



Fig. 1. *Rhizoclonium africanum* between tufts of *Isoplepis cernua*, just above the high-tide line, under an old overhanging kowhai tree (*Sophora chathamica*). Photo: Joshua Salter, 20 Mar 2015.

Rhizoclonium africanum

Colonies of this filamentous alga were recorded along the northern banks of the Pourewa Creek, extreme upper intertidal to semi-terrestrial, mingling with land plants such as ferns and *Apium prostratum* and *Isoplepis cernua* (Fig. 1). Specimen: AK 357828 (MW 6035).

Rhizoclonium riparium

Growing as an epiphyte on the dying-off stems of *Bolboschoenus medianus*, Pourewa Creek, below Kepa Bush Reserve. Specimen: AK 357825 (MW 6029).

Red algae (Rhodophyta)

Bostrychia harveyi

This was conspicuously abundant on debris and marginal plants along Pourewa Creek in Dec 2008, but during the 2015 BioBlitz it was only sparsely recorded, at the base of *Bolboschoenus medianus*. Specimen: AK 306326 (MW 6037).

Bostrychia moritziana

Occasional on *Bolboschoenus*, and pneumatophores. Specimen: AK 357823 (MW 6037) (mixed with MW 6027, *Caloglossa*).

Bostrychia simpliciuscula

This was the commonest of the *Bostrychia* species, especially on *Bolboschoenus*. Specimen: MW 6032.

Caloglossa vieillardii

Common on mangrove pneumatophores and as an epiphyte on dying-off stems of *Bolboschoenus medianus*, Pourewa Creek, below Kepa Bush Reserve. Specimens: AK 357824 (MW 6027), AK 357826 (MW 6030).

Catenella nipae

This was not recorded during the BioBlitz, but has been collected from there in 2008 (AK 308669, abundant on mangrove pneumatophores, 29 Dec 2008).

Unidentified alga

A brownish-green globose alga was recorded as an epiphyte on *Bostrychia simpliciuscula*.

Reference

Cameron, E.K. 2015: BioBlitz 2015: Pourewa Reserve and Kepa Bush, 27-28 Mar 2015, Auckland – general introduction and vascular plants. *Auckland Botanical Society Journal* 70: 109-129.

Vegetation and flora of Wattle Bay Reserve, Lynfield

Mike Wilcox and Joseph Kowhai

The Auckland Botanical Society visited the 35 ha Wattle Bay Reserve, Lynfield, Auckland, on 16 May 2015. Those attending were: Jenny Andrew, Bruce Calvert, Brian Cumber, Neil Davies, Ann Dudley, Brian Dudley, Sarah Gibbs, Sharen Graham, Ilmars Gravis, Joe Greig, Richard Hursthouse, Wendy John, Margi Keys, Joseph Kowhai (local guide), Miriam Ludbrook, Juliet Richmond, Joshua Salter, Jenni

Shanks, Vijay Soma, David Stejskal, Claire Stevens, Lenka Trefulkova, Elizabeth Walker, Alison Wesley, Mike Wilcox (leader), Dave Wilson.

Our objective was to examine the different vegetation types and record the plant species present (see Appendix). It is a coastal reserve fringing the northern shoreline of the Manukau



Fig. 1. Aerial view of Wattle Bay Reserve looking west, Lynfield, Whites Aviation, 6 March 1963 (National Library, Ref. WA-59371-G, Alexander Turnbull Library, Wellington, New Zealand. <http://natlib.govt.nz/records/22747191>).

Harbour, and part of the 5 km sequence of Auckland Council reserves which extends from Hillsborough to Blockhouse Bay, as mapped by Esler (1983). Esler (1990) has provided a description of the vegetation of the area, with a plant species list. Other relevant references to the plants of Wattle Bay Reserve are Kuschel (1990), the wetland management plan (Anon. 2007) and the biodiversity management plan (Forbes 2012). The reserve is very popular for recreational walking.

The vegetation of the reserve has been much modified over centuries by fires, clearing for farming (and subsequent abandonment), planting of exotic timber trees (pines, eucalypts and wattles), and by the arrival of introduced animals and weeds. Originally Maori land, the steep coastal scrubland was in 1849 vested in the Wesley Training College Board for agriculture, for which it proved to be unsuitable; much of it was subdivided for housing in the 1930s (and later), with the very steepest areas becoming reserves (Anon 1984). Its main claim to biological fame is that it was one of the sites of the remarkable study undertaken by Dr Willy Kuschel on the beetle fauna of Lynfield (Kuschel 1990). In addition, Esler (1991) stated, in describing the scraps of native forest and scrubland that have survived urbanisation over the Auckland isthmus, that "coastal

forest can be seen in its finest form near Wattle Bay on the Manukau Harbour".

Wattle Bay Reserve (Figs. 1 and 2) lies between the coastal headlands of Cape Horn and Sylvania Crescent, and comprises coastal sandstone cliffs, some shelly beaches, steep vegetated slopes up to the residential areas, and an extensive wetland. A local environmental volunteer, Joseph Kowhai, helps to keep animal pests under control, and guided our group down the steep bush-clad slopes below Lloyd and Anneke Kendrick's house at 34A James Tyler Crescent to the wetland. We also traversed sections of the **Waikōwhai Walkway, visiting the Cape Horn** lookout and the Sylvania Crescent slopes.

Native bush

The main large trees to be found in the bush remnants back from the coast are puriri (*Vitex lucens*), kohekohe (*Dysoxylum spectabile*), karaka (*Corynocarpus laevigata*), rewarewa (*Knightia excelsa*), and locally, kahikatea (*Dacrycarpus dacrydioides*). There are also occasional miro (*Prumnopitys ferruginea*), northern rata (*Metrosideros robusta*), pohutukawa (*Metrosideros excelsa*) and kowhai (*Sophora chathamica*). All these trees occur mostly as scattered individuals or small groves, rather than extensive closed-canopy forest. Rewarewa and kahikatea here grow as narrow-crowned emergents above the subcanopy, while puriri are typically large, spreading individuals. Seedlings and occasional saplings of totara (*Podocarpus totara*) are commonly seen in the bush, though we have found no trees other than some planted at the 34A James Tyler Crescent entrance.

This main block of bush is a 'fire shadow' headwater remnant that has obviously survived past clearing and burning in the general area (Fig. 3). Extensive areas have no large canopy trees, with the forest instead being formed of 5-8 m high thickets of mapou, pigeonwood, multi-trunked mahoe, and occasional kohuhu (*Pittosporum tenuifolium*) and frequent houpara and karaka (Fig. 4).

Smaller trees and shrubs dominate the subcanopy and understorey, the commonest being mahoe (*Melicactus ramiflorus*), pigeonwood (*Hedycarya arborea*), mapou (*Myrsine australis*) and koropapa

Figs. 2-8: **2.** Location of Wattle Bay Reserve and Cape Horn, Lynfield, Auckland (image from GIS Map viewer, Auckland Council). **3.** The main valley of Wattle Bay Reserve; native bush dominated by puriri, rewarewa and kohekohe on the upper slopes (centre); low forest of mapou, mahoe and pigeonwood on the slopes at right; wetland and beach in centre foreground, 11 May 2015. Photo: Mike Wilcox. **4.** Thickets of mapou, pigeonwood and mahoe, 16 May 2015. Photo: Joseph Kowhai. **5.** *Aleuosmia macrophylla*, Wattle Bay Reserve, 20 September 2015. Photo: Joseph Kowhai. **6.** Green-hood orchid, *Pterostylis trullifolia*, Wattle Bay Reserve, June 2015. Photo: Joseph Kowhai. **7.** Old stands of *Pinus radiata* and eucalypts, with pohutukawa along the sea cliffs, Cape Horn, 11 May 2015. Photo: Mike Wilcox. **8.** *Eucalyptus pilularis*, Cape Horn, 16 May 2015. Photo: ilmars Gravis.





(*Alseuosmia macrophylla*) – Fig. 5, together with regenerating saplings of kohekohe, karaka and puriri. Turepo (*Rhabdothamnus solandri*) was seen beside some small streams and also on drier slopes, while the only specimens seen of milk tree (*Streblus heterophyllus*) were seedlings. Pate (*Schefflera digitata*) is also prevalent beside streams. Silver fern (*Cyathea dealbata*) is very common, with mamaku (*C. medullaris*) also prominent on the moister sites. Nikau (*Rhopalostylis sapida*) is uncommon. Hangehange (*Geniostoma ligustrifolium*) is the commonest understorey shrub, with kawakawa (*Piper excelsum*) and coastal karamu (*Coprosma macrocarpa*) also abundant. Five-finger (*Pseudopanax arboreus*) and lancewood (*Pseudopanax crassifolius*) occur sparsely as scattered, mature individuals throughout the reserve, but seedlings are noticeably absent or rare. White maire (*Nestegis lanceolata*) is a rarity, and native broom (*Carmichaelia australis*) thrives in a few colonies on the eastern slopes.

Epiphytes and climbers were not particularly common, though there were several patches of kiekie (*Freycinetia banksii*) and supplejack (*Ripogonum scandens*), and a fair amount of climbing rata (*Metrosideros fulgens*), the latter nearing the end of its flowering season. Supplejack here climbs high into trees such as puriri and is the dominant climber in the reserve. Also present were *Clematis indivisa*, *Parsonsia heterophylla* and *Passiflora tetrandra*, and rarely, bush lawyer (*Rubus cissoides*). Tank lily (*Astelia hastata*) was noted as an epiphyte on a puriri, but generally in this bush the puriri trees are unusually lacking in epiphytes or climbers except for low fern climbers such as *Microsorium scandens* at the base of the trunks. Joseph Kowhai subsequently found the orchid *Drymoanthus adversus* on the trunk of a kohekohe tree and some extensive colonies of the green-hood orchid *Pterostylis trullifolia*, flowering from late May to mid-August (Fig. 6), and also *Pterostylis graminea* (flowering in September) and *Pterostylis banksii* (flowering in October).

Our fern enthusiasts were pleased to see a good range of species, some noteworthy ones being *Adiantum fulvum*, *Asplenium lamprophyllum*, *Blechnum chambersii*, *Lastreopsis microsora*, *Lastreopsis hispida*, *Leptopteris hymenophylloides* and *Pneumatopteris pennigera*, the latter being the commonest big ground fern along the numerous small creeks. Some planted king ferns (*Ptisana salicina*) were observed, and Joseph Kowhai subsequently found a colony along a narrow creek that was obviously natural. The creek heads here often begin as small waterfalls, where the moss *Fissidens rigidulus* prominently carpets the dripping vertical sandstone rock faces. Bush rice grass (*Microlaena avenacea*) and sedges such as hook grass (*Carex uncinata*) are mostly found in shady, damp areas in the bush, while *Carex banksiana* is common on drier slopes.

Fungi recorded in the native bush were *Conchomyces bursaeformis* on dead wood of karaka and wood ear (*Auricularia cornea*) on dead wood of houpara, karaka and mahoe.

There is a patch of similar bush on steep slopes just below the start of the coastal walkway leading down from 30 Sylvania Crescent, where *Blechnum parrisiae*, *Lastreopsis glabella* and *Pteris macilentia* are conspicuous ground ferns, with occasional plants of *Blechnum zeelandicum*.

Exotic woodlands

Several hectares of the reserve, concentrated on the headlands, are clothed in planted exotic trees possibly around 100 years of age. At Cape Horn there are tall stands of Monterey pine (*Pinus radiata* – Fig. 7) and three species of *Eucalyptus* – Sydney blue gum (*E. saligna*), blackbutt (*E. pilularis* – Fig. 8), and bangalay (*E. botryoides*). The understorey is dominated by mapou, hangehange, coastal karamu and houpara (*Pseudopanax lessonii*), with pate in the gullies. Along the track to the Cape Horn lookout were some interesting finds: a few patches of the herb *Wahlenbergia vernicosa* (non-shiny shade

Figs. 9-20: **9.** Fly agaric (*Amanita muscaria*) under *Pinus radiata*, Cape Horn, 11 May 2015. Photo: Mike Wilcox. **10.** Parasol mushroom (*Macrolepiota clelandii*), pine forest, Wattle Bay, 16 May 2015. Photo: ilmars Gravis. **11.** Sydney green wattle (*Acacia decurrens*), Wattle Bay Reserve, 20 July 2015. Photo: Mike Wilcox. **12.** Tangle fern (*Gleichenia dicarpa*), scrubland below James Tyler Crescent, 16 May 2015. Photo: Joshua Salter. **13.** Forest of pohutukawa (*Metrosideros excelsa*) at Cape Horn, 27 May 2015. Photo: Mike Wilcox. **14.** *Blechnum triangularifolium* on coastal cliffs, Cape Horn, 27 May 2015. Photo: Mike Wilcox. **15.** New Zealand spinach (*Tetragonia tetragonioides*) on the shelly beach, Wattle Bay, 27 May 2015. Photo: Mike Wilcox. **16.** A fine patch of oioi (*Apodasmia similis*) at east end of Wattle Bay, 16 May 2015. Photo: Neil Davies. **17.** Our group emerging from the bush at the margin of the wetland, 16 May 2015. Photo: Joseph Kowhai. **18.** Boardwalk across the wetland, 11 May 2015. Photo: Mike Wilcox. **19.** Green turf beside the main path from Canberra Ave, 4 June 2015. Photo: Mike Wilcox. **20.** Climbing asparagus (*Asparagus scandens*), a bad forest weed on the steep slopes of Cape Horn, 27 May 2015. It has a smothering habit, it grows in shade as well in more open sites, it is difficult to control (underground tubers), and its abundant seeds are spread by birds. Photo: Mike Wilcox.

form), *Peperomia urvilleana* at the base of a large pine tree below the lookout (it also occurs on pine trees on the Sylvania headland), *Callitriche muelleri* in damp spots, a solitary specimen of the fern *Hypolepis dicksonioides*, and plants of *Veronica stricta*, *V. macrocarpa*, and the monocots *Cordyline pumilio* and *Dianella nigra*, and with *Astelia banksii* and *Phormium cookianum* on the coastal headland. *Oplismenus hirtellus* and *Microlaena stipoides* were plentiful native grasses. Our visit was seasonally well-timed to see abundant fly agaric (*Amanita muscaria* – Fig. 9) and another large mushroom, *Macrolepiota clelandii* (Fig. 10), under the pines. There was also the bright orange bracket fungus *Pycnoporus coccineus* on felled pine trunks and branches, and *Favolaschia calocera* on dead wood.

The track up to Sylvania Crescent has particular significance because it here that the namesake trees of Wattle Bay are found. Black wattle (*Acacia mearnsii*) and Sydney green wattle (*A. decurrens* – Fig. 11) were planted there many years ago as a source of bark tannin for the leather industry. Francis Gittos established and operated a leather tannery at the bottom of Lewis St, Blockhouse Bay, c.1894-1910 (Blockhouse Bay Historical Society 2009), and was behind much of the wattle planting in the district. The trees have persisted (though many are over-mature and have collapsed) and now form open woodland over a ground cover of gumland scrub. *Acacia decurrens* flowers from the first week of July to late-August, while *A. mearnsii* flowers from September to November. Large old Monterey pine and maritime pine (*Pinus pinaster*) also grow here in open stands. Silver fern, bracken fern (*Pteridium esculentum*), mapou, hangehange, and the grass *Microlaena stipoides* are common components of the understory and ground cover.

Gumland species of note recorded were the sedges *Gahnia setifolia*, *Lepidosperma australe*, *L. laterale*, *Morelotia affinis*, and *Schoenus tendo*; the grasses *Rytidosperma biannulare*, *R. unarede* and *Deyeuxia quadriseta*; a sun orchid, *Thelymitra pauciflora*; *Dianella latissima*; and the shrubs *Coprosma lucida*, *C. rhamnoides*, *Dodonaea viscosa*, *Leucopogon fasciculatus*, *Pomaderris amoena* and *P. kumeraho*. Manuka (*Leptospermum scoparium*) is scarce, while kanuka (*Kunzea robusta*) occurs as one impressive surviving grove of large trees on the upper eastern slopes. There is also a small area of gumland scrub associated with the exotic tree *Hakea salicifolia* near our entry point to the native bush off James Tyler Crescent, where we recorded *Dracophyllum sinclairii*, *Gleichenia dicarpa* (Fig. 12), *Lycopodium deuterodensum*, *Olearia furfuracea* and *Schoenus tendo*. Other plants subsequently recorded in this part of the reserve are prickly hakea (*Hakea sericea*), Sydney golden wattle

(*Acacia longifolia*), the sedge *Machaerina tenax*, heketara (*Olearia ranii*), and numerous saplings of tanekaha (*Phyllocladus trichomanoides*).

Coastal vegetation

Pohutukawa (*Metrosideros excelsa*) forest occurs in a narrow band on the steep coastal faces below the exotic woodlands (Figs. 7 and 13). The trees are large and healthy, and have a characteristic assemblage of associated species, the main one being houpara, and a few adult lancewood and karaka. There is also a sprinkling of wharangi (*Melicope ternata*) and karo (*Pittosporum crassifolium*), and plentiful coastal karamu and kawakawa. Coastal astelia (*Astelia banksii*) and bamboo sedge (*Gahnia lacerata*) are abundant on the ground, while trackside banks had fine examples of *Blechnum parrisiae*, *Polystichum neozelandicum* and *Poa anceps*, and some patches of *Libertia grandiflora*. Cineraria (*Pericallis × hybrida*) and ivy-leaved toadflax (*Cymbalaria muralis*) have a firm foothold on shady cliff faces on the western end of the bay, while tutu (*Coriaria arborea*) and rangiora (*Brachyglottis repanda*) are colonists on slips. *Blechnum triangularifolium* (Fig. 14) occurs in a few patches on the cliffs at Cape Horn, together with *Adiantum cunninghamii*, *A. raddianum*, *Phormium cookianum* and *Austroderia splendens*.

In the shoreline 'splash zone' there are patches of maritime plants, the commonest being native celery (*Apium prostratum*), shore lobelia (*Lobelia anceps*), sea primrose (*Samolus repens*), glasswort (*Sarcocornia quinqueflora*), knobby sedge (*Ficinia nodosa*), trip-me-up (*Carex flagellifera*). The small sedge *Isolepis cernua* is prevalent where there are freshwater seepages and, with it, *Triglochin striata* in places. Additionally, Kuschel (1990) records *Cotula coronopifolia* from the Wattle Bay shore.

The main shelly beach at Wattle Bay and also the smaller beach around the shore towards Cape Horn, supports a sparse flora, the main species present being beach orache (*Atriplex prostrata*), New Zealand spinach (*Tetragonia tetragonioides* – Fig. 15), beach spinach (*T. implexicoma*), wild radish (*Raphanus raphinistrum*), puha (*Sonchus oleraceus*), dwarf mallow (*Malva neglecta*), Bermuda grass (*Cynodon dactylon*), tall fescue (*Schedonorus arundinaceus*) and umbrella sedge (*Cyperus ustulatus*). Kikuyu grass (*Cenchrus clandestinus*) abounds. The Cape Horn beach has a fine patch of oioi (*Apodasmia similis* – Fig. 16), while seedlings of mangrove (*Avicennia marina*) are sparsely taking hold in the upper muddy shore of the bay. The weedy native *Haloragis erecta* is a common coloniser of open sites along the coast, and on slips in the forest. This plant is host to a fascinating insect, the stem-boring weevil *Rhadinosomus acuminatus* (Kuschel 1990), which MW and JK found commonly in the reserve on

1 Aug 2015. Mercury Bay weed (*Dichondra repens*) occurs sparsely in colonies in the coastal bush.

Wetlands

The wetland (Figs. 17 and 18) covers an area of around 0.5 ha (Anon. 2007). From a boardwalk can be viewed the dominant plant species there, which are raupo (*Typha orientalis*); flax (*Phormium tenax*); the native sedges *Bolboschoenus fluviatilis*, *Carex geminata*, *C. lessoniana*, *C. secta*, *C. virgata*, *Cyperus ustulatus*, *Eleocharis acuta*, *Isolepis prolifera*, *Machaerina rubiginosa*, and bulrush (*Schoenoplectus tabernaemontani*); the exotic sedge *Cyperus eragrostis*; the native rushes *Juncus australis*, *Juncus edgariae* and *J. sarophorus*, and the exotic rush *Juncus effusus*; and a number of herbaceous species including *Calystegia sepium*, *Epilobium ciliatum*, *Haloragis erecta*, water cress (*Nasturtium officinale*), creeping buttercup (*Ranunculus repens*), water forget-me-not (*Myosotis laxa*), *Persicaria decipiens*, sea aster (*Symphyotrichum subulatum*) and water speedwell (*Veronica anagallis-aquatica*). There are several cabbage trees (*Cordyline australis*) and the skeletons of crack willow (*Salix fragilis*) which used to be prevalent here (now poisoned, though there is a large living tree at the very head of the wetland). Putaputaweta (*Carpodetus serratus*) occurs occasionally on the wetland margin, as does *Muehlenbeckia complexa* as a stout climber, with orange-coloured bark. Water purslane (*Ludwigia palustris*) can be found as a submerged aquatic in a small, slow-moving stream on the western side of the wetland. Swamp maire (*Syzygium maire*), pukatea (*Laurelia novae-zelandiae*) and kahikatea are present in the wetland as small plantings.

Other wet areas in the reserve are the damp banks of the small creeks, and damp herbfields beside the main concrete path which descends from Canberra Avenue to the beach. The dominant plants near the creeks are *Carex dissita*, *C. lambertiana* and *C. ochrosaccus*. Colonies of the fern *Deparia petersenii* are also found on the creek banks subject to periodic flooding, and *Blechnum novae-zelandiae* is locally common. The sedge *Schoenus maschalinus* occurs in damp, shaded places near creeks and beside the wetland.

The grassy herbfields beside the main path (Fig. 19) have lawn daisy (*Bellis perennis*), *Cardamine hirsuta*, *Galium divaricatum*, *Galium propinquum*, Australian pennywort (*Hydrocotyle tripartita*), *Kyllingia brevifolia*, swamp plantain (*Plantago australis*), broad-leaved plantain (*Plantago major*), Indian strawberry (*Potentilla indica*), selfheal (*Prunella vulgaris*), creeping buttercup (*Ranunculus repens*), spiny fruit buttercup (*Ranunculus muricatus*), dandelion (*Taraxacum officinale*), and scrambling speedwell (*Veronica persica*). The introduced feather moss (*Eurhynchium praelongum*) is common in this habitat. An unusual find during

August was the yellow-green alga *Vaucheria geminata* growing in puddles beside the main path near the beach.

Weeds

The prominent exotic pines, wattles and eucalypts in the reserve have not become weeds, but could spring up in abundance should there be a major fire. As previously mentioned, crack willow in the wetland has been poisoned out. The woody weeds present in the reserve needing regular monitoring and local control are brush wattle (*Paraserianthes lophantha*) – we saw numerous seedlings coming away in several places, with bigger trees on eroding coastal cliffs; honeysuckle (*Lonicera japonica*) – sparse now, but was once very prevalent in the wetland (Anon. 2007); lilly pilly (*Syzygium smithii*) – sporadic through the bush areas, with the most troublesome colonies on the western slopes; loquat (*Eriobotrya japonica*) – seedlings in bush areas; queen of the night (*Cestrum nocturnum*) – in wet openings, but easily overlooked; cotoneaster (*Cotoneaster glaucophyllus*) – local on coastal cliffs; climbing jasmine (*Jasminum polyanthum*) – sparse, but needs to be vigorously eliminated wherever it appears; and gorse (*Ulex europaeus*) – just a few patches seen. Banana passionfruit (*Passiflora tarminiana*), Jerusalem cherry (*Solanum pseudocapsicum*), Chinese privet (*Ligustrum sinense*), magenta lilly pilly (*Syzygium paniculatum*), brush cherry (*Syzygium australe*) and Queensland poplar or bleeding heart (*Homalanthus populifolius*) are additionally present in low numbers, but need to be monitored. On a ridge on the western part of the reserve there are several trees of *Hakea salicifolia*, and also a tree of *Acacia verticillata*.

Several well-established introduced creepers, herbs, and monocots are also of concern as they are ground cover weeds that can prevent regeneration of native trees (McAlpine et al. 2015). The ones which are most likely to become (or have already become) nuisance environmental weeds are climbing asparagus (*Asparagus scandens*) – **the reserve's** worst weed, and most prevalent in the Cape Horn forest on steep, hard-to-reach coastal slopes (Fig. 20); wandering jew (*Tradescantia fluminensis*) – mainly along creek banks; wild ginger (*Hedychium gardnerianum*) – sparse, mostly in damp shady places, but ever threatening; veldt grass (*Ehrharta erecta*) – it has spread a lot in Auckland over the last ten years and is present on track margins throughout the reserve; pampas (*Cortaderia selloana*) – mostly on coastal slips; Cape ivy (*Senecio angulata*) – a high climber (yellow flowers in winter); German ivy (*Delairea odorata*) – a low creeper near the shore; pitted crassula (*Crassula multicava*) – on the coast on steep open sites above where there were once boat sheds; ladder fern (*Nephrolepis cordifolia*) – dense colonies on steep coastal slopes; and panic grass (*Entolasia marginata*) – colonies near the Cape

Horn lookout and in the wetland near the footbridge. Three others – Mexican daisy (*Erigeron karvinskianus*), mist flower (*Ageratina riparia*) and Mexican devil (*Ageratina adenophora*) – are present but in fairly low numbers. Regular surveillance and spot eradication is keeping most of these weeds under control. Lilac oxalis (*Oxalis incarnata*) is commonly seen beside the paths. African clubmoss (*Selaginella kraussiana*) occurs locally beside the stream at the head of the wetland and in a few other damp places.

Plants of the reserve margins

There are houses on several parts of the reserve boundary with an associated assortment of plants in the reserve derived from garden discards, or planted there. Native species in this category include kauri (*Agathis australis*), totara (*Podocarpus totara*), lemonwood (*Pittosporum eugenioides*), puka (*Meryta sinclairii*) and *Pennantia baylisiana* (a Three Kings Islands endemic tree), the latter a very fine specimen thriving in the bush below a property on James Tyler Crescent. Planted exotic trees include pin oak (*Quercus palustris*), coral tree (*Erythrina × sykesii*), ginkgo (*Ginkgo biloba*), Dutch elm (*Ulmus × hollandica*), edible fig (*Ficus carica*), Moreton Bay fig (*Ficus macrophylla*), hill cherry (*Prunus serrulata*), and Peking willow (*Salix matsudana*). Other exotics recorded near boundaries are yellow jasmine (*Jasminum mesnyi*), busy lizzie (*Impatiens walleriana*), shrub balsam (*Impatiens sodenii*), Chilean feather bamboo (*Chusquea culeou*), watsonia (*Watsonia meriana* 'Bulbillifera'), red hot poker (*Kniphofia uvaria*), violet (*Viola odorata*), Australian violet (*Viola hederacea*), black-eyed Susan (*Thunbergia alata*), tobacco (*Nicotiana tabacum*), *Lilium formosana* and *Alstroemeria aurea*.

Management of Wattle Bay Reserve

(contributed by David Stejskal, Auckland Council) Wattle Bay is one of 31 high value parks in Central Auckland. To help with the work planning, each high value park is scoped annually and its restoration phase is decided. As such the reserve is receiving continuous maintenance with the goal of restoring the ecology to a stage where only a brief annual visit is required. Te Ngahere Ltd is the Auckland Council contractor undertaking plant pest control in the area and volunteers are taking care of the animal pest control. The aim is to have the main bush areas free of weeds and pests by 2018/19, though wetland and coastal edge areas will progress more slowly.

Four phases are used in weed control: initial control (removal of all woody species and releasing vines), follow up control (foliar spraying of vines and herbaceous pest plants), seedbank control (foliar spraying and hand pulling of plants germinating from the seedbank) and forest protection (control of invasions and general maintenance). Wattle Bay is in seedbank-control phase. The current focus is on a

few areas with higher weed density (especially to the east) requiring control of regrowth, for example climbing asparagus and Japanese honeysuckle. Tradescantia (*Tradescantia fluminensis*) has been reduced to low levels but numerous gullies and streams, the wetland, and places along the northern boundary are regularly checked for regrowth. The wetland also has issues with regrowth of honeysuckle (especially the eastern area) and arum lily (*Zantedeschia aethiopica*), which require more frequent visits. Ongoing control of dense honeysuckle is needed in the eastern section of wetland amongst raupo and *Bolboschoenus fluviatilis*. Coastal cliff weeds include pampas, brush wattle, woolly nightshade (*Solanum mauritianum*), climbing asparagus, tuber ladder fern and Sexton's bride (*Rhaphiolepis umbellata*). The central part has significant weed issues with ginger, climbing asparagus, Japanese honeysuckle, tradescantia, brush wattle and woolly nightshade.

Regarding animal pest control, Joseph Kowhai and other volunteers target rodents (ship rat, Norway rat, house mouse) and possums, the latter seemingly now absent or in very low numbers as none are currently being caught in traps and there is no uptake of gel baits. For possums 6 Timms traps are set in the central part of the area (about 15 ha in size) and 32 gel bait stations are positioned (largely) around the perimeter of the reserve. For rodents there are 28 bait stations with each station having a maximum of 8 baits.

Conclusion

Wattle Bay has an interesting and diverse assemblage of native plants and habitats. It is most heartening to see trees such as kohekohe and puriri now regenerating strongly, thanks to successful pest control, which has also allowed birds such as kereru and tui to flourish. Most exotic weeds are now contained, the only ones still of serious concern being climbing asparagus on the steep coastal cliffs; brush wattle which seems to have a huge lingering seed bank from which seedlings spring up in abundance following major disturbance such as the felling of pine trees; and veldt grass which seems to be out of control. The old pines, eucalypts and wattles are a distinctive heritage feature of the reserve, supporting native understorey species including various gumland plants in the wattle area. Altogether we have recorded 446 vascular plant species here (223 natives and 223 exotics), including some notable rarities in urban Auckland such as king fern (*Ptisana salicina*) and *Blechnum zeelandicum*.

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Appendix. Wattle Bay Species List

Compiled from field visits by Mike Wilcox from May to November 2015; ABS group visit on 16 May 2015; regular visits by Joseph Kowhai; and from some herbarium specimens, records in reports or publications, and other observations, as listed. * = introduced plants; pl. = planted; ns = not seen by the authors.

Club mosses

Lycopodium deuterodensum
Selaginella kraussiana *

Ferns

Adiantum cunninghamii
Adiantum fulvum
Adiantum raddianum *
Asplenium bulbiferum
Asplenium hookerianum (AK 151770, R.O.Gardner, 5 Apr 1980) ns
Asplenium lamprophyllum
Asplenium flaccidum
Asplenium oblongifolium
Asplenium polyodon
Blechnum chambersii
Blechnum filliforme
Blechnum fraseri
Blechnum membranaceum
Blechnum molle (*Doodia mollis*) (AK 151767, R.O.Gardner, 5 Apr 1980) ns
Blechnum novae-zelandiae
Blechnum parrisiae (*Doodia australis*)
Blechnum triangularifolium
Blechnum zeelandicum (*Doodia squarrosa*)
Cardiomanes reniforme
Cyathea dealbata
Cyathea medullaris
Deparia petersenii
Dicksonia squarrosa
Gleichenia dicarpa
Hymenophyllum demissum
Hymenophyllum flabellatum
Hypolepis dicksonioides
Lastreopsis glabella
Lastreopsis hispida

Lastreopsis microsora
Lastreopsis velutina (AK 151768-9, R.O.Gardner, 5 Apr 1980) ns
Leptopteris hymenophylloides
Loxogramme dictyopteris
Microsorium pustulatum
Microsorium scandens
Nephrolepis cordifolia *
Paesia scaberula
Pellaea rotundifolia
Pneumatopteris pennigera
Polystichum neozelandicum
Pteridium esculentum
Pteris cretica *
Pteris macilentia
Pteris saxatilis
Pteris tremula
Ptisana salicina (natural and pl.)
Pyrrosia eleagnifolia
Tmesipteris elongata
Tmesipteris lanceolata

Gymnosperms

Agathis australis (pl. 2014 and earlier)
Araucaria heterophylla * (pl.)
Cupressus macrocarpa * (pl.)
Dacrycarpus dacrydioides (natural, and pl.in wetland, 2012, 2013)
Dacrydium cupressinum (pl. 2015)
Ginkgo biloba * (pl.)
Phyllocladus trichomanoides
Pinus pinaster * (pl.)
Pinus radiata * (pl.)
Podocarpus laetus
Podocarpus totara (pl. and natural)
Prumnopitys ferrugineus

Angiosperm trees, shrubs & woody climbers

Acacia decurrens * (pl. and naturalised)
Acacia floribunda *
Acacia longifolia *
Acacia mearnsii * (pl. and naturalised)
Acacia verticillata *
Alectryon excelsum (pl.)
Alseuosmia macrophylla
Anredera cordifolia * (Te Ngahere), ns
Araujia sericifera *
Aristolelia racemosa (pl. 2015)
Avicennia marina
Beilschmiedia tarairi (seedlings)
Beilschmiedia tawa
Brachyglottis repanda
Carmichaelia australis (AK 22184, B.E.G.Molesworth, 6 Apr 1940)
Carpodetus serratus
Cestrum nocturnum *
Citrus × paradisi * (pl.)
Citrus reticulata * (pl.)
Clematis paniculata
Coprosma grandifolia
Coprosma lucida
Coprosma macrocarpa
Coprosma rhamnoides
Coprosma robusta
Coriaria arborea
Corynocarpus laevigatus
Cotoneaster glaucophyllus *
Dodonaea viscosa
Dracophyllum sinclairii
Dysoxylum spectabile
Eriobotrya japonica *
Erythrina × sykesii * (pl.)
Eucalyptus botryoides * (pl.)
Eucalyptus pilularis * (pl.)
Eucalyptus saligna * (pl.)
Euonymus japonicus *
Euryops chrysanthemoides *
Fatsia japonica *
Ficus carica * (pl.)
Ficus macrophylla * (pl.)
Fuchsia excorticata (pl. 2015)
Ficus pumila *
Geniostoma ligustrifolium
Griselinia littoralis (pl.)
Hakea salicifolia *
Hakeas sericea *
Hedera helix *
Hedycarya arborea
Hoheria populnea
Homalanthus populifolius *
Jasminum mesnyi *
Jasminum polyanthum *
Knightia excelsa
Kunzea robusta
Laurelia novae-zelandiae (pl. in wetland, 2012, 2013)
Leptospermum scoparium

Leptospermum scoparium "Sunraysia"
(pl., pink double-flowered cultivar)
Leucopogon fasciculatus
Ligustrum lucidum *
Ligustrum sinense *
Lonicera japonica *
Melicope ternata
Melicytus ramiflorus
Meryta sinclairii (pl.)
Metrosideros excelsa
Metrosideros fulgens
Metrosideros perforata
Metrosideros robusta
Muehlenbeckia australis
Muehlenbeckia complexa
Myrsine australis
Nandina domestica "Fire Power" * (pl.)
Nestegis lanceolata
Olearia furfuracea
Olearia rani
Paraserianthes lophantha *
Parsonia heterophylla
Passiflora edulis *
Passiflora tarminiana * (eradicated, 7 Sep 2015)
Passiflora tetrandra
Pennantia baylisiana (pl.)
Pimelea tomentosa (AK 101208, N.Mackie, 26 Nov 1934) ns
Piper excelsum
Pittosporum crassifolium
Pittosporum eugenioides (pl.)
Pittosporum lessonii
Pittosporum tenuifolium
Pomaderris amoena
Pomaderris kumeraho
Plagianthus regius (on boundary with Maxim Institute, Cape Horn)
Platanus orientalis *
Prunus serrulata * (pl.)
Pseudopanax arboreus
Pseudopanax crassifolius
Pseudopanax lessonii
Pseudopanax lessonii × *P. crassifolius*
Quercus palustris *
Quercus robur * (pl.)
Rhabdothamnus solandri
Rhaphiolepis umbellata *
Rubus cissoides
Rubus fruticosus * (Te Ngahere) ns
Salix fragilis *
Salix matsudana * (pl.)
Schefflera digitata
Senecio angulatus *
Solanum mauritianum *
Solanum pseudocapsicum *
Sophora chathamica
Streblus heterophyllus
Syzygium australe
Syzygium maire (pl.in wetland, 2012, 2013)
Syzygium paniculatum *

Syzygium smithii *
Tristaniopsis laurina * (pl.)
Ulex europaeus *
Ulmus ×hollandica * (pl.)
Veronica (Hebe) macrocarpa
Veronica (Hebe) stricta
Vitex lucens
Vitis vinifera * (Te Ngahere) ns

Dicot Herbs

Acanthus mollis * (Te Ngahere) ns
Ageratina adenophora *
Ageratina riparia *
Anagallis arvensis subsp. *arvensis* var. *arvensis* *
Aphanes arvensis * (Sylvania Cres. verge)
Apium nodiflorum *
Apium prostratum
Atriplex prostratum *
Bellis perennis *
Callitriche muelleri
Callitriche stagnalis *
Calystegia sepium subsp. *roseata*
Calystegia tuguriorum
Cardamine flexuosa *
Cardamine hirsuta *
Centaureum erythraea *
Centella uniflora
Ciclospermum leptophyllum *
Cirsium vulgare *
Conyza sumatrensis *
Cotula coronopifolia (Kuschel) ns
Crassula multicava *
Crepis capillaris *
Cymbalaria muralis *
Daucus carota *
Delairea odorata (Senecio mikanoides) *
Dichondra repens
Digitalis purpurea *
Drosera auriculata
Elatostema rugosum (pl.)
Epilobium ciliatum *
Erigeron karvinskianus *
Euchiton cf. *limosus*
Euphorbia lathyris *
Euphorbia peplus *
Foeniculum vulgare *
Galium aparine *
Galium divaricatum *
Galium propinquum
Gamochoaeta coarctata *
Gamochoaeta purpurea *
Geranium dissectum *
Geranium homeanum
Geranium molle *
Geranium robertianum *
Haloragis erecta
Helminthotheca echioides *
Hydrocotyle moschata
Hydrocotyle tripartita *
Hypochaeris radicata *

Impatiens sodenii * (entrance via 34A James Tyler Cres.)
Impatiens walleriana * (track entrance via 16 Sylvania Cres.)
Lamium purpureum *
Lapsana communis *
Leontodon saxatilis *
Lepidium didymum *
Lobelia anceps
Lobelia pedunculata * (Sylvania Cres. verge.)
Lotus pedunculatus *
Lotus suaveolens *
Ludwigia palustris *
Malva neglecta *
Medicago arabica *
Medicago lupulina *
Mentha pulegium *
Mentha spicata *
Modiola caroliniana *
Myosotis laxa *
Myosotis sylvatica *
Nasturtium officinale *
Nicotiana tabacum *
Oenanthe pimpinelloides *
Oenothera sp. *
Oxalis exilis (Sylvania Cres. verge)
Oxalis incarnata *
Oxalis pes-caprae *
Oxalis vallicola * (AK 118811, *D.V.G. Woods*, Oct 1959) ns
Parentucellia viscosa *
Peperomia urvilleana
Pericallis ×hybrida *
Persicaria decipiens
Persicaria sp. willow weed (Te Ngahere) ns *
Physalis peruviana *
Phytolacca octandra *
Plantago australis *
Plantago lanceolatus *
Plantago major *
Plectranthus ciliatus *
Potentilla indica *
Prunella vulgaris *
Pseudognaphalium luteo-album
Ranunculus muricatus *
Ranunculus parviflorus * (track entrance, Sylvania Cres.)
Ranunculus repens *
Ranunculus sardous *
Raphanus raphanistrum *
Rumex crispus *
Rumex pulcher *
Sagina procumbens *
Samolus repens
Sarcocornia quinqueflora
Senecio angulatus *
Senecio bipinnatisectus *
Senecio esleri *
Senecio glomeratus
Senecio hispidulus
Senecio skirrhodon *
Senecio vulgaris *
Sherardia arvensis *
Silene gallica *

Solanum nigrum *
Solanum nodiflorum
Sonchus asper *
Sonchus oleraceus *
Stellaria media *
Symphyotrichum (*Aster*) *subulatum* *
Taraxacum officinale *
Tetragonia implexicoma
Tetragonia tetragonioides
Thunbergia alata *
Trifolium dubium * (Sylvania Cres. verge)
Trifolium repens *
Trifolium subterraneum * (Cape Horn lookout and Sylvania Cres. verge)
Tropaeolum majus *
Verbena bonariensis *
Veronica anagallis-aquatica *
Veronica arvensis *
Veronica persica *
Veronica serpyllifolia *
Vicia sativa *
Vicia tetrasperma *
Viola hederacea *
Viola odorata *
Wahlenbergia vernicosa

Monocots - Orchids

Drymoanthus adversus
Microtis unifolia
Pterostylis banksii
Pterostylis graminea
Pterostylis trullifolia (*Diplodium trullifolium*)
Thelymitra pauciflora

Monocots - Grasses

Agrostis stolonifera *
Anthoxanthum odoratum *
Axonopus fissifolius *
Austroderia splendens
Austrostipa stipoides
Briza minor *
Bromus diandrus *
Bromus willdenowii *
Cenchrus clandestinus *
Chusquea culeou * (pl.)
Cortaderia selloana *
Cynodon dactylon *
Dactylis glomerata *
Deyeuxia quadrifida
Dichelachne crinita
Digitaria sanguinalis *
Echinochloa crus-galli *
Ehrharta erecta *
Entolasia marginata *
Glyceria declinata *
Holcus lanatus *
Lachnagrostis filiformis
Lolium perenne *
Lolium rigidum *
Microlaena avenacea
Microlaena stipoides

Oplismenus hirtellus
Paspalum dilatatum *
Paspalum urvillei *
Phyllostachys aurea *
Poa anceps
Poa annua *
Poa trivialis *
Polypogon viridis *
Rytidosperma biannulare
Rytidosperma unarede
Schedonorus arundinaceus *
Sporobolus africanus *
Vulpia bromoides *

Monocots - Sedges, rushes & restiads

Apodasmia similis
Bolboschoenus fluviatilis
Carex banksiana (previously *Uncinia banksii*)
Carex lessoniana
Carex dissita
Carex flagellifera
Carex geminata
Carex lambertiana
Carex lessoniana (pl. in wetland, 2012, 2013)
Carex maorica (Te Ngahere), ns
Carex ochrosaccus
Carex secta (pl. in wetland, 2012, 2013)
Carex solandri
Carex uncinata (previously *Uncinia uncinata*)
Carex virgata
Cyperus congestus *
Cyperus eragrostis *
Cyperus rotundus *
Cyperus ustulatus (pl. in wetland, 2012, 2013)
Eleocharis acuta
Ficinia nodosa
Gahnia lacera
Gahnia setifolia
Gahnia xanthocarpa
Isolepis cernua
Isolepis inundata
Isolepis levynsiana (*Cyperus tenellus*)*
Isolepis prolifera
Isolepis sepulcralis *
Juncus australis
Juncus bufonius *
Juncus edgariae
Juncus effusus *
Juncus planifolius
Juncus sarophorus (possibly pl. see Anon. 2007)
Juncus tenuis *
Kyllingia (*Cyperus*) *brevifolia* *
Lepidosperma australe
Lepidosperma laterale
Machaerina rubiginosa (possibly pl. see Anon. 2007)
Machaerina tenax
Morelotia affinis
Schoenus maschalinus
Schoenus tendo
Schoenoplectus tabernaemontani

Other monocots

Agapanthus praecox subsp. *orientalis* *

Allium triquetrum *

Alocasia brisbanensis * (Te Ngahere) ns

Alstroemeria aurea *

Arthropodium cirratum

Asparagus scandens *

Astelia banksii

Astelia hastata (previously *Collospermum hastatum*)

Astelia solandri (Jenni Shanks) ns

Canna indica * (Te Ngahere) ns

Cordyline australis (pl. in wetland, 2012, 2013)

Cordyline banksii

Cordyline pumilio

Crocosmia × *crocosmiiflora* *

Dianella latissima

Dianella nigra

Freesia refracta *

Freycinetia banksii

Gladiolus undulatus *

Hedychium gardnerianum *

Kniphofia uvaria *

Libertia grandiflora

Lilium formosana *

Monstera deliciosa *

Phormium cookianum

Phormium tenax

Rhopalostylis sapida

Ripogonum scandens

Syagrus romanzoffiana *

Tradescantia fluminensis *

Triglochin striata

Typha orientalis

Watsonia meriana 'Bulbillifera' *

Yucca sp. *

Zantedeschia aethiopicum *

A visit to Rangitoto Island

Mike Wilcox

This field trip was held on 15 August 2015, those attending being: *Michelle Boulle, Bruce Calvert, Lisa Clapperton, Brian Cumber, Bev Davidson, Geoff Davidson, Richard Davies, Joseph Kowhai, Ian McLean, Juliet Richmond, Doug Sheppard, Doug Shaw, Ian Smith, Lydia Smith, Trina Smith, Val Smith, Vijay Soma, Lawrence Thoms, Val Tomlinson, Mike Wilcox* (leader).

Our programme for the day entailed walking from the main Rangitoto wharf along the road towards Islington Bay, and down the track to Boulder Bay (Shipwreck Bay), and return. We experience intermittent rain in the morning, but the weather cleared for most of the afternoon. This particular route gives a good representation of the island's vegetation on lava flows, with some large bare lava fields (Fig. 1), areas with scattered pohutukawa (*Metrosideros excelsa*), and some closed forest on parts of the Boulder Bay track (Fig. 2). The ubiquitous pohutukawa was the dominant tree everywhere, with its commonest attendant companions being puka (*Griselinia lucida*), mapou (*Myrsine australis*), hangehange (*Geniostoma ligustrifolium*), and coastal astelia (*Astelia banksii*), and more sparsely, rewarewa (*Knightia excelsa*). Akeake (*Dodonaea viscosa*) seedlings were abundant in places, mainly on the road margins, but also colonising otherwise bare lava. Tank lily (*Astelia hastata*, previously *Collospermum hastatum*) was noted as being very common, mainly as a terrestrial



Fig. 1. Open lava fields, Boulder Bay Track. Photo: Joseph Kowhai. All photos taken on 15 Aug 2015.



Fig. 2. Boulder Bay Track passes through a lush forest area full of ferns. Photo: Joseph Kowhai.