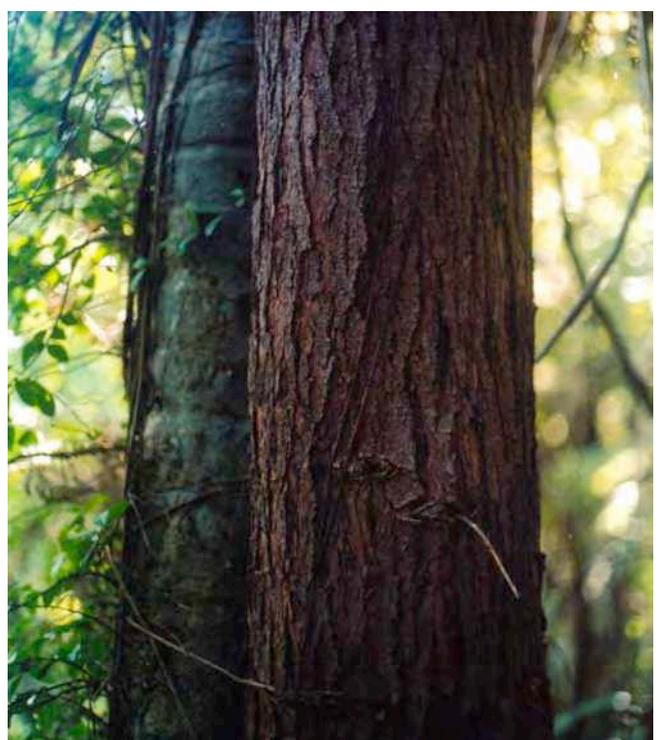


Fig. 12. *Metrosideros excelsa* x *M. robusta* and its nikau host, in 2002. Photo: Sandra Jones.



Fig. 13. *Tmesipteris sigmatifolia*. Photo: Sandra Jones, 20 Aug 2011.



Fig. 14. Mike Wilcox and pupils at Titirangi Primary School. Photo: Philip Moll, 20 Aug 2011.

Appendix: Species list for Atkinson Reserve, Titirangi.

Species list for the main tracks (Zig Zag Track, and the un-named track through the eastern section down to Titirangi Beach). Compiled by Sandra Jones for Auckland Botanical Society field trip 20 Aug 2011, with new records added on the day marked (ABS). Other species found in the reserve (e.g. *Astelia nervosa*, *Syzygium maire*, *Uncinia zotovii*, *Melicytus macrophyllus*) are not included in the list because they were not recorded on the main track.

FERNS & FERN ALLIES

Adiantum cunninghamii
Adiantum fulvum
Adiantum viridescens
Asplenium bulbiferum
Asplenium flaccidum
Asplenium lamprophyllum
Asplenium oblongifolium
Asplenium polyodon
Blechnum chambersii
Blechnum filiforme
Blechnum fraseri
Blechnum membranaceum
Blechnum novae zelandiae
Cardiomanes reniforme
Ctenopteris heterophylla
Cyathea dealbata
Cyathea medullaris
Dicksonia squarrosa
Doodia australis (ABS)
Histiopteris incisa
Huperzia varia
Hymenophyllum demissum
Hymenophyllum dilatatum
Hymenophyllum flabellatum
Hymenophyllum revolutum
Hymenophyllum sanguinolentum
Lastreopsis glabella
Lastreopsis hispida
Leptopteris hymenophylloides
Lindsaea linearis
Lindsaea trichomanoides
Loxogramme dictyopteris
Lycopodium deuterodensum
Lygodium articulatum
Microsorium pustulatum
Microsorium scandens
Paesia scaberula
Pneumatopteris pennigera
Pteris macilenta
Pteris tremula
Ptisana salicina (probably self-sown
from garden above)
Pyrrosia eleagnifolia
Schizaea fistulosa
Tmesipteris elongata
Tmesipteris lanceolata
Tmesipteris sigmatifolia
Tmesipteris tannensis
Trichomanes elongatum
Trichomanes venosum

GYMNOSPERMS

Agathis australis
Dacrycarpus dacrydioides
Dacrydium cupressinum
Phyllocladus trichomanoides
Podocarpus totara (seedling) (ABS)
Prumnopitys ferruginea
Prumnopitys taxifolia

DICOTYLEDONS

Alectryon excelsus
Alseuosmia macrophylla
Aristolelia serrata
Beilschmiedia tawa
Brachyglottis kirkii var. *angustior*
Brachyglottis repanda
Carmichaelia australis
Carpodetus serratus
Centella uniflora
Clematis paniculata
Coprosma arborea
Coprosma grandifolia
Coprosma lucida
Coprosma macrocarpa (ABS)
Coprosma rhamnoides
Coprosma robusta
Coprosma spathulata
Coriaria arborea (ABS)
Corokia buddleioides
Corynocarpus laevigatus
Drosera auriculata
Dysoxylum spectabile
Elaeocarpus dentatus
Elatostema rugosum
Epilobium sp.
Fuchsia excorticata
Geniostoma ligustrifolium
Gonocarpus incanus
Griselinia lucida
Hedycarya arborea
Hoheria populnea
Knightia excelsa
Kunzea ericoides
Laurelia novae-zelandiae
Leptecophylla juniperina (ABS)
Leucopogon fasciculatus
Macropiper excelsum
Melicope ternata
Melicytus ramiflorus
Metrosideros carminea
Metrosideros diffusa

Metrosideros excelsa × *M. robusta*
Metrosideros fulgens
Metrosideros perforata
Metrosideros robusta
Mida salicifolia
Myrsine australis
Myrsine salicina
Nertera dichondrifolia
Nestegis lanceolata
Olearia furfuracea (ABS)
Olearia rani
Parsonsia ?heterophylla
Passiflora tetrandra
Pittosporum cornifolium
Pittosporum eugenioides
Pittosporum tenuifolium
Pomaderris phyllicifolia
Pseudopanax arboreus
Pseudopanax crassifolius
Ranunculus reflexus
Rhabdothamnus solandri
Rubus australis
Rubus cissoides
Schefflera digitata
Sophora microphylla
Streblus heterophyllus
Toronia toru
Vitex lucens

MONOCOTS excl. grasses & orchids

Astelia banksii
Astelia solandri
Astelia trinervia
Carex dissita (ABS)
Carex lambertiana (ABS)
Carex solandri (ABS)
Collopermum hastatum

Cordyline australis
Cordyline banksii
Cordyline pumilio
Dianella nigra
Freycinetia banksii
Gahnia lacera
Gahnia pauciflora
Gahnia setifolia
Isolepis reticularis
Rhopalostylis sapida
Morelotia affinis
Ripogonum scandens
Schoenus maschalinus
Uncinia banksii
Uncinia uncinata

ORCHIDS

Acianthus sinclairii
Caladenia [carnea]
Diplodinium alobulum
Diplodinium brumalium
Diplodinium trullifolium
Drymoanthus adversus
Earina mucronata
Ichthyostomum pygmaeum
Nematoceras trilobum
Pterostylis agathicola
Pterostylis banksii
Simpliglottis cornuta
Singularybas oblongus
Winika cunninghamii

GRASSES

Microlaena avenacea
Microlaena stipoides
Oplismenus hirtellus

Whangarei Weekend, 17-18 September 2011

Maureen Young

Whangarei is rather too far for Aucklanders to travel for a normal monthly day trip, so for the September field trip a booking was made at the Whangarei Youth Hostel and several members stayed over-night for a weekend's botanising. Northern members, Lisa Forester from Northland Regional Council (NRC) and Andrew Townsend, the Department of Conservation (DoC) botanist for Northland, were our leaders. This was also an opportunity for more northerly members and friends to attend a Bot Soc trip.

Saturday 17 September - Maungatapere Mountain

Trip participants: Sara Brill (NRC), Jan Butcher, Lisa Forester (NRC), Sharen Graham, Leslie Haines, Penny

& Steve Palmer, Helen Preston Jones, Laura Shaft (NRC), Doug Sheppard, Val Tomlinson, Andrew Townsend (DoC), Maureen Young.

Maungatapere Mountain (359 m; approximately 10 km SW of Whangarei) is classified as ecologically significant in the Protected Natural Area Programme (PNAP) report for the Whangarei Ecological District (Manning 2001). It is the only volcanic cone in this area to have a complete forest cover, and is renowned for the swamp forest in the crater. It is in a mixture of private ownership and public land (administered by DoC as a scenic reserve). Thirty hectares (42%) is protected by QE II open space covenants, 22 ha. (31%) is protected as a scenic

reserve and 19 ha. (27%) is in private ownership with no legal protection. The parent soil type is classified as Kerikeri Volcanics basaltic scoria cone (Manning 2001). The NRC, following extensive public consultation, has developed an integrated pest management plan. This involves the Council reducing the animal pest population density down to a low level that the community is then able to maintain (D. McKenzie, pers. comm.). An indication of the success of this strategy was the vast numbers of taraire (*Beilschmiedia tarairi*) fruit (just at the stage where a jelly-like substance was appearing on them) littering the slopes of the mountain. We were surprised at this, as none of us had seen such quantities before.

Life-long Maungatapere resident, Peter Grove, with his wife June, made us welcome on their property, so we parked our cars there and commenced our botanising. (See Appendix for species list.) A small area of bush spread from the base of the mountain onto the Grove's flats, and we explored this first. It was the only rock forest that we encountered, as the steep slopes were mostly rock-free.

Before we climbed the fence into the broadleaf forest there was a comment that the taraire looked a suitable host for the orchid, *Drymoanthus adversus*, and sure enough a plant was seen on a branch right above the fence. Lisa thought that the rocks would be good habitat for the filmy fern, *Hymenophyllum flexuosum*, and we soon found that too. *Tradescantia fluminensis* and climbing asparagus (*Asparagus scandens*) were unwelcome pests spreading over the rocks, and Sara (biodiversity officer for the NRC) had to be persuaded to give up destroying plants of queen-of-the-night (*Cestrum nocturnum*) so we could get on with our walk. The naturalised tamarillo (*Cyphomandra betacea*) caused more delay, as the fruit was temptingly ripe.

Once we commenced our climb the weeds were less prominent, and kohekohe (*Dysoxylum spectabile*) became the commonest species in the broadleaf forest that grows so typically on volcanic soils. The steep slope kept the pace slow, even for botanists, and allowed time to study the vegetation in detail. It was a good opportunity to learn to differentiate the species of *Tmesipteris*, as all four species known in Northland were present. All trees of towai (*Weinmannia silvicola*) were carefully checked, as makamaka (*Ackama rosifolia*) was on the species list that we had been given, and separating these two species is always a brain-teaser for Bot Soccers when they venture north. Whangarei is as far south as makamaka grows, so it would have been interesting to find it. An ancient puriri (*Vitex lucens*) supported many lianes and epiphytes, including *Griselinia lucida* and *Pittosporum cornifolium*. A few saplings of mangeao (*Litsea calicaris*) were seen.

Once the rim of the crater was reached we decided to delay the gratification of entering the promised swamp forest below, and instead walked half way around the rim. Here was a good population of the shiny-fronded *Asplenium lamprophyllum*, and a hybrid was determined as *A. flaccidum* × *A. lamprophyllum*. Crown fern (*Blechnum discolor*) was plentiful, and as rare as gymnosperms were, it was here that we saw a few totara (*Podocarpus totara*) and added one small tanekaha (*Phyllocladus trichomanoides*) to the list. Maori earthworks were common, with several well-defined pits. Someone picked up a single half-opened flower of *Clematis paniculata* that was obviously female, but the ring of stamens had us rather puzzled; later reading confirmed that they are abortive. The Groves were pleased when we reported this find to them, as clematis has not been seen on the mountain for many years.



Fig. 1. Swamp forest in the crater of Maungatapere Mountain. Photo: L. Forester, 17 Sep 2011.

At last it was time to enter the swamp forest in the crater (Fig. 1), and we hoped fervently that the water would not be too deep. Fortunately for our purposes the north is drying out rapidly, and apart from a few wet mossy areas that we could avoid, we got across dry footed. Once down in the crater we were astounded by the quality of the trees there. Nothing had prepared us for the sight of the huge trees of pukatea (*Laurelia novae-zelandiae*), some multi-trunked (Fig. 2), and swamp maire (*Syzygium maire*), soaring overhead. The trunks were straight and free of branches, and our estimates of their height ranged from 25 m. upwards. Kahikatea (*Dacrycarpus dacrydioides*) was not as common as the other two species, but a few huge trees overtopped them. The circumference of the largest of these was 5 m. What little understorey was present was composed of wheki (*Dicksonia squarrosa*), kanono (*Coprosma grandifolia*) and pigeonwood (*Hedycarya arborea*), with a very few raukawa (*Raukawa edgerleyi*). We walked carefully; the abundant looping pneumatophores of the swamp maire, with spongy white bark, were lying in wait to trip us. The creeping fern, *Microsorium*

scandens, found these roots a good host, as did, but less commonly, the filmy fern *Hymenophyllum demissum*. Kiekie (*Freycinetia banksii*) and hen and chicken fern (*Asplenium bulbiferum*) grew *en masse* as the groundcover.

After this highlight a careful descent was undertaken and we were then welcomed into the home of Peter and June for a debriefing. They confirmed the rumour that carmine rata (*Metrosideros carminea*), which they knew as the spring-flowering rata, was present in several places.



Fig. 2. ABS members admiring a large pukatea in the crater of Maungatapere Mountain. Photo: L. Forester, 17 Sep 2011.

Sunday 18 September – Parihaka Scenic Reserve

Trip participants: Jan Butcher, Jerome Demmer, Sharen Graham, Leslie Haines, Helen Preston Jones, Jacqui Knight, Doug Shaw, Doug Sheppard, Val Tomlinson, Andrew Townsend (DoC), Diana Whimp, Maureen Young.

Residents of Whangarei are fortunate to have this forest-clad hill (241 m.) right on their doorstep, in the Western Hills. There are several tracks that can be followed, and Andrew chose to take us through Mair Park to the Hatea River (just where the salt water gives way to fresh), then up the Drummond Track and down the Dobbie Track. The Dobbie Track is named for the man to whom so many fern-lovers owed a debt of gratitude in earlier years, for his writing of the fern book affectionately known as "Dobbie", and later as "Crookes and Dobbie" (Dobbie & Crookes 1951)

A short walk from the carpark to the river took us through bush where both lemon (*Citrus limon*) and tamarillo were naturalised, a clue to the northern latitude we were in. Between the bush edge and the mown river flat was a small flood zone, and here Andrew pointed out the tiny creeping *Leptinella tenella* (threat status: declining) growing alongside

Triglochin striata, *Lilaeopsis novae-zelandiae*, *Callitriche muelleri* and *Apium* "white denticles". *Coprosma propinqua* and *Carex secta* were other remnants of the original native riverside vegetation. As we crossed the bridge the creeping fig (*Ficus pumila*) growing up a tree could, at a cursory glance, be confused with rata.

Our first impression on starting up the Drummond Track, and for the rest of the day, was the glorious diversity of the small-leaved *Alseuosmia* growing there abundantly (Fig. 3) The growth form ranged from trailing shrubs to small tree-like shrubs with slender trunks and branching heads. The leaf-shapes were completely variable, even on a single plant (see Eagle (2006) for illustrations of some of the many leaf forms of this puzzling genus). Some plants could fit into what is understood as *A. banksii* var. *banksii*, some into *A. quercifolia* and others could perhaps pass as *A. banksii* var. *linariifolia*, but with such wide variation and no clear boundaries, it seems arrogant to try to make them fit into convenient species¹. A few small greenish flowers were still present.



Fig. 3. One of many forms of *Alseuosmia* found in Parihaka Reserve. Photo: A. Townsend, 18 Sep 2011.

¹ In 1963 a bus-load of 32 ABS members travelled north for Anniversary Weekend (Warren 1963). On visiting Coronation Reserve, also in the Western Hills of Whangarei, Warren reported: "*Alseuosmia* was plentiful, but puzzling as usual where there is more than one variety growing in the district. Some appeared to be *Alseuosmia banksii*, some were clearly *A. quercifolia*, some had the characteristics of both, while others had the leaves of both on the one plant". A couple of days later, on visiting Parihaka, he wrote: "*Alseuosmia* was present, but here it was *A. linariifolia* only, although only a short distance from Coronation Reserve as the crow flies".

Of the several orchids seen, *Corybas cheesemanii* was flowering and fruiting, *Pterostylis alobula* and *P. trullifolia* were in late flower, and *Nematoceras macranthus* was in bud. The softly blue/green fern, *Loxosoma cunninghamii*, was present in several places. The "umbrella" ferns were well represented with *Sticherus flabellatus*, *S. cunninghamii*, *Gleichenia dicarpa* and *G. microphylla* all being present. Lunch was eaten near the viewing platform at the summit of the park, and a squally shower that passed over then was the only rain we experienced during the weekend, despite a rather dismal forecast.

After lunch we explored the gumland scrub a short distance from the summit road. The two species of *Gleichenia* grew abundantly, with *Schoenus tendo*, toru (*Toronia toru*), *Dracophyllum lessonianum* and the occasional young kauri (*Agathis australis*). On the

downward walk we passed several trees of kawaka (*Libocedrus plumosa*). Back at the river we tried to check the species of kowhai growing there, but with the new leaves still emerging and out of our reach we decided to leave it as *Sophora microphylla*, as listed in the species list provided by Andrew.

One of the pleasing features of the bush walk was the relative lack of weeds. Seedlings of Phoenix palm (*Phoenix canariensis*) were quite common, but no larger plants were seen and apart from a sapling of monkey apple (*Syzygium smithii*), there was little to report.

All participants were very pleased with the two days botanising in this region which is within Auckland Botanical Society's sphere of interest, but which has been little visited by us.

Acknowledgements

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Appendix: Vascular plants seen on Maungatapere Mountain (Nigel Clunie, Lisa Forester, ABS [17/09/11]), and on Parihaka Scenic Reserve (Andrew Townsend, ABS [18/09/11]).

Key

- M** = Maungatapere Mountain
P = Parihaka Scenic Reserve. Mair Park to Hatea River, Drummond Track, Dobbie Track.
 * = adventive species
 ✓ = present
 + = added to the species list by ABS

	M	P		M	P
Lycophytes			<i>A. flaccidum</i> x <i>A. lamprophyllum</i>		
<i>Huperzia varia</i>	✓		<i>Asplenium gracillimum</i>	✓+	
<i>Lycopodiella cernua</i>		✓	<i>Asplenium lamprophyllum</i>	✓	✓
<i>Lycopodium deuterodensum</i>		✓	<i>Asplenium oblongifolium</i>	✓	✓
<i>Lycopodium volubile</i>		✓+	<i>Asplenium polyodon</i>	✓	
<i>Selaginella kraussiana</i> *		✓	<i>Blechnum chambersii</i>	✓	✓
Ferns & Fern Allies			<i>Blechnum discolor</i>	✓	✓
<i>Adiantum cunninghamii</i>		✓	<i>Blechnum filiforme</i>	✓	✓
<i>Adiantum diaphanum</i>	✓+		<i>Blechnum fraseri</i>	✓	✓
<i>Adiantum fulvum</i>	✓		<i>Blechnum membranaceum</i>	✓	✓
<i>Adiantum hispidulum</i>	✓+	✓	<i>Blechnum novae-zelandiae</i>	✓	✓
<i>Adiantum viridescens</i>	✓		<i>Cardiomanes reniforme</i>	✓	✓
<i>Arthropteris tenella</i>	✓	✓	<i>Cyathea cunninghamii</i>	✓	
<i>Asplenium bulbiferum</i>	✓	✓+	<i>Cyathea dealbata</i>	✓	✓
<i>Asplenium flaccidum</i>	✓	✓	<i>Cyathea medullaris</i>	✓	✓
			<i>Deparia petersenii</i>	✓+	

	M	P		M	P
<i>Dicksonia squarrosa</i>	√	√	<i>Alseuosmia macrophylla</i>	√	
<i>Diplazium australe</i>	√+		<i>Alseuosmia quercifolia</i>		√
<i>Doodia australis</i>	√+	√	<i>Alternanthera philoxeroides*</i>		√
<i>Gleichenia dicarpa</i>		√	<i>Aristolelia serrata</i>	√	
<i>Gleichenia microphylla</i>		√	<i>Beilschmiedia tarairi</i>	√	√
<i>Grammitis ciliata</i>		√	<i>Beilschmiedia tawa</i>	√	√
<i>Histiopteris incisa</i>	√		<i>Brachyglottis kirkii</i> var. <i>angustior</i>		√
<i>Hymenophyllum demissum</i>	√	√	<i>Brachyglottis repanda</i>	√	
<i>Hymenophyllum dilatatum</i>	√+	√	<i>Callitriche muelleri</i>		√
<i>Hymenophyllum flabellatum</i>	√	√	<i>Callitriche stagnalis*</i>		√
<i>Hymenophyllum flexuosum</i>	√+		<i>Centella uniflora</i>	√	
<i>Hymenophyllum rarum</i>	√	√	<i>Cestrum nocturnum*</i>	√+	
<i>Hymenophyllum revolutum</i>	√	√	<i>Cirsium vulgare*</i>	√	
<i>Hymenophyllum sanguinolentum</i>	√	√	<i>Citrus limon*</i>		√
<i>Hymenophyllum scabrum</i>	√		<i>Clematis cunninghamii</i>	√	√
<i>Lastreopsis glabella</i>	√		<i>Clematis paniculata</i>	√+	√
<i>Lastreopsis hispida</i>	√	√	<i>Conyza sumatrensis*</i>	√	√
<i>Leptopteris hymenophylloides</i>		√	<i>Coprosma arborea</i>	√	√
<i>Lindsaea linearis</i>		√	<i>Coprosma areolata</i>	√+	
<i>Lindsaea trichomanoides</i>		√	<i>Coprosma grandifolia</i>	√	√
<i>Loxogramme dictyopteris</i>	√	√	<i>Coprosma lucida</i>	√+	√
<i>Loxsoma cunninghamii</i>		√	<i>Coprosma macrocarpa</i> subsp. <i>minor</i>		√
<i>Lygodium articulatum</i>	√	√	<i>Coprosma propinqua</i>		√
<i>Microsorium pustulatum</i>	√	√	<i>Coprosma propinqua</i> × <i>C. robusta</i>	√	√
<i>Microsorium scandens</i>	√	√	<i>Coprosma rhamnoides</i>	√	√
<i>Pneumatopteris pennigera</i>	√	√	<i>Coprosma robusta</i>	√	√
<i>Pteridium esculentum</i>	√	√	<i>Coprosma spathulata</i>	√	√
<i>Pteris macilentata</i>	√	√	<i>Coprosma tenuicaulis</i>	√	
<i>Pteris tremula</i>	√	√	<i>Corynocarpus laevigatus</i>	√	√
<i>Pyrrosia eleagnifolia</i>	√	√	<i>Cyphomandra betacea*</i>	√+	√+
<i>Rumohra adiantiformis</i>	√		<i>Dichondra repens</i>	√+	√+
<i>Schizaea dichotoma</i>		√	<i>Dracophyllum lessonianum</i>		√
<i>Sticherus cunninghamii</i>		√	<i>Drosera auriculata</i>		√
<i>Sticherus flabellatus</i>		√	<i>Dysoxylum spectabile</i>	√	√
<i>Tmesipteris elongata</i>	√		<i>Elaeocarpus dentatus</i>	√	√
<i>Tmesipteris lanceolata</i>	√	√	<i>Entelea arborescens</i>		√
<i>Tmesipteris sigmatifolia</i>	√+		<i>Eriobotrya japonica*</i>		√
<i>Tmesipteris tannensis</i>	√+	√	<i>Euchiton audax</i>		√
<i>Trichomanes elongatum</i>	√	√	<i>Ficus pumila*</i>		√
<i>Trichomanes venosum</i>	√		<i>Fuchsia excorticata</i>	√	
Gymnosperms			<i>Gaultheria antipoda</i>		√
<i>Agathis australis</i>		√	<i>Geniostoma ligustrifolium</i>	√	√
<i>Dacrycarpus dacrydioides</i>	√	√	<i>Geranium homeanum</i>	√+	
<i>Dacrydium cupressinum</i>	√	√	<i>Geranium molle*</i>	√	
<i>Libocedrus plumosa</i>		√	<i>Gonocarpus incana</i>		√
<i>Phyllocladus trichomanoides</i>	√+	√	<i>Griselinia lucida</i>	√	
<i>Pinus radiata*</i>		√	<i>Hakea sericea*</i>		√
<i>Podocarpus hallii</i>	√	√	<i>Haloragis erecta</i>	√	√
<i>Podocarpus totara</i>	√	√	<i>Hebe macrocarpa</i>		√
<i>Prumnopitys ferruginea</i>	√	√	<i>Hebe stricta</i>		√
<i>Prumnopitys taxifolia</i>		√	<i>Hedycarya arborea</i>	√	√
Dicotyledons			<i>Hoheria populnea</i>	√	√
<i>Ackama rosifolia</i>	√		<i>Hydrocotyle dissecta</i>		√+
<i>Syzygium smithii*</i>		√	<i>Hydrocotyle moschata</i>		√
<i>Ageratina adenophora*</i>	√		<i>Hypochoeris radicata*</i>	√	
<i>Ageratina riparia*</i>		√	<i>Knightia excelsa</i>	√	√
<i>Alectryon excelsus</i>	√	√	<i>Kunzea ericoides</i>		√
<i>Alseuosmia banksii</i>		√	<i>Laurelia novae-zelandiae</i>	√	√
			<i>Leptecophylla juniperina</i>		√
			<i>Leptinella tenella</i>		√

	M	P		M	P
<i>Leptospermum scoparium</i>	√	√	<i>Astelia trinervia</i>		√
<i>Leucopogon fasciculatus</i>	√	√	<i>Baumea tenax</i>		√
<i>Litsea calicaris</i>	√	√	<i>Bromus</i> sp.*	√	
<i>Lobelia anceps</i>	√		<i>Bromus willdenowii</i> *	√	
<i>Lophomyrtus bullata</i>	√		<i>Caladenia chlorostyla</i>		√
<i>Lotus pedunculatus</i> *	√		<i>Carex dissita</i>		√
<i>Ludwigia palustris</i> *		√	<i>Carex lambertiana</i>		√+
<i>Macropiper excelsum</i>	√	√	<i>Carex secta</i>		√+
<i>Melicytus macrophyllus</i>	√	√	<i>Carex spinirostris</i>		√
<i>Melicytus ramiflorus</i>	√	√	<i>Carex virgata</i>		√
<i>Metrosideros carminea</i>	√		<i>Collospermum hastatum</i>	√	√
<i>Metrosideros diffusa</i>	√+	√	<i>Cordyline australis</i>	√	√
<i>Metrosideros fulgens</i>	√	√	<i>Cordyline banksii</i>	√	√
<i>Metrosideros perforata</i>	√	√	<i>Cortaderia selloana</i> *	√	√
<i>Mida salicifolia</i>		√+	<i>Corybas cheesemani</i>	√	√+
<i>Myrsine australis</i>	√	√	<i>Crocasmia × crocosmiiflora</i> *		√
<i>Nertera dichondrifolia</i>	√	√	<i>Dianella nigra</i>	√	√
<i>Oenanthe pimpinelloides</i> *		√	<i>Drymoanthus adversus</i>	√+	
<i>Olearia furfuracea</i>		√	<i>Earina aestivalis</i>		√
<i>Olearia rani</i>	√	√	<i>Earina autumnalis</i>	√	
<i>Peperomia urvilleana</i>		√	<i>Earina mucronata</i>	√	√
<i>Pittosporum cornifolium</i>	√+		<i>Freycinetia banksii</i>	√	√
<i>Pittosporum eugenioides</i>		√	<i>Gahnia lacera</i>	√	√
<i>Pittosporum tenuifolium</i>		√	<i>Gahnia pauciflora</i>		√+
<i>Pomaderris amoena</i>		√	<i>Gahnia setifolia</i>		√+
<i>Prunella vulgaris</i> *	√	√	<i>Gahnia xanthocarpa</i>		√
<i>Prunus campanulata</i> *	√+	√	<i>Hedychium gardnerianum</i> *		√
<i>Pseudopanax arboreus</i>	√+	√	<i>Holcus lanatus</i> *	√	
<i>Pseudopanax crassifolius</i>	√	√	<i>Ichthyostomum pygmaeum</i>	√	
<i>P. crassifolius × P. lessonii</i>		√	<i>Isolepis inundata</i>		√
<i>Ranunculus amphitrichus</i>		√	<i>Juncus effusus</i> *		√
<i>Ranunculus repens</i> *	√		<i>Lepidosperma laterale</i>		√
<i>Raukaua edgerleyi</i>	√		<i>Microlaena avenacea</i>	√	
<i>Roldana (Senecio) petasitis</i> *	√+		<i>Microlaena stipoides</i>	√+	√+
<i>Rubus cissoides</i>	√		<i>Microtis unifolia</i>	√	√
<i>Rubus fruticosus</i> agg.*	√		<i>Morelotia affinis</i>		√
<i>Schefflera digitata</i>	√	√	<i>Nematoceras macranthum</i>		√+
<i>Senecio bipinnatisectus</i> *	√		<i>Nematoceras trilobum</i>	√	√
<i>Senecio hispidulus</i>	√		<i>Opismenus hirtellus</i>	√	√
<i>Solanum aviculare</i>	√		<i>Phoenix canariensis</i> *		√+
<i>Solanum nigrum</i> *		√	<i>Phormium tenax</i>		√
<i>Solanum pseudocapsicum</i> *		√	<i>Pterostylis alobula</i>		√+
<i>Sophora microphylla</i>		√	<i>Pterostylis banksii</i>	√	√+
<i>Streblus heterophyllus</i>	√	√	<i>Pterostylis trullifolia</i>		√
<i>Syzygium maire</i>	√		<i>Rhopalostylis sapida</i>	√	√
<i>Toronia toru</i>		√	<i>Ripogonum scandens</i>	√	√
<i>Ulex europaeus</i> *		√	<i>Schedonorus arundinaceus</i> *	√	
<i>Veronica arvensis</i> *	√		<i>Schoenus maschalinus</i>		√
<i>Vicia sativa</i> *	√		<i>Schoenus tendo</i>		√
<i>Vitex lucens</i>	√	√	<i>Singularybas oblongus</i>	√	√
<i>Wahlenbergia violacea</i>	√		<i>Thelymitra</i> aff. <i>longifolia</i>		√
<i>Weinmannia silvicola</i>	√	√	<i>Thelymitra pulchella</i>		√
			<i>Thelymitra</i> sp.		√
Monocotyledons			<i>Tradescantia fluminensis</i> *	√+	√
<i>Acianthus sinclairii</i>	√	√	<i>Uncinia banksii</i>		√
<i>Allium triquetrum</i> *		√	<i>Uncinia uncinata</i>	√	√
<i>Anthoxanthum odoratum</i> *	√		<i>Uncinia zotovii</i>		√+
<i>Apodasmia similis</i>		√	<i>Winika cunninghamii</i>	√+	
<i>Asparagus scandens</i> *	√	√			
<i>Astelia solandri</i>	√				

A lichen species list for Motu Kaikoura, Fitzroy Harbour, Great Barrier Island

Dan Blanchon, Carol Elliott, Ingrid Ennis, Glenys Hayward, Mel Galbraith, Glenn Aguilar

Introduction

Motu Kaikoura (Kaikoura Island) is a 535 ha island off the coast of Great Barrier Island, North Island, New Zealand. The island was purchased by the Crown in 2004 as a reserve. The island has been heavily modified by farming, fires, bush clearances and the impacts of exotic mammals such as fallow deer (*Dama dama*), ship rats (*Rattus rattus*) and cats (*Felis catus*). The vegetation of the island is now dominated by tea tree (*Kunzea* and *Leptospermum*), small patches of broadleaf forest and bare rocky areas (Cameron 2007). A number of vegetation surveys since 2006 recorded a total of 381 species of higher plants (68% native), but bryophytes were not systematically studied (Cameron 2007), and lichens and fungi were not studied at all. Only one specimen (*Stereocaulon ramulosum* (AK283628)) was found in the Auckland Museum herbarium (AK), collected by Jonathan Boow and Bec Stanley in 2003.

Fallow deer have had perhaps the greatest impact on the vegetation of the island, having been present since the 1930s (Cameron 1995) and were estimated to have reached numbers as high as c. 360 individuals (Cameron 2007). Deer were eradicated by shooting, but a recent attempt to eradicate rats failed. However, rats continue to be controlled through trapping and poisoning. A number of permanent quadrats have been set up on Motu Kaikoura to monitor any changes in the vegetation after pest removal, but this has not included monitoring of lichen cover. While it is clear that the deer had a serious impact on the higher plants, it is not clear what, if any, impact they had on lichens. There is limited information available on the prevalence of lichens in the diet of fallow deer in New Zealand. Nugent (1990) found that fallow deer ate significant quantities of fungi and lichens in beech forests in Otago, particularly species of *Usnea*. He commented that the use of lichen may indicate "poor quality habitat". Forsyth et al. (2002) studied the diet preferences of introduced ungulates in New Zealand and found that some lichens (*Pseudocyphellaria* and *Usnea*) were preferred, while others like *Cladonia* and *Stictia* species were avoided by fallow deer or red deer (*Cervus elaphus*).

For this reason, the Motu Kaikoura Trust and Unitec Faculty of Social and Health Sciences funded four trips (July and December 2008, December 2009 and 2010) to the island to catalogue the lichen diversity (see Appendix) and investigate any changes to the lichens after the removal of the deer.

Area surveyed

Over the four trips, most of the island was surveyed, with particular emphasis on the area around the lodge, the pine forest and kanuka forest between the lodge and airstrip, the airstrip, the scrub, around the airstrip, the forested gully up from Houseboat Bay, the Ngati Rehua track, Taraire Valley, Bradshaw Cove, Waitetuna Bay, track to Mt Overlook and the track from there back to the lodge. Six permanent quadrats (Fig. 1) were also set up on rocky substrates between the lodge and Taraire Valley and within Taraire Valley. Ten kanuka trees in the upper part of Taraire Valley were surveyed with horizontal quadrats (relevé). These quadrats will be monitored annually for any changes to lichen diversity or cover.



Fig. 1. Map of the island showing the quadrat sites. (created by G. Aguilar).

Lichens of the general habitats visited

(modified from Cameron 2007)

Badlands/scrub

The badlands are poor in lichens, with only sparse small thalli of *Menegazzia neozelandica* and *Parmelina labrosa* on the twigs of kanuka (*Kunzea ericoides*), manuka (*Leptospermum scoparium*) and *Hakea* spp. Small white patches of the soil crust *Baeomyces heteromorphus* can be seen on eroded banks, although not usually with their characteristic lolly-pink fruiting structures. Scattered speckles of *Stereocaulon vesuvianum* are present on andesite boulders. Very occasional clumps of the red and white *Cladonia floerkiana* can be found on clay soil in sheltered spots (Fig. 2).

Kanuka forest and scrub

The kanuka forest and associated scrub are also poor in lichens, with only a few species found on the trunks



Fig. 2. *Cladonia floerkiana*, track between airstrip and Mt Overlook, July 2008. All Photos D. J. Blanchon.



Fig. 3. Fruiting *Pseudocyphellaria* species on a kanuka, upper Taraire Valley, December 2008.



Fig. 4. *Sticta*, kanuka trunk, upper Taraire Valley, July 2008.



Fig. 5. *Pseudocyphellaria poculifera*, on fallen branch in light gap, Taraire Valley, July 2008.



Fig. 6. *Strigula delicata* on fallen taraire leaf, from Taraire Valley, December 2009.



Fig. 7. *Baeomyces heteromorphus*, shaded roadside banks between lodge and airstrip, July 2008.



Fig. 8. *Pseudocyphellaria carpoloma* on shaded bluff, Ngati Rehua track, July 2008.



Fig. 9. *Leprocaulon arbuscula* on volcanic breccia, Ngati Rehua track, July 2008.



Fig. 10. *Xanthoparmelia* species on top of inland bluff, Ngati Rehua track, July 2008.



Fig. 11. *Jackelixia ligulata* on coastal rocks below Mt Overlook, July 2008.



Fig. 12. Top House orchard, with plum tree festooned in lichens, July 2008.



Fig. 13. *Teloschistes flavicans* on plum tree in Top House orchard, July 2008.

and branches. In more sheltered sites, small thalli of *Parmelina labrosa*, *Menegazzia neozealandica* and occasional hanging fat tubes of *Hypogymnia subphysodes* are growing on branches and twigs. Green or brown clumps of *Cladia aggregata* are found in some of the light gaps. The white coral lichen (*Cladia retipora*) is only rarely present in some areas on soil, with a particularly good site above Houseboat Bay. It is possible that this usually common species was being eaten by deer. Rocks in shaded sites sometimes have patches of the bluish crustose *Porpidia albocaerulescens*, while those in the open are covered in species of *Heterodermia*, *Parmotrema* and *Xanthoparmelia*.

Broadleaf forest

Pockets of broadleaf forest in watersheds support the highest number of lichen species on the island, perhaps because of the shade and higher humidity but also the diversity of substrates available. The different bark types of taraire (*Beilschmiedia taraire*), kohekohe (*Dysoxylon spectabile*), pohutukawa (*Metrosideros excelsa*) and old kanuka (*Kunzea ericoides*), and the shaded bluffs and boulders all provide habitats quite different from the drier kanuka trunks elsewhere on the island. The trunks of taraire and kohekohe support mainly crustose lichens, including *Porina exocha*, but the greatest diversity can be found at the tops of the valleys on the trunks of mature kanuka. A range of large foliose lichens, particularly species of *Pseudocyphellaria* (Fig. 3), *Sticta* (Fig. 4), *Peltigera* and *Pannaria* are conspicuous. The bright yellow-green thalli of *Pseudocyphellaria aurata* and *P. poculifera* (Fig. 5) are reasonably common on trunks of kanuka in light gaps. Many of these species are also present on shaded rock faces, and the rock faces near the track in Taraire Valley are covered in unusually large sheets of the yellow-green *Porina exocha*. Fallen leaves of taraire are covered in silvery or green spots of the foliicolous (leaf-dwelling) lichen, *Strigula delicata* (Fig. 6).

Kauri-associated forest

The kauri forest (*Agathis australis*) was not visited by the authors, but pieces of bark were brought back to the lodge by Maureen Young and Alison Wesley. These supported a range of lichen species, including *Menegazzia aucklandica*, *Parmelia testacea*, *Parmotrema grayanum* and *P. reticulatum* and *Usnea rubicunda*.

Pine forest

Pine forest (*Pinus pinaster* and *P. radiata*) supports a reasonable range of lichens, with foliose lichens ranging from the small *Parmelinopsis afrorevoluta* to larger inflated thalli of *Hypogymnia subphysodes* and large paint-like patches of the leprose lichens such as the bright yellow *Chrysothrix candelaris*, dull yellow *Lepraria* cf. *eburnea* and grey-green *Lepraria incana*. A number of lichen species such as species of *Usnea*

and *Parmotrema* grow in the canopy and can be found on the ground after storms. The fruticose *Stereocaulon ramulosum* can be seen on exposed clay banks, and in some areas, large white patches of *Baeomyces heteromorphus*, with bright lolly-pink podetia (Fig. 7) can also be found.

Inland bluffs

The inland bluffs were noted as being botanically interesting by Cameron (2007), and the lichens found on these sites are similarly interesting. The sides of most of the bluffs are covered in mats of bryophytes and filmy ferns (particularly *Hymenophyllum sanguinolentum*) and they are also covered in an extensive range of lichens. The shadier parts support species of the large foliose *Pseudocyphellaria*, *Sticta* and *Peltigera* (Fig. 8), while sunnier spots have long strands of the fruticose lichens *Ramalina australiensis*, *Usnea rubicunda* and occasionally *Heterodermia leucomela*. Of most interest were the sites where the rarely collected *Leprocaulon arbuscula* could be found on shaded vertical bluffs of volcanic breccia (Fig. 9). The well-lit tops of the bluffs are covered in stunted brown clumps of *Cladia aggregata* and patches of species of *Xanthoparmelia* (Fig. 10), *Heterodermia*, *Cladonia* and *Parmotrema*.

Rocky outcrops

The exposed rocky outcrops were more difficult to reach, but when investigated they supported a range of *Xanthoparmelia*, *Parmotrema*, *Cladonia* species, *Heterodermia obscurata* and *Cladia aggregata*.

Stream margins

Most of the streams on the island were dry when visited in December, but the stream still flowing below the Top House plunged through a cut in the rocky cliff. This area supported moisture-loving cyanobacterial lichens such as *Pseudocyphellaria dissimilis* and *Leptogium denticulatum* and bluish patches of *Porpidia albocaerulescens*.

Rocky shore

The rocky beaches and cliffs support the bright orange *Jackelixa ligulata* (formerly *Xanthoria ligulata*) (Fig. 11) and white splashes of the "bird-dropping lichen" *Poeltiaria turgescens*. The grey *Physcia erumpens* can be found on rocks above the high-tide mark. Yellow spots of *Rhizocarpon geographicum* are rare. The fruticose *Ramalina australiensis* is not uncommon on the cliffs at several points around the island. The similar, but less common *R. meridionalis* was collected at Waitetuna Bay. This species is largely restricted to rocky peninsulas and islands off the east coast of Northland (Blanchon and Bannister 2002), and has been collected nearby at a number of sites on Great Barrier Island (e.g. Oruawharo Bay, AK 169325) and associated islands (e.g. Rakitu Island, AK 166151). On rocks below the high tide mark, the black marine lichen, *Lichina pygmaea* is locally abundant at most of the rocky bays.

Mangroves

Some large mangroves were found at Houseboat Bay. Few lichens were found, but the cyanobacterial *Leptogium aucklandicum* was reasonably common, as was the graphid *Thallocoma subvellata*.

Top House orchard

The orchard at the Top House supported a large number of lichen species. In particular, the two plum trees (*Prunus persica*) and the pear (*Pyrus communis*) had a range of typical orchard lichens growing on the trunks and branches (Fig. 12), with *Usnea rubicunda*, *Parmotrema reticulatum* and *Ramalina celastri* most abundant. More unusual was the presence of typical native forest lichens such as *Menegazzia neozelandica*, *Sticta martini*, *Heterodermia leucomela* and *Porina exocha*. The most interesting find was a clump of the bright orange *Teloschistes flavicans* (Fig. 13), which is uncommon on the mainland, although it can be found on other offshore islands.

Comparison with nearby islands

Hayward and Hayward (1986) recorded 247 lichen taxa from Great Barrier and adjacent islands, and their list included most of the lichens found on Motu Kaikoura. Smaller studies of parts of Great Barrier island, include that of Dakin and Galloway (1980),

who found 27 largely montane lichen species on Hirakimata (Mt Hobson), and Hayward and Hayward (1973), who reported 40 species from habitats near Whangaparapara. The most useful comparison is with Rakitu Island off the east coast of Great Barrier, where Hayward and Hayward (1982) reported 124 species from this 350 ha island. Motu Kaikoura is larger (535 ha), but to date we have only identified 114 species from the island. It is likely that Rakitu island has a larger lichen flora due to its more diverse and intact vegetation.

Conclusion

Despite the relatively small size of the island and the poor state of the vegetation, there were a high number of lichen species present. Some of the more unusual species seem to be restricted in their distribution. Particularly important habitats include the Top House orchard, broadleaf forest areas and shaded inland bluffs. Removal of the deer may result in the recovery of some lichens or recolonisation by others if they were in fact being eaten by the deer. Conversely, recovery by grasses and other vascular plants may impact negatively on soil and rock-dwelling lichens. In some of our quadrats this appears to be already the case (unpublished observations).

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Appendix: Motu Kaikoura lichen species list.

Compiled from collections made in July and December 2008, December 2009 and December 2010. Names follow Galloway (2007), with updates where appropriate.

Lichens	Voucher		
<i>Baeomyces heteromorphus</i>	Unitec 4584	<i>Candelariella vitellina</i>	Unitec 4160
<i>Buellia stellulata</i>	Unitec 4623	<i>Canoparmelia pustulescens</i>	Unitec 4090
<i>Calicium hyperelloides</i>	Unitec 4111	<i>Chrysothrix candelaris</i>	Unitec 3365
<i>Caloplaca acheila</i>	Unitec 4622	<i>Cladia aggregata</i>	Unitec 3188
<i>Caloplaca litoralis</i>	Unitec 4157	<i>Cladia retipora</i>	Unitec 4575
		<i>Cladonia confusa</i>	Unitec 3362
		<i>Cladonia capitellata</i>	Unitec 4609

<i>Cladonia chlorophaea</i>	Unitec 4626	<i>Physcia erumpens</i>	Unitec 4566
<i>Cladonia floerkiana</i>	Unitec 4109	<i>Physcia poncinsii</i>	Unitec 4084
<i>Coccocarpia palmicola</i>	Unitec 3176	<i>Poeltiaria turgescens</i>	
<i>Collema kauaiense</i>	Unitec 3420	<i>Porina exocha</i>	Unitec 3163
<i>Degelia durietzii</i>	Unitec 4167	<i>Porpidia albocaerulescens</i>	Unitec 4601
<i>Dirinaria applanata</i>	Unitec 4100	<i>Pseudocyphellaria aurata</i>	Unitec 3154
<i>Flavoparmelia haywardiana</i>	Unitec 4081	<i>Pseudocyphellaria carpoloma</i>	Unitec 3155
<i>Fuscodermia limbatum</i>	Unitec 3395	<i>Pseudocyphellaria chloroleuca</i>	Unitec 3926
<i>Heterodermia chilensis</i>	Unitec 4565	<i>Pseudocyphellaria crocata</i>	Unitec 3149
<i>Heterodermia japonica</i>	Unitec 3184	<i>Pseudocyphellaria dissimilis</i>	Unitec 4567
<i>Heterodermia leucomela</i>	Unitec 3166	<i>Pseudocyphellaria haywardiorum</i>	Unitec 3356
<i>Heterodermia microphylla</i>	Unitec 3717	<i>Pseudocyphellaria montagnei</i>	Unitec 3388
<i>Heterodermia obscurata</i>	Unitec 3185	<i>Pseudocyphellaria multifida</i>	Unitec 3148
<i>Heterodermia speciosa</i>	Unitec 3916	<i>Pseudocyphellaria pickeringii</i>	Unitec 3391
<i>Hypogymnia subphysodes</i>	Unitec 4108	<i>Pseudocyphellaria poculifera</i>	Unitec 3152
<i>Jackelixia ligulata</i>	Unitec 4552	<i>Pseudocyphellaria rubella</i>	Unitec 3151
<i>Lecanora intumescens</i>	Unitec 4170	<i>Pseudocyphellaria wilkinsii</i>	Unitec 3167
<i>Lecidella elaeochroma</i>	Unitec 4103	<i>Punctelia borreri</i>	Unitec 4091
<i>Leiorreuma exaltatum</i>	Unitec 4101	<i>Punctelia perreticulata</i>	Unitec 3193
<i>Lepraria cf. eburnea</i>	Unitec 4557	<i>Punctelia subflava</i>	Unitec 3196
<i>Lepraria incana</i>	Unitec 4166	<i>Pyrenula sp.</i>	Unitec 4501
<i>Leprocaulon arbuscula</i>	Unitec 4155	<i>Pyxine subcinerea</i>	Unitec 4169
<i>Leptogium aucklandicum</i>	Unitec 4154	<i>Ramalina australiensis</i>	Unitec 3162
<i>Leptogium cyanescens</i>	Unitec 3187	<i>Ramalina celastri</i>	Unitec 4105
<i>Leptogium denticulatum</i>	Unitec 4568	<i>Ramalina meridionalis</i>	Unitec 4553
<i>Leptogium propaguliferum</i>	Unitec 4153	<i>Ramalina peruviana</i>	Unitec 3159
<i>Lichina pygmaea</i>	Unitec 3426	<i>Rhizocarpon geographicum</i>	Unitec 3414
<i>Megalaria maculosa</i>	Unitec 4093	<i>Stereocaulon corticatulum</i>	Unitec 3189
<i>Megalospora atrorubicans</i>	Unitec 4600	<i>Stereocaulon ramulosum</i>	Unitec 3418
subsp. <i>australis</i>		<i>Stereocaulon vesuvianum</i>	Unitec 4113
<i>Megalospora gompholoma</i>	Unitec 4590	<i>Sticta fuliginosa</i>	Unitec 3355
subsp. <i>gompholoma</i>		<i>Sticta lacera</i>	Unitec 3928
<i>Menegazzia aucklandica</i>	Unitec 4582	<i>Sticta latifrons</i>	Unitec 3378
<i>Menegazzia neozelandica</i>	Unitec 3198	<i>Sticta martinii</i>	Unitec 3195
<i>Pannaria araneosa</i>	Unitec 3497	<i>Sticta squamata</i>	Unitec 3423
<i>Pannaria crenulata</i>	Unitec 3174	<i>Sticta subcaperata</i>	Unitec 3361
<i>Pannaria immixta</i>	Unitec 3171	<i>Strigula delicata</i>	Unitec 4569
<i>Pannaria aff. patagonica</i>	Unitec 3172	<i>Strigula fossulicola</i>	Unitec 4572
<i>Pannaria subcrustacea</i>	Unitec 3175	<i>Teloschistes flavicans</i>	Unitec 3191
<i>Parmelia testacea</i>	Unitec 4579	<i>Teloschistes sieberianus</i>	Unitec 3192
<i>Parmelina conlabrosa</i>	Unitec 4088	<i>Teloschistes xanthorioides</i>	Unitec 4082
<i>Parmelina labrosa</i>	Unitec 4106	<i>Tephromela atra</i>	Unitec 4168
<i>Parmelinopsis afrorevoluta</i>	Unitec 4107	<i>Thallolema subvellata</i>	Unitec 4178
<i>Parmotrema austrocetratum</i>	Unitec 3180	<i>Thelotrema lepadinum</i>	Unitec 4092
<i>Parmotrema cetratum</i>	Unitec 3161	<i>Xathoparmelia australasica</i>	Unitec 4593
<i>Parmotrema crinitum</i>	Unitec 3168	<i>Xanthoparmelia furcata</i>	Unitec 3194
<i>Parmotrema grayanum</i>	Unitec 4578	<i>Xanthoparmelia isidiigera</i>	Unitec 4596
<i>Parmotrema mellissii</i>	Unitec 3922	<i>Xanthoparmelia scabrosa</i>	Unitec 3197
<i>Parmotrema perlatum</i>	Unitec 3911	<i>Xanthoparmelia verrucella</i>	Unitec 4595
<i>Parmotrema reticulatum</i>	Unitec 3181	<i>Usnea angulata</i>	Unitec 4554
<i>Parmotrema subtinctorum</i>	Unitec 3177	<i>Usnea rubicunda</i>	Unitec 4581
<i>Peltigera nana</i>	Unitec 3424		
<i>Pertusaria subplanaica</i>	Unitec 4576		

The botany of Kopuahingahinga Island, Pahurehure Inlet, Auckland

Kristy L. Hall

Kopuahingahinga Island is located within the Pahurehure Inlet of the Manukau Harbour, south Auckland. The island covers 11.3ha and is situated near the mouth of Drury Creek, immediately to the south of larger Pararekau Island (Fig. 1). Both islands are connected to the mainland by way of a causeway that runs through the middle of Kopuahingahinga Island. Although private land, both islands can be viewed from the southern motorway near Karaka.



Fig. 1. Location of Kopuahingahinga Island, Pahurehure Inlet, Manukau Harbour. Map produced by Kristy Hall, Mei Nee Lee and Joshua Salter. 2010 aerials sourced from Auckland Council GIS.

A botanical survey of Kopuahingahinga Island was undertaken on the afternoon of 16 June 2010 to assess the potential effects of widening the existing access road through the island. For the purposes of this investigation, a 20m wide zone on either side of the existing road was demarcated as the area of particular interest. The botanical survey focused on the area immediately adjacent to the road and causeways, although additional transects were undertaken through the island in order to ascertain the botanical significance of the wider site.

Most of the island is dominated by mature emergent *Pinus radiata* (Fig. 2). These appear to have been planted as a woodlot over 30 years ago, but have not been maintained or thinned. Some of the trees are now beginning to fall, and others are subject to erosion around the coastline. Beneath the pines is a regenerating native shrub tier of plants that are tolerant of acidic soil conditions beneath these trees. Species comprise *Myrsine australis*, *Cyathea dealbata*, *Geniostoma ligustrifolium* and *Leptocophylla juniperina*, with some *Coprosma lucida* and

Leucopogon fasciculatus. In places *Cyathea dealbata* tree ferns form exclusive stands.

Beneath the shrub layer, much of the ground is cloaked in pine needles and ponga fronds, which prevent groundcover species from establishing. Patches of *Lepidosperma laterale* and *Baumea tenax* occur, although they are being shaded out in many places. *Gleichenia dicarpa* was conspicuous, particularly along the eastern coast, growing with *Pteridium esculentum* and *Blechnum novae-zelandiae*. Other ferns were uncommon, limited to *Asplenium flaccidum*, *A. polyodon*, and *Paesia scaberula*, with *Pyrrosia eleagnifolia* on trees, and one patch of *Adiantum cunninghamii* by the coast. Small patches of native grasses, *Microlaena stipoides* and *Oplismenus hirtellus* were observed. A large area of bryophytes was present in boggy, less free draining soil located south of the access road.



Fig. 2. Kopuahingahinga Island viewed from Pararekau Island. Note cleared mangroves in the foreground. Photo: P. Kensington, 18 June 2010.

Kanuka (*Kunzea ericoides*) have densely colonised open areas where there is sufficient light for them to grow, including the edges of the access road (Fig. 3), old walking tracks and a power line route. Manuka (*Leptospermum scoparium*) is much less common. Mature trees are present near the north-west coastline and some younger trees occur on old walking tracks to the north. Some of the mature manuka are parasitized by dwarf mistletoe (*Korthalsella salicornioides*) (Fig. 4). This plant was first discovered on the Island by Andrea Julian in 2007 where it was reported "by the causeway" to the island (Cameron 2008: p. 37). No mistletoe plants were located on or immediately adjacent to the causeway in 2010.

Korthalsella salicornioides is a nationally At Risk species classified as Naturally Uncommon (de Lange



Fig. 3. The road through Kopuahingahinga Island showing dense kanuka with emergent pine trees. Photo: K. Hall, 16 June 2010.

et al. 2010), recognising that the plants occur within naturally small and widely scattered populations (Townsend et al. 2008). The favoured host of dwarf mistletoe in Auckland is manuka, although it also occurs on kanuka (Cameron 2001). Dwarf mistletoe plants are generally only present on one species at a particular site (E. Cameron, pers. comm.) and disperse over short distances by explosive dehiscence, with longer distance dispersal possibly provided by birds (Burrows 1996). On Kopuahingahinga Island,



Fig. 4. *Korthalsella salicornioides* on manuka, Kopuahingahinga Island. Photo: K. Hall, 16 June 2010.

the host manuka trees are mature and some appear to be dying. The lack of successional habitat and young manuka in the immediate vicinity poses a threat to the long-term survival of this species on the island. Perhaps this warrants seed collection and transfer to protected sites around the Manukau Harbour? The Project Manukau foreshore restoration project on former Watercare land provides one possible location, where more than 300,000 eco-sourced native seedlings have been established, including manuka (Spellerberg & Frey 2011).

Alternatively, dwarf mistletoe could be used as a catalyst to motivate a local community restoration project.

Another unusual species found on Kopuahingahinga Island is *Epacris pauciflora*. This species usually occurs in poor soils in open shrubland, fernland and bog (Allan 1961). Although not nationally threatened, it is rare in Auckland, known only from Great Barrier Island, the Tomarata Lakes and historic records by Waiuku (E. Cameron, pers. comm.). Only one mature plant was located during the survey, situated on the southern coast.



Fig. 5. Areas of saltmarsh occur along the north-eastern side of Kopuahingahinga Island. Photo: K. Hall, 16 June 2010.

In the inter-tidal zone, the island is fringed by a wide band of mangroves (*Avicennia marina*). Historic aerial photographs show that the mangroves established in the latter part of the 20th century, being largely absent until at least the 1960s. Their establishment around the island may be associated with the construction of State Highway 1 and the island's causeway, which would have restricted water flows through Pahurehure Inlet. Today, the local community wishes to remove the mangroves from much of the inlet (ARC & PDC 2006), and consent has been granted to clear nearly 30 ha of the plants (Nash 2010) (Fig. 2). Complementing the mangroves, Kopuahingahinga Island has very small areas of saltmarsh, consisting of *Juncus kraussii*, *Baumea juncea* and *Apodasmia similis*. The saltmarsh is largely confined to the north-eastern coastline (Fig. 4). On other parts of the island, eroding clay cliffs fall vertically into the sea.

Weed abundance on the island is relatively low, with most weeds restricted to the road and causeways. Pampas grass (*Cortaderia selloana*), gorse (*Ulex europaeus*) and *Asparagus asparagoides* are the most widespread weeds, with Japanese honeysuckle (*Lonicera japonica*) in a few locations. Most of the weeds along the roadside have been planted or dumped but are spreading, including *Agapanthus*