

Plants of Waiaatarua Reserve, Remuera, Auckland

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Introduction

Waiaatarua Reserve covers 41 ha (Fig. 1), comprising 16 ha of restored wetlands, 16 ha of open meadows and paths, and 9 ha of planted forest (native, and some eucalypts). It used to be Lake Waiaatarua (St John's Lake) covering 22 ha (Cranwell 1981, Stanley 1999) (Fig. 2), and was part of the original 54 ha of land purchased from the Anglican Church and subsequently in 1916 donated by R.H. Abbott to the city. Because of periodic flooding of surrounding land, a tunnel was built in 1918 to drain water from swamps around the lake into Ōrākei Creek and thence to the sea in Ōrākei Basin. The lake itself was eventually drained in 1929 by an improved enlarged tunnel (800 m long, 1.2 m in diameter), following a detailed engineering plan (Harrison 1917).

Restoration plantings began in 1987, the objective being to create a stormwater management system and habitat for birds, and recreation space for the public (Auckland City Council 1984, Anon. 2006, Prema 2006, Hunt 2007, Cameron et al. 2008, Carlyon & Morrow 2011). It is the largest urban constructed wetland in New Zealand (Auckland Council, no date). As well as the plantings, there is a complex system of installations to remove sediment and nutrients from the stormwater before it flows out to the Waitematā Harbour via Ōrākei Basin. Construction of the upgraded stormwater scheme began in 2002 at a cost of \$5.9 m and was completed in 2004 (Fox 2005).

The reserve is owned by the Auckland Council, and managed for stormwater cleansing and disposal, biodiversity (particularly as a haven for wildfowl), and recreation. Stormwater from the surrounding catchment suburbs flows into the reserve through large underground pipes. From 2000 to 2012, Grant Ockleston of the Auckland City Council (and then Auckland Council) had responsibility for the stormwater side of the scheme.

As well as the Council, organisations involved with the reserve are Waiaatarua Reserve Protection Society (planting), Conservation Volunteers New Zealand (monitoring rat trap lines), Meadowbank & St Johns Residents Association (help with planting days), and the Ōrākei Local Board. Wetland Solutions carried out the upgrade including planting 90,000 wetland plants, and Aranovus Ltd (Grant Dumbell) has been involved with environmental monitoring, community consultation about the reserve and with "Wetland Walk" interpretation signage.

The soil throughout the reserve is organically rich and fertile for plant growth. The wetland itself is



Fig. 1. Aerial photo of Waiaatarua Reserve, Ōrākei Local Board, Auckland City, 2016, adapted from GeoMaps, Auckland Council.

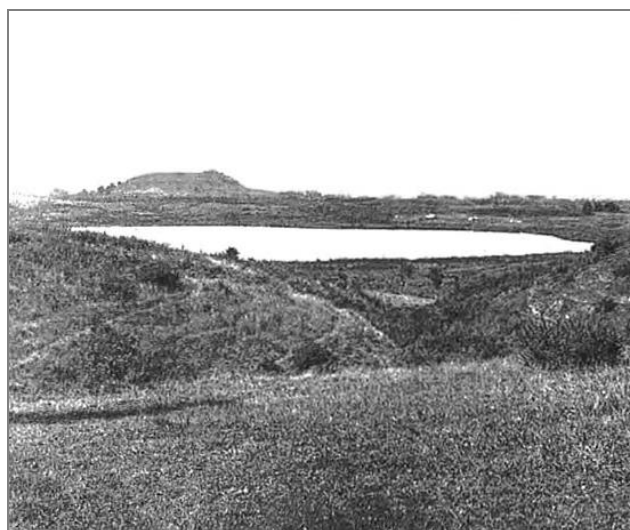


Fig. 2. Lake St John (1916) looking towards Mt Wellington from St Johns Road (source Winkelmann 1916, Auckland City Libraries Photo Archive).

eutrophic, being fed by rainwater plus stormwater inflow which periodically enriches the wetland with nitrates and phosphates and heavy metal contaminants such as zinc. By the time the water



Fig. 3. Waiaatarua Reserve, water outfall, before it flows through a pipe to the Ōrākei Basin, 16 Oct 2017. All photos by Mike Wilcox.



Fig. 4. Auckland Bot Soc group, Waiaatarua Reserve, 18 Nov 2017. Those visible in the picture, from left: Michelle Boule, John Cleland, Shelley Heiss-Dunlop, Anna Mairs, Neil Davies, Lawrence Thoms, Lynne Scott, Stephanie Angove-Emery, Yolanda Thorp, Liz Walker, Sam Sutherland, Andrea Hartman, Marcus Spranger.



Fig. 5. *Carex secta*, with eucalypt plantations in the background, 16 Oct 2017. Some 10,000 nursery-grown seedlings have been planted (Auckland City Council 2003).

exits the reserve (Fig. 3) it has been considerably filtered and stripped of nutrients by the wetland plants. Nonetheless, silt traps need to be periodically emptied, and there is a noticeably bad anaerobic smell at times coming from the boggy margins of the wetland.

Monitoring of the birdlife in the wetland has included a study by Unitec from 2009 to 2016 lead by Judith Nicholson (Nicholson et al. 2014; Nicholson 2015; Nicholson et al. 2015; Nicholson et al. 2016). The Auckland Council's Wetland Biodiversity Monitoring Programme has included periodic assessment of the indigenous biodiversity at Waiaatarua Reserve (Bishop & Khin 2014, Bishop et al. 2014).

Auckland Botanical Society Field Trip, 18 November 2017

The Auckland Botanical Society visited the reserve on 18 November 2017 (Fig. 4), those attending being: *Stephanie Angove-Emery, Rieke Behrens, Michelle Boule, John Cleland, Steve Cook, Brian Cumber, Neil Davies, Ben Goodwin, Andrea Hartmann, Shelley Heiss-Dunlop, Anna Mairs, Dylan Mairs (9 months old), Richard Mairs, Lynne Scott, Sam Sutherland, Marcus Spranger, Lawrence Thoms, Liz Walker, Jack Warden, Mike Wilcox and Elise Wood.* Yolanda Thorp of the Waiaatarua Reserve Protection Society gave an introductory talk on the history of the reserve, and she and another local resident, *Alison McPherson*, accompanied us for a while. For the purposes of plant recording, the vegetation of Waiaatarua can be classified into four types: wetlands, meadows, scattered trees and landscape plantings, and perimeter planted forests.

Wetlands

The present wetland vegetation at Waiaatarua Reserve was mostly artificially established using



Fig. 6. *Schoenoplectus tabernaemontani*, Waiaatarua Reserve, 14 Dec 2017.

species that were or may have been there at the time before the draining of St John's Lake or are otherwise known to be typical wetland native plants of Auckland (see de Lange et al. 2014). Planting took place from 1987 using wetland species raised in nurseries or sourced from the site (Auckland City Council 2003), the core assemblage being tall monocots: raupo (*Typha orientalis*) – sourced from the site, pūrei, pūkio or green swamp tussock (*Carex secta*) (Fig. 5), lake sedge or bulrush (*Schoenoplectus tabernaemontani*) – up to 2 m tall (Fig. 6), kuta or bamboo spike sedge (*Eleocharis sphacelata*), pallid rush (*Juncus pallidus*), and flax (*Phormium tenax*) – sourced from the site. Species of lesser stature planted were oioi (*Apodasmia similis*), *Carex virgata*, *Eleocharis acuta*, and *Machaerina juncea*. *Carex subdola* was listed as having 2200 seedlings planted (Auckland Council 2003), but we did not record this species in our survey. On the other hand, some prominent species in the wetland were not on the planting list (Auckland Council 2003) so may either be natural or established in the earlier plantings from 1987: marsh clubrush or purua grass (*Bolboschoenus fluviatilis*), *Carex lessoniana*, *C. maorica* (Fig. 7), *Cyperus ustulatus*, jointed sedge or jointed twig rush (*Machaerina articulata*), *Machaerina arthropphylla*, and rushes such as *Juncus australis*, and the tall, slender *Juncus amabilis* which grows along the northern margins of the wetland, below Towle Place (Fig. 8). It is an Australian rush and was first collected here (at St Johns Lake) by H. Carse (28 Jan 1925, CHR 291478 and Feb 1926, AK 3046, AK 209033).

Wetland trees planted have been cabbage tree (*Cordyline australis*), kahikatea (*Dacrycarpus dacrydioides*), swamp maire (*Syzygium maire*) and pukatea (*Laurelia novae-zelandiae*), together with *Coprosma propinqua* and ribbonwood (*Plagianthus regius*). Unwelcome woody intruders are honeysuckle (*Lonicera japonica*), blackberry (*Rubus fruticosus*), and gorse (*Ulex europaeus*). Swamp maire has grown reasonably well and trees had ripe fruit at the time of the ABS visit; however, several trees died during January-March 2018. Kahikatea, on the other hand, has struggled in the wetland plantings but has grown very well in the perimeter plantings, as has ribbonwood.

Numerous other plants, both native and exotic, have colonised the wetland and damp hollows in the meadows, possibly aided by seed transported by ducks. Common plants include water plantain (*Alisma plantago-aquatica*), slender knotweed (*Persicaria decipiens*) in green-leaved and red-leaved variants (Fig. 9), water pepper (*Persicaria hydropiper*), freshwater paspalum or Mercer grass (*Paspalum distichum*), floating sweetgrass (*Glyceria declinata*), water celery (*Apium nodiflorum*) (Fig. 10), beggar's ticks (*Bidens frondosa*), marsh bedstraw or 'snow-in-



Fig. 7. *Carex maorica*, 8 Dec 2017.



Fig. 8. *Juncus amabilis*, raupo behind, 17 Jan 2018.



Fig. 9. *Persicaria decipiens*, 27 Nov 2017.



Fig. 10. Water celery (*Apium nodiflorum*), 18 Nov 2017.



Fig. 11. *Galium palustre*, 14 Dec 2017.



Fig. 12. Alligator weed (*Alternanthera philoxeroides*), 18 Nov 2017.



Fig. 13. Swamp lily (*Ottelia ovalifolia*), 14 Nov 2017.

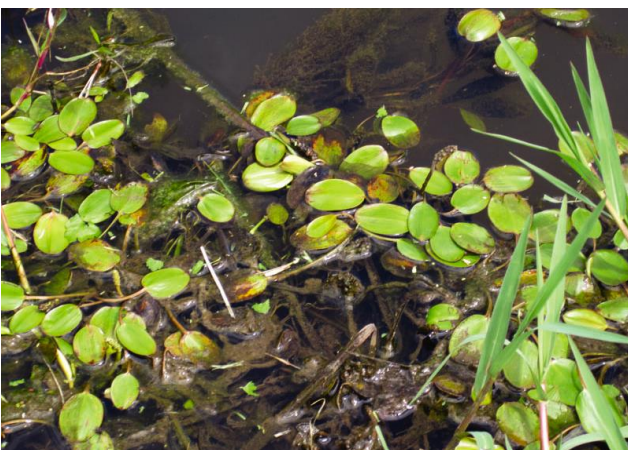


Fig. 14. Pondweed (*Potamogeton cheesemani*), 7 Jan 2018.

summer' (*Galium palustre*) (Fig. 11), lotus (*Lotus pedunculatus*), marsh bindweed (*Calystegia sepium* subsp. *roseata*), water purslane (*Ludwigia palustris*), alligator weed (*Alternanthera philoxeroides*) – which makes particularly rank growth in the side channels of the wetland (Fig. 12), yellow flag (*Iris pseudacorus*), bachelors button (*Cotula coronopifolia*), prickly smartweed (*Persicaria strigosa*) – rarely recorded from Auckland, water speedwell (*Veronica anagallis-aquatica*), water cress (*Rorippa nasturtium-aquaticum*), sea aster (*Symphotrichum subulatum*), clustered dock (*Rumex conglomeratus*), *Isolepis prolifera*, *Juncus articulatus*, and *Juncus effusus*. A native willow herb *Epilobium hirtigerum* is also present, on the edge of a pathway across a bridge. Fully submerged aquatic plants recorded are water milfoil (*Myriophyllum propinquum*), Brazilian waterweed (*Egeria densa*), and tape grass (*Vallisneria gigantea*), while swamp lily (*Ottelia ovalifolia*) (Fig. 13) and pondweed (*Potamogeton cheesemani*) (Fig. 14) have leaves which float on the water surface. Backwaters have colonies of duckweed floating on the water surface, the species identified being the native duckweed (*Lemna aequinoctialis*) – (see de Lange et al. 2014), and the introduced *Landoltia punctata*.

Damp hollows, which are flooded in winter and dry out most of the time in summer, support an assemblage of mainly exotic plants: *Callitriche stagnalis*, *Cardamine flexuosa*, *Cotula coronopifolia*, *Echinochloa crus-galli* (Fig. 15), *Glyceria declinata*, *Isolepis sepulchralis*, *Juncus articulatus*, *J. bufonius*, *J. microcephalus* (Fig. 16), *Ludwigia palustris*, *Lythrum hyssopifolia*, *Paspalum distichum*, *Persicaria maculosa* (which Alan Esler noted as being probably *P. 'long spike'* – Esler 1975), *Ranunculus bulbosus* and *R. sardous*. Umbrella sedge (*Cyperus eragrostis*) is abundant on the margins of the wetland, as is the very tall Vasey grass (*Paspalum urvillei*).

One ephemeral meadow wetland has a population of marsh or kneed foxtail (*Alopecurus geniculatus*) – a grass rarely recorded from Auckland, and with it both *Alternanthera denticulata* and *A. nahui* (Fig. 17), the last also found on damp margins of some paths with *Lythrum hyssopifolia*.

What is known of the plant life in and around the original St John's Lake before it was drained? Stanley (1999) has listed several now-threatened plants recorded by T.F. Cheeseman in 1873 that used to grow there – *Sparganium subglobosum*, *Hydrocotyle pterocarpa*, *Ranunculus glabrifolius* (but now considered to be *R. amphitrichus*) and *Empodisma minus*. There is no account, however, of the main plants that used to fringe the lake or grew in the surrounding swamp, though Esler (1991) lists several native wetland species recorded from there and presumably native to the site, including *Carex*

subdola, *C. maorica*, *Juncus amabilis*, *Epilobium pallidiflorum*, and *Machaerina articulata* (as *Baumea articulata*). Prema (2006) mentioned pollen analyses from peat in the former lake bed, indicating that raupo (*Typha orientalis*), various sedges, *Potamogeton*, *Myriophyllum*, kahikatea and manuka were once present.

Meadows

Grassed meadows occupy much of the middle ground between the central wetland and the perimeter trees. These were grazed by cattle up to 2002 and are now periodically mowed. They are seasonally wet, poorly drained because of the underlying peat, and subject to ponding following prolonged wet weather. The dominant grasses in the meadows depending on the season are meadow grass (*Poa trivialis*), cocksfoot (*Dactylis glomerata*), prairie grass (*Bromus catharticus* var. *catharticus*, syn. *B. willdenowii*), pasture brome (*B. catharticus* var. *elatus*, syn. *B. valdivianus*), perennial ryegrass (*Lolium perenne*), Italian ryegrass (*L. multiflorum*), Yorkshire fog (*Holcus lanatus*), browntop (*Agrostis capillaris*), sweet vernal (*Anthoxanthum odoratum*), tall oat grass (*Arrhenatherum elatius*), tall fescue (*Schedonorus arundinaceus*), paspalum (*Paspalum dilatatum*), and kikuyu (*Cenchrus clandestinum*). Damp hollows have floating sweet grass (*Glyceria declinata*) and creeping bent (*Agrostis stolonifera*), while the drier margins of paths have much annual poa (*Poa annua*), ratstail (*Sporobolus africanus*) and Bermuda grass (*Cynodon dactylon*).

There are numerous herbs ("wild flowers") throughout the meadows, some particularly common ones being creeping buttercup (*Ranunculus repens*), spiny-fruited buttercup (*R. muricatus*), bulbous buttercup (*R. bulbosus*), hairy buttercup (*R. sardous*), Cape weed (*Arctotheca calendula*) (Fig.18), mouse-eared chickweed (*Cerastium glomeratum*), wild carrot (*Daucus carota*), parsley dropwort (*Oenanthe pimpinelloides*) (Fig. 19), white clover (*Trifolium repens*), pennyroyal (*Mentha pulegium*) in damper places, and various docks (*Rumex conglomeratus*, *R. crispus*, *R. obtusifolius*, *R. pulcher*). Herbs of gravelly margins of paths are shepherds purse (*Capsella bursa-pastoris*), pineapple weed (*Matricaria discoidea*), dwarf mallow (*Malva neglecta*), cudweeds (*Gamochaeta coarctata*, *Pseudognaphalium luteoalbum*), sand spurrey (*Spergularia rubra*), wireweeds (*Polygonum arenastrum* and *P. aviculare*), and rarely, *Ciclospermum leptophyllum* and *Crassula decumbens*. Damp depressions in the meadows support large patches of starwort (*Callitriche stagnalis*), purple loosestrife (*Lythrum hyssopifolia*) and creeping cinquefoil (*Potentilla reptans*), while water pennywort (*Hydrocotyle umbellata*) occupies an extensive area of saturated ground on the northern boundary of the reserve below Grand Drive (see Wilcox 2018).



Fig. 15. *Echinochloa crus-galli*, 28 Dec 2017.



Fig. 16. *Juncus microcephalus*, 27 Nov 2017.



Fig. 17. *Alternanthera nahui*, 7 Jan 2018.



Fig. 18. Cape weed (*Arctotheca calendula*), in meadow, 3 Oct 2017.



Fig. 19. Parsley dropwort (*Oenanthe pimpinelloides*), 27 Nov 2017.

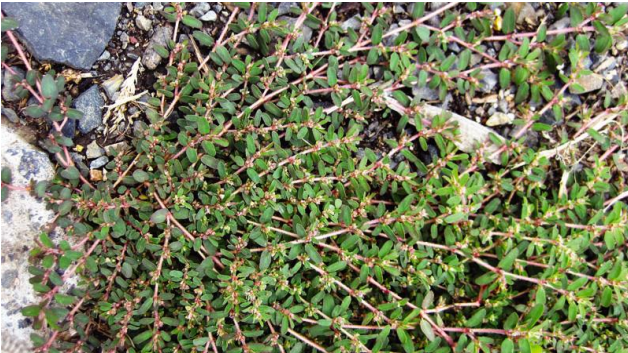


Fig. 20. Spotted spurge (*Euphorbia maculata*), 24 Jan 2018.



Fig. 21. *Picconia excelsa* (planted), 5 July 2017.



Fig. 22. *Nestegis cunninghamii* (planted), Waiatarua Reserve, 3 Oct 2017.

There is a distinctly ruderal fringe to the meadows at the site of the old cattle yards off Abbots Way. Here there are gravelly paths, a carpark, and a maintenance depot where grow a suite of weedy plants including the native wind grass (*Lachnagrostis filiformis*) – see Gardner (2014) for mention of its liking for man-made habitats in Auckland. Plants occurring on gravel (including many with a prostrate habit) are white clover (*Trifolium repens*), *Galium divaricatum*, gravel groundsel (*Senecio skirrhodon*), creeping mallow (*Modiola caroliniana*), scarlet pimpernel (*Lysimachia arvensis*), purslane (*Portulaca oleracea*), allseed (*Polycarpon tetraphyllum*), procumbent pearlwort (*Sagina procumbens*), spotted spurge (*Euphorbia maculata*) (Fig. 20), *Amaranthus deflexus*, *Epilobium ciliatum*, and the monocots *Cyperus eragrostis*, *Eleusine indica*, *Digitaria sanguinalis*, *Panicum dichotomiflorum*, and *Polypogon viridis*. A colony of the creeper *Ipomoea cairica* has made itself at home over the old wooden cattle yard railings and an adjoining chainwire-netting fence, and there is a patch of bladder hibiscus (*Hibiscus trionum*) beside the service building.

Scattered trees and landscape plantings

Landscape planting with both exotic and native trees has taken place since 1987 at the main entrance off Grand Drive in and around the children's playground, at the other entrances off Grand Drive, and in a few places alongside sections of the main walkway around the reserve. Noteworthy exotic broad-leaved trees are oaks (*Quercus aliena* var. *acutiserrata*, *Q. bicolor*, *Q. cerris*, *Q. coccinea*, *Q. palustris*, *Q. robur*, *Q. rubra*), horse chestnut (*Aesculus hippocastanum*), Italian alder (*Alnus cordata*), common alder (*Alnus glutinosa*), sweet chestnut (*Castanea sativa*), pecan (*Carya illinoensis*), black walnut (*Juglans nigra*), common walnut (*J. regius*), tulip tree (*Liriodendron tulipifera*), sweet gum (*Liquidambar styraciflua*), Australian frangipani (*Hymenosporum flavum*), Norfolk Island hibiscus (*Lagunaria patersonii*), honey locust (*Gleditsia triacanthos*), Tasmanian boobialla (*Myoporum insulare*), tung oil tree (*Vernicia fordii*), Canary Island olive (*Picconia excelsa*) (Fig. 21), camphor laurel (*Cinnamomum camphora*), Chinese happy tree (*Camptotheca acuminata*), Chilean willow (*Salix humboldtensis*), silky oak (*Grevillea robusta*), white mulberry (*Morus alba*), brush box (*Lophostemon confertus*), water gum or kanooka (*Tristaniopsis laurina*) and smooth-barked apple (*Angophora costata*). Exotic conifers include a grove of swamp cypress (*Taxodium distichum*) and with them a dawn redwood (*Metasequoia glyptostroboides*), and specimen trees of Queensland kauri (*Agathis robusta*), bunya (*Araucaria bidwillii*), coast redwood (*Sequoia sempervirens*), and Japanese cedar (*Cryptomeria japonica*).

The main native trees to feature prominently (and successfully) in landscape plantings are pohutukawa

(*Metrosideros excelsa*), puriri (*Vitex lucens*), totara (*Podocarpus totara*), and black maire (*Nestegis cunninghamii*). The maire trees have grown particularly well into sturdy, healthy, round-headed specimens (Fig. 22).

Perimeter planted forests

The comparatively dry ground on the sloping margins of the reserve has been subjected to dense planting of native trees (Fig. 23) and some groves of exotic trees as well. The main native trees in these artificial copses (planting began in 1987) are kanuka (*Kunzea robusta*), cabbage tree titoki (*Alectryon excelsum*), lemonwood (*Pittosporum eugenioides*), kohuhu (*P. tenuifolium*), kowhai (*Sophora microphylla* and *S. chathamica*), rewarewa (*Knightia excelsa*), hinau (*Elaeocarpus dentatus*), puriri and totara. rimu (*Dacrydium cupressinum*), kahikatea kauri (*Agathis australis*), pukatea (*Laurelia novae-zelandiae*) and tainui (*Pomaderris apetala*) are also present, with the kauri planted as a grove.

Dense monocultural forests of kanuka (Fig. 24) are mostly bare underneath (possibly resulting from rabbit browsing), but in places there is starting to be natural colonisation of native trees and shrubs such as kawakawa (*Piper excelsum*), karo (*Pittosporum crassifolium*), kohuhu, houpara (*Pseudopanax lessonii*), coastal karamu (*Coprosma macrocarpa*), mapou (*Myrsine australis*), mahoe (*Melicytus ramiflorus*), titoki and cabbage tree.

There have been enrichment plantings in the kanuka forest, too, with black maire, rimu and totara. Damper kanuka copses adjoining the golf course have some dense patches of *Zantedeschia aethiopica* and a noteworthy abundance of the native sedge *Carex virgata*. A very unexpected discovery was an apparently naturalised plant of weeping matipo (*Myrsine divaricata*). There are also dense plantings of lemonwood (Fig. 25) usually with some kohuhu, beneath which regeneration of kawakawa, karaka, mahoe and poroporo (*Solanum laciniatum*) is often abundant. Poroporo is conspicuous throughout the reserve planted on the forest margins, flowering and fruiting abundantly (Fig. 26), and now regenerating profusely.

Other native trees and shrubs planted on the margins are taupata (*Coprosma repens*), *Coprosma areolata*, lacebark (*Hoheria populnea* and *H. sexstylosa*), narrow-leaved lacebark (*H. angustifolia*), black maire, wineberry (*Aristotelia serrata*), tree fuchsia (*Fuchsia excorticata*), manuka (*Leptospermum scoparium*), wharangi (*Melicope ternata*) and koromiko (*Veronica stricta*), while coast banksia (*Banksia integrifolia*) has been planted to attract birds and swan plant (*Gomphocarpus fruticosus*) to attract monarch butterflies.



Fig. 23. Planted native forest, 5 July 2017.



Fig. 24. Planted forest of kanuka (*Kunzea robusta*), 18 Nov 2017.



Fig. 25. Planted forest of lemonwood (*Pittosporum eugenioides*), 14 Nov 2017.



Fig. 26. Poroporo (*Solanum laciniatum*), flower (left), fruits (right), 5 July 2017.



Fig. 27. Arum lily (*Zantedeschia aethiopica* cv. 'Green Goddess'), 18 Nov 2017.



Fig. 28. Ivy (*Hedera helix*), 8 Dec 2017.



Fig. 29. *Freesia laxa*, 5 Dec 2017.



Fig. 30. Cleavers (*Galium aparine*) with mite infection, 5 Dec 2017.

Unitec students have carried out quantitative ecological studies in the perimeter forests (Butcher 2013; Hayes 2005), highlighting the prominence of *Kunzea robusta*, *Pittosporum tenuifolium*, *P. eugenioides*, *Podocarpus totara* and *Hoheria populnea*.

Several ferns have colonised damper parts of these forests, with *Deparia petersenii*, *Diplazium australe*, *Histiopteris incisa*, *Parablechnum novae-zelandiae* and *Pteris tremula* being the commonest, together with five kinds of tree ferns: *Cyathea dealbata*, *C. medullaris*, *Dicksonia fibrosa*, *D. squarrosa*, and the Australian species *Cyathea cooperi*.

Weed species have taken over the forest floor in several damper areas, with wandering Jew (*Tradescantia fluminensis*) being spectacularly dense in places, and abundant onion weed (*Allium triquetrum*), arum lily (*Zantedeschia aethiopica* 'Green Goddess') (Fig. 27) and veldt grass (*Ehrharta erecta*). Where the canopy is broken *Calystegia silvatica* can become rampant. Another noteworthy weedy plant (but treated as native by Landcare Research – Wilton et. al 2016) is Australian fireweed (*Senecio bipinnatisectus*) which the ABS group encountered in pure stands on the eastern boundary with the golf course – a consequence of soil disturbance and exposure following some tree felling. Inkweed (*Phytolacca octandra*) is plentiful on the margins and within the more open copses. Ivy (*Hedera helix*) carpets the forest floor (and is climbing up trees, too) in some of the lemonwood stands (Fig. 28), and with it may occur Madeira vine (*Anredera cordifolia*) and bower vine (*Pandorea jasminoides*). An attractive South African member of the Iridaceae, red flame lily (*Freesia laxa*, syn. *Anomatheca laxa*) is well established in one of the copses (Fig. 29).

Special mention needs to be made of cleavers (*Galium aparine*). It is a common scrambling weed of the margins of copses. Virtually every plant seen in November and December was heavily deformed,

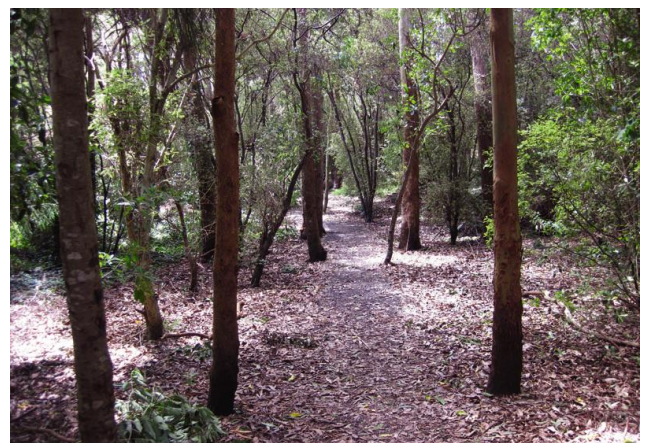


Fig. 31. Planted Eucalypt forest, 7 Jan 2018.



Fig. 32. Planted blackbutt (*Eucalyptus pilularis*), 5 July 2017.



Fig. 33. Planted spotted gum (*Corymbia maculata*), 7 Jan 2018.



Fig. 34. Planted Blue Mountains ash (*Eucalyptus oreades*), 5 July 2017.

with leaves much distorted and in-rolled (Fig. 30). This disorder is caused by a gall mite, *Cecidophyes rouhollahi* Craemer (Acari, Eriophyidae) which resides and feeds within the in-rolled leaves (Martin 2017). It was first described from Europe (Craemer et al. 1999) and has been used as a biocontrol agent on *Galium aparine* and *G. spurium* in Canada. Dr Zhang Ziqiang of Landcare Research confirmed the identification.

A significant feature of Waiatarua Reserve is the well-grown healthy plantation of eucalypts on the eastern boundary adjoining the Remuera Golf Course (Fig. 5, Fig. 31). These trees were established as a windbreak in 1987–89 under the direction of Nick Chin and Jim Doidge of the Auckland City Council. Seedlings and advice on species selection were provided by Murray Faulkner of Centrepont Nursery, Albany. The plantation comprises a series of block plantings of an array of timber eucalypt species, the main constituents and best grown being mountain ash (*Eucalyptus regnans*), Maiden's blue gum (*E. maidenii*), Sydney blue gum (*E. saligna*), bangalay (*E. botryoides*), white stringybark (*E. globoidea*), blackbutt (*E. pilularis*) (Fig. 32), and the very impressive spotted gum (*Corymbia maculata*) (Fig. 33). Others present in the display are shining gum (*E. nitens*), tallowwood (*E. microcorys*), brown barrel (*E. fastigata*), wandoo (*E. wandoo*), yellow stringybark (*E. muelleriana*), thin-leaved stringybark (*E. eugenioides*), large-fruited blackbutt (*E. pyrocarpa*), Blue Mountains ash (*E. oreades*) (Fig. 34), white ash (*E. fraxinoides*), swamp gum (*E. ovata*), and manna gum (*E. viminalis*). Tasmanian blackwood (*Acacia melanoxylon*) is also present.

Conclusions

Waiatarua Reserve is a botanically interesting Auckland park. It has its own unique assemblage of species – native and exotic; natural, naturalised and planted. Our tally of vascular species (and hybrids) is

540, comprising 174 natives and 366 exotics (see Appendix). The habitats are well-defined into four zones: wetland, meadows, perimeter planted forest, and amenity tree plantings. Positive aspects for the reserve's botanical future are the increase in native plants colonising the perimeter planted forest and the thriving colonies of tall native monocots in the wetland. However, we have noted the great abundance of the exotic plants such as freshwater paspalum (*Paspalum distichum*) and marsh bedstraw (*Galium palustre*) dominating the wetlands, probably at the expense of native species, and the invasion of perimeter plantings by veldt grass (Fig. 35). One weed which we think should and could be eliminated from the wetland as a priority is Japanese honeysuckle – see Auckland Council (2017) for prospects of biocontrol by the Honshu white admiral butterfly.

Acknowledgements

We thank Yolanda Thorp (Waiatarua Reserve Protection Society) and Judy Nicholson (birds) for sharing information about their involvement in Waiatarua Reserve; Howell Davies (Auckland Council) for information about the eucalypt plantation; and Rieke Behrens for helpful comments.



Fig. 35. Veldt grass (*Ehrharta erecta*), invading native copses, 24 Jan 2018.

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Appendix: Plant list for Waiatarua Reserve, Remuera, Auckland

Unless otherwise stated, all records were observed by the authors during Jul 2017 – Mar 2018 (during 25 visits), with additions from: Esler (1975 and 1991); sight observations by Wilcox in 2001 and 2005 (MDW) and Heiss-Dunlop in 2005 (SHD); herbarium records (cited); or the 2003 planting list (Auckland City Council 2003).

* = exotic species; cult. = planted species

LYCOPHYTES

Selaginella kraussiana *

FERNS

Adiantum raddianum *

Asplenium flabellifolium (H.Carse & H.B. Matthews 1917, CHR 290834, CHR 2246, lava flat near Lake St John)

Cyathea cooperi *

Cyathea dealbata

Cyathea medullaris

Cyrtomium falcatum *

Deparia petersenii

Dicksonia fibrosa cult. ?

Dicksonia squarrosa

Diplazium australe

Doodia australis (syn. *Blechnum parrisiae*)

Histiopteris incisa

Hypolepis ambigua

Ophioglossum petiolatum (Crookes & Dobbie 1963 in Stanley 1999)

Paesia scaberula

Parablechnum minus (syn. *Blechnum minus*)

Parablechnum novae-zelandiae (syn. *Blechnum novae-zelandiae*)

Parapolystichum glabellum (syn. *Lastreopsis glabella*)

Pneumatopteris pennigera

Pteris cretica *

Pteris tremula

Pyrrhosia eleagnifolia (on *Eucalyptus grandis*, Golf Course boundary)

Thelypteris confluens (T. Kirk, St Johns Lake, CHR 289349)

GYMNOSPERMS

Agathis australis (cult.)

Agathis robusta * (cult.)

Araucaria bidwillii * (cult.)

Araucaria heterophylla * (cult. boundary)
Cedrus deodara * (cult. Golf Course boundary)
Cryptomeria japonica * (cult.)
Cupressus lusitanica * (cult. Golf Course boundary)
Dacrycarpus dacrydioides (cult.)
Dacrydium cupressinum (cult.)
Ginkgo biloba * (cult.)
Libocedrus plumosa (cult.)
Metasequoia glyptostroboides * (cult.)
Phyllocladus trichomanoides (cult.)
Pinus radiata * (cult.)
Podocarpus laetus (cult.)
Podocarpus totara (cult.)
Prumnopitys ferruginea (cult.)
Prumnopitys taxifolia (cult.)
Sequoia sempervirens * (cult.)
Taxodium distichum * (cult.)

BASAL ANGIOSPERMS & MAGNOLIIDS

Beilschmiedia tarairi (cult.)
Beilschmiedia tawa (cult.)
Cinnamomum camphora * (cult. and naturalising)
Hedycarya arborea (cult.)
Laurelia novae-zelandiae (cult.)
Laurus nobilis *
Magnolia grandiflora * (cult.)
Piper excelsum subsp. *excelsum*
Piper excelsum subsp. *peltatum* (cult.)

MONOCOTS – Grasses

Agrostis capillaris *
Agrostis stolonifera *
Alopecurus geniculatus *
Anthoxanthum odoratum *
Arrhenatherum elatius *
Austroderia fulvida (cult.)
Bromus catharticus var. *catharticus* (syn. *B. wilddenowii*) *
Bromus catharticus var. *elatus* * (syn. *B. valdivianus*, [= *B. stamineus*])
Bromus hordeaceus *
Cenchrus clandestinum *
Cortaderia selloana subsp. *jubata* *
Cortaderia selloana subsp. *selloana* *
Cynodon dactylon *
Dactylis glomerata *
Digitaria sanguinalis *
Echinochloa crus-galli *
Echinochloa crus-pavonis *
Ehrharta erecta *
Eleusine indica *
Empodisma minus (Esler 1991)
Festuca glauca * (cult.)
Glyceria declinata *
Glyceria fluitans * (St Johns Lake, H.Carse 1928, CHR 5062)

Hierochloa redolens (Cheeseman, AK 1324)
Holcus lanatus *
Lachnagrostis filiformis
Lolium multiflorum *
Lolium perenne *
Machaerina rubiginosa (Esler 1991)
Microlaena stipoides
Oplismenus hirtellus subsp. *imbecillis*
Panicum dichotomiflorum *
Paspalum dilatatum *
Paspalum distichum *
Paspalum urvillei *
Poa annua *
Poa trivialis *
Phalaris aquatica * (SHD 2005)
Polypogon monspeliensis *
Polypogon viridis *
Schedonorus arundinaceus *
Setaria gracilis *
Setaria pumila *
Sporobolus africanus *

MONOCOTS – Sedges, rushes and restiads

Apodasmia similis (cult.)
Bolboschoenus fluviatilis
Carex dissita
Carex divulsa *
Carex fascicularis
Carex geminata
Carex lessoniana
Carex maorica
Carex secta (cult.)
Carex subdola (D. Petrie 1898, AK 247262; Cheeseman, AK 214467; planting list, but not seen by us)
Carex virgata (cult.)
Cyperus eragrostis *
Cyperus congestus *
Cyperus ustulatus
Eleocharis acuta (cult.)
Eleocharis sphacelata (cult.)
Ficinia nodosa (cult.)
Isolepis cernua
Isolepis distigmata (Cheeseman, AK 219791)
Isolepis prolifera
Isolepis levynsiana *
Isolepis sepulcralis *
Juncus amabilis *
Juncus articulatus *
Juncus australis
Juncus bufonius var. *bufonius* *
Juncus dichotomus *
Juncus distegus (MDW 2001)
Juncus edgariae (MDW 2001)
Juncus effusus *

Juncus holoschoenus (Cheeseman 1918, AK 3010)
Juncus microcephalus *
Juncus pallidus (cult.)
Juncus planifolius
Juncus prismatocarpus
Juncus tenuis *
Machaerina arthropophylla (cult.)
Machaerina articulata
Machaerina juncea (cult.)
Schoenoplectus tabernaemontani (cult.)
Schoenus apogon

OTHER MONOCOTS

Agapanthus praecox subsp. *orientalis* *
Alisma plantago-aquatica *
Allium triquetrum *
Alocasia brisbanensis *
Archontophoenix cunninghamiana *
Aristea ecklonii *
Arthropodium bifurcatum (cult.)
Asparagus asparagoides *
Asparagus scandens *
Astelia banksii (cult.)
Astelia grandis (cult.)
Canna indica *
Chlorophytum comosum *
Clivia miniata *
Cordyline australis (cult.)
Crocasmia × *crocosmiiflora* *
Egeria densa *
Hedychium gardnerianum *
Freesia laxa (syn. *Anomatheca laxa*) *
Iris foetidissima *
Iris pseudacorus *
Landoltia punctata *
Lemma aequinoctialis
Ottelia ovalifolia *
Phormium cookianum (cult.)
Phormium tenax (cult. and natural)
Potamogeton cheesemanii (type locality)
Rhopalostylis sapida (cult.)
Sparganium subglobosum (Cheeseman, AK 1208)
Trachycarpus fortunei *
Tradescantia fluminensis *
Typha orientalis (cult. and natural)
Vallisneria gigantea *
Watsonia meriana var. *bulbillifera* *
Yucca gigantea *
Zantedeschia aethiopica 'Green Goddess' *

DICOTS – trees, shrubs and woody climbers

Acacia melanoxylon * (cult.)
Acca sellowiana * (cult.)
Acer negundo * (cult.)
Aesculus × *carnea* * (cult.)

*Aesculus hippocastanum** (cult.)
Albizia julibrissin * (cult.)
Alectryon excelsus (cult. and natural regeneration)
Alnus cordata * (cult.)
Alnus glutinosa * (cult.)
Angophora costata * (cult.)
Anredera cordifolia *
Araujia hortorum *
Aristolelia serrata (cult.)
Banksia integrifolia * (cult.)
Buddleja davidii *
Calystegia sepium subsp. *roseata*
Calystegia silvatica *
Camptotheca acuminata * (cult.)
Carpodetus serratus (cult.)
Carya illinoensis * (cult.)
Castanea sativa * (cult.)
Casuarina cunninghamiana * (cult. Golf Course boundary)
Casuarina glauca * (cult. Golf Course boundary)
Catalpa × erubescens * (cult.)
Chrysanthemoides monolifera *
Citrus × jambhiri * (cult.)
Coprosma areolata (cult.)
Coprosma × cunninghamii (cult.)
Coprosma × kirkii (cult.)
Coprosma lucida (cult.)
Coprosma macrocarpa
Coprosma propinqua (cult.)
Coprosma repens (cult.)
Coprosma rhamnoides
Coprosma robusta (cult.)
Coprosma virescens (cult.)
Corokia × cheesemanii (cult.)
Corymbia citriodora * (cult., on Golf Course boundary)
Corymbia maculata * (cult.)
Corynocarpus laevigatus
Delairea odorata *
Dracaena draco *
Dodonaea viscosa (cult.)
Dysoxylum spectabile (cult.)
Elaeocarpus dentatus (cult.)
Eriobotrya japonica * (seedlings)
Eucalyptus botryoides * (cult.)
Eucalyptus elata * (cult.)
Eucalyptus eugenioides * (cult.)
Eucalyptus fastigata * (cult.)
Eucalyptus fraxinoides * (cult.)
Eucalyptus globoidea * (cult.)
Eucalyptus grandis * (cult. Golf Course boundary)
Eucalyptus leucoxydon * (cult.)
Eucalyptus maidenii * (cult.)
Eucalyptus muelleriana * (cult.)
Eucalyptus microcorys * (cult.)
Eucalyptus nitens * (cult.)
Eucalyptus oreades * (cult.)
Eucalyptus ovata * (cult.)
Eucalyptus pauciflora * (cult.)
Eucalyptus pilularis * (cult.)
Eucalyptus pyrocarpa * (cult.)
Eucalyptus regnans * (cult.)
Eucalyptus saligna * (cult.)
Eucalyptus sideroxydon * (cult.)
Eucalyptus viminalis * (cult.)
Eucalyptus wandoo * (cult.)
Euonymus japonicus * (seedling)
Euryops pectinatus * (cult., margin)
Fatsia japonica *
Ficus microphylla *
Fraxinus excelsior *
Fraxinus angustifolia subsp. *oxycarpa*
‘Raywood’ * (cult.)
Fuchsia boliviana *
Fuchsia excorticata (cult.)
Geniostoma ligustrifolium
Gleditsia triacanthos * (cult.)
Gomphocarpus fruticosus * (cult.)
Grevillea banksii * (cult.)
Grevillea robusta * (cult.)
Griselinia littoralis (cult.)
Hedera helix *
Hoheria angustifolia (cult.)
Hoheria populnea (cult.)
Hoheria sexstylosa (cult.)
Hydrangea macrophylla *
Hymenosporum flavum * (cult.)
Impatiens walleriana *
Indigofera decora *
Ipomoea cairica
Jasminum polyanthum *
Juglans ailantifolia *
Juglans nigra * (cult.)
Juglans regia * (cult.)
Knightia excelsa (cult.)
Kunzea robusta (cult.)
Lagunaria patersonii * (cult.)
Lavendula stoechas * (cult.)
Leptospermum morrisonii ‘Copper Sheen’ * (cult.)
Leptospermum scoparium (cult.)
Leptospermum scoparium cv. (tall white-flowered weeping cultivar) (cult.)
Ligustrum lucidum *
Ligustrum sinense *
Liquidambar styraciflua * (cult.)
Liriodendron tulipifera * (cult.)
Lonicera japonica *
Lophostemon confertus * (cult.)
Melaleuca salicina (syn. *Callistemon salignus*) * (cult.)
Melicope ternata (cult.)
Melicytus ramiflorus (cult. & naturalised)
Meryta sinclairii
Metrosideros collina * (cult.)
Metrosideros excelsa (cult.)
Metrosideros kermadecensis (cult.)
Metrosideros robusta (cult.)
Metrosideros × subtomentosa (cult.)
Morus alba * (cult.)
Muehlenbeckia australis
Muehlenbeckia complexa (cult.)
Myoporum insulare * (cult.)
Myoporum laetum (cult.)
Myrsine australis (cult. and naturalised)
Myrsine divaricata
Myrsine salicina (cult.)
Nestegis apetala (cult.)
Nestegis cunninghamii (cult.)
Nestegis lanceolata (cult.)
Ochna serrulata *
Olearia albida (cult.)
Olearia lineata ‘Dartonii’ (cult.)
Olearia paniculata (cult.)
Olearia solandri (cult.)
Olearia traversiorum (cult.)
Pandorea jasminoides *
Paraserianthes lophantha *
Parsonsia sp.
Picconia excelsa * (cult.)
Pittosporum colensoi (cult.)
Pittosporum crassifolium (cult.)
Pittosporum eugenioides (cult.)
Pittosporum ralphii (cult.)
Pittosporum tenuifolium (cult.)
Pittosporum umbellatum (cult.)
Plagianthus divaricatus (cult.)
Plagianthus regius (cult.)
Platanus acerifolia * (cult., margin)
Podranea ricasoliana *
Polyspora axillaris * (cult., margin)
Pomaderris apetala (cult.)
Pomaderris hamiltonii (cult.)
Pomaderris kumerahou (cult.)
Populus × euamericana hybrid * (cult.)
Prunus ‘Awanui’ * (cult.)
Prunus campanulata *
Prunus persica * (cult.)
Prunus serrulata *
Pseudopanax arboreus (cult.)
Pseudopanax crassifolius (cult.)
Pseudopanax laetus (cult.)
Pseudopanax lessonii (cult.)
Pyracantha koidzumii * (cult.)
Quercus aliena var. *acutiserrata* * (cult.)
Quercus bicolor * (cult.)
Quercus cerris * (cult.)
Quercus coccinea * (cult.)
Quercus palustris * (cult.)
Quercus robur * (cult.)

Quercus rubra * (cult., some naturalised)
Rhamnus alaternus *
Rhododendron sp. * (cult.)
Ricinus communis *
Rosa canina *
Rubus fruticosus *
Salix cinerea *
Salix ×fragilis *
Salix humboldtiana * (cult.)
Schinus terebinthifolius *
Solanum laciniatum
Solanum mauritianum *
Solanum pseudocapsicum *
Sophora chathamica (cult.)
Sophora microphylla (cult.)
Sophora molloyi (cult.)
Sophora tetraptera (cult.)
Streblus banksii (cult.)
Syzygium maire (cult.)
Syzygium paniculatum *
Syzygium smithii *
Taxandria juniperina * (cult.)
Tristaniopsis laurina * (cult.)
Ulex europaeus *
Vernicia fordii * (cult.)
Veronica parviflora (cult.)
Veronica diosmifolia (cult.)
Veronica stricta (cult.)
Vitis vinifera *
Vitex lucens (cult.)

DICOTS – herbs

Acanthus mollis *
Acetosa sagittata * (syn. *Rumex sagittatus*)
Alternanthera denticulata
Alternanthera nahui
Alternanthera philoxeroides *
Amaranthus deflexus *
Amaranthus lividus *
Anthemis cotula *
Aphanes inexpectata *
Apium nodiflorum *
Aquilegia vulgaris *
Arctotheca calendula *
Artemisia verlotiorum *
Barbarea intermedia *
Bellis perennis *
Bidens frondosa *
Brassica rapa subsp. *sylvestris* *
Callitriche stagnalis *
Capsella bursa-pastoris *
Cardamine flexuosa *
Cardamine hirsuta *
Carduus tenuiflorus *
Centella uniflora
Centipeda minima (Cheeseman 1873
 as *Myriogyne minuta* in Stanley 1999)

Cerastium fontanum *
Cerastium glomeratum *
Chamaemelum nobile *
Ciclospermum leptophyllum *
Cirsium arvense *
Cirsium vulgare *
Conium maculatum *
Cotula coronopifolia
Crassula decumbens *
Crepis capillaris *
Cucumis sativus *
Cymbalaria muralis *
Cynoglossum amabile *
Daucus carota *
Epilobium ciliatum *
Epilobium hirtigerum
Epilobium pallidiflorum (Esler 1991)
Erechtites hieracifolia *
Erigeron karvinskianus *
Erigeron sumatrensis *
Erodium moschatum *
Euphorbia helioscopia * (E.K. Cameron
 1985, AK 274643)
Euphorbia lathyris *
Euphorbia maculata (syn. *Chamaesyce maculata*) *
Euphorbia peplus *
Foeniculum vulgare *
Fumaria bastardii *
Fumaria capreolata *
Fumaria muralis *
Galeobdolon luteum 'Variegatum' *
Galinsoga quadriradiata *
Galium aparine *
Galium divaricatum *
Galium palustre *
Gamochaeta coarctata *
Gamochaeta simplicicaulis *
Geranium dissectum *
Geranium gardneri *
Geranium homeanum
Geranium molle *
Geranium robertianum *
Haloragis erecta
Helminthotheca echioides *
Hibiscus trionum
Hypochaeris radicata *
Hydrocotyle moschata
Hydrocotyle pterocarpa (Cheeseman
 1920, AK 6259)
Hydrocotyle tripartita *
Hydrocotyle umbellata *
Lactuca serriola *
Lamium purpureum *
Lapsana communis *
Leontodon saxatilis *
Lepidium didymum *
Leucanthemum vulgare *

Linaria purpurea *
Linum bienne *
Lotus angustissimus *
Lotus pedunculatus *
Lotus suaveolens *
Ludwigia palustris *
Lysimachia arvensis (syn. *Anagallis arvensis*) *
Lythrum hyssopifolia *
Malva neglecta *
Malva parviflora *
Matricaria discoidea *
Mazus pumilio * (cult.)
Medicago arabica *
Medicago lupulina *
Medicago nigra *
Mentha × piperita var. *citrata* *
Mentha pulegium *
Modiola caroliniana *
Myosotis arvensis *
Myosotis laxa subsp. *caespitosa* *
Myosotis sylvatica *
Myriophyllum propinquum
Oenanthe pimpinelloides *
Orobanche minor *
Oxalis corniculata *
Oxalis exilis
Oxalis incarnata *
Parentucellia viscosa *
Pericallis × hybrida *
Persicaria decipiens
Persicaria hydropiper *
Persicaria 'long spike' (Esler 1975;
 SHD 2005)
Persicaria maculosa *
Persicaria strigosa *
Physalis peruviana *
Phytolacca octandra *
Plantago lanceolata *
Plantago major *
Polycarpon tetraphyllum *
Polygonum arenastrum *
Polygonum aviculare *
Portulaca oleracea *
Potentilla indica *
Potentilla reptans *
Prunella vulgaris *
Pseudognaphalium luteoalbum
Ranunculus amphitrichus (Esler
 1991; Cheeseman 1881, AK 4325,
 AK 4326)
Ranunculus bulbosus *
Ranunculus glabrifolius (Cheeseman
 1881, AK 4325)
Ranunculus muricatus *
Ranunculus parviflorus *
Ranunculus repens *
Ranunculus sardous *

Raphanus raphanistrum *
Rorippa nasturtium-aquaticum *
 (syn. *Nasturtium officinale*)
Rumex acetosella *
Rumex conglomeratus *
Rumex crispus *
Rumex obtusifolius *
Rumex pulcher *
Sagina procumbens *
Senecio bipinnatisectus
Senecio esleri
Senecio hispidulus
Senecio skirrhodon *
Senecio sylvaticus *
Senecio vulgaris *

Sherardia arvensis *
Sisymbrium officinale *
Solanum chenopodioides *
Solanum nigrum *
Solanum nodiflorum
Soliva sessilis *
Sonchus asper *
Sonchus oleraceus *
Spergula arvensis *
Spergularia rubra *
Stachys arvensis *
Symphotrichum subulatum *
Stellaria media *
Taraxacum officinale *
Torilis arvensis *

Trifolium dubium *
Trifolium micranthum *
Trifolium pratense *
Trifolium repens *
Trifolium subterraneum *
Tropaeolum majus *
Verbena bonariensis *
Verbena incompta *
Veronica anagallis-aquatica *
Veronica arvensis *
Veronica persica *
Vicia sativa *
Vinca major *
Viola odorata *

A Kaipatiki Christmas at the Eskdale Reserve Network, 2 December 2017

Bec Stanley

Participants: *Jenny Andrew, Fabrice Barras, Colleen Brewer, Warren Brewer, Maureen Burke, Ewen Cameron, Lisa Clapperton, Derek Craig, Brian Cumber, Neil Davies, Frances Duff, Leslie Haines, Peter Moosberger, Helen Preston-Jones, Dhahara Ranatunga, Juliet Richmond, Joshua Salter, Ian Smith, Lydia Smith, Bec Stanley, Adrienne Stanton, Alison Wesley, Mike Wilcox and Maureen Young.*

This is the second time Bot Soc has visited the Eskdale Reserve network on Auckland's North Shore, the first being sixteen years ago (16th June 2001) on a day that we also visited Smiths Bush (led by Steve Cook). A report of this first visit never quite made it to publication but I've included a record of it, by Mike Wilcox, as an appendix (Appendix 1).



Fig. 1. The slow start as we gather around the Clover dodder. All photos by author on the trip.

Our December trip each year is usually combined with a shared lunch and we were pleased to be able to use the facilities of the Kaipatiki Project, based at the Eskdale Reserve. For the past twenty years this project has coordinated restoration of the reserve and provided environmental education based at their centre, teaching garden and nursery. We were hosted (and led) by Kaipatiki volunteer Fabrice Barras and Restoration Manager Derek Craig. After lunch they gave us a tour of their nursery facility.

This patch of bush is an amalgam of eight gazetted reserves, covering 63 ha, set in a highly urban context. As parcels of land were acquired each was given its own unique name. The council's management plan refers to them collectively as the "Eskdale Reserve Network" which seems the most helpful way of describing the place we visited (Eskdale Bush Reserve, Birkenhead Domain, Hiwihau Reserve and Lauderdale Reserve). The first parts of this network were protected almost 140 years ago (1880). It's had a complicated history of clearance and use (including as milling and gum-digging and later, market gardens). This patchwork of acquisitions has left a range of ages of secondary forest. Botanically this mixed aged forest, surrounding several valleys, provides habitat for a diverse range of plants. The reserve network as a whole is kauri-podocarp-broadleaved forest with patches of taraire/tawa-podocarp forest, wetland and gumland scrub.