

*Entolasia marginata** ABS
Freycinetia banksii
Gahnia lacera
Gahnia setifolia
Gahnia xanthocarpa
*Holcus lanatus**
Ichthyostomum pygmaeum
Isachne globosa ABS
Isolepis inundatus
*Juncus articulatus**
*Juncus effusus** ABS
Juncus planifolius
*Juncus tenuis**
Libertia grandiflora ABS
Libertia micrantha
Linguella puberula
Machaerina sinclairii
Microlaena avenacea
Morelotia affinis
Nematoceras acuminatum
Nematoceras macranthum

Nematoceras sp. "Kaimai"
Oplismenus hirtellus var. *imbecillis*
*Paspalum dilatatum**
*Paspalum urvillei**
Petalochilus (Caladenia) sp.
Phormium cookianum
Plumatichilos tasmanicum
Pterostylis banksii
Rhopalostylis sapida
Ripogonum scandens
Rytidosperma gracile
*Schedonorus arundinaceus**
Schoenus maschalinus
Schoenus tendo
Simpliglottis (Chiloglottis) cornuta
Singulariybas oblonga ABS
Thelymitra carnea
Thelymitra longifolia
Typha orientalis ABS
Uncinia uncinata
Winika cunninghamii ABS

Te Matuku Bay catchment, Waiheke Island (ABS camp, January 1994)

Ewen K. Cameron

Introduction

The first botanical account of the Waiheke Island was by Kirk (1878) when he recorded forests being cleared for pasture, frequent burning of fern and open manuka (*Leptospermum scoparium*) country, and the destruction of forest by constant browsing of cattle. He also mentioned tooth-leaved beech [hard beech, *Nothofagus truncata*] occurring in "considerable quantity at sea level, occasionally of large size" and that kauri [*Agathis australis*] "was formerly plentiful at several localities, but has become extremely rare." Fitzgibbon & Slaven (1988) documented the remaining important habitats, and scored Te Matuku Bay and adjacent land highly for protection. Management Plans, with plant species lists, have been published for the three Forest & Bird reserves on the island. These include the Te Haahi-Goodwin Reserve at the head of Te Matuku Bay (Slaven 1986, revised by White 2000). The Auckland Botanical Society (ABS) surveyed most of the forested catchment of Te Matuku Bay in January 1994 and an account of this visit is reported below. In 1994 Whakanewha (247 ha) was purchased and developed into a Regional Park by the Auckland Regional Council – ABS visited it in November 2001 and published a full account of its natural history, including a species list (Wilcox et al. 2002). In 2002 Auckland City Council (ACC) surveyed the vegetation and flora of the whole of Waiheke Island. Several specimens from that survey were deposited in the Auckland Museum herbarium (AK), but no report has been located. The biota of the small islets adjacent to Waiheke were described by Lee

(1999) and the vascular floras of the islands off Waiheke Island's southwest coast were described

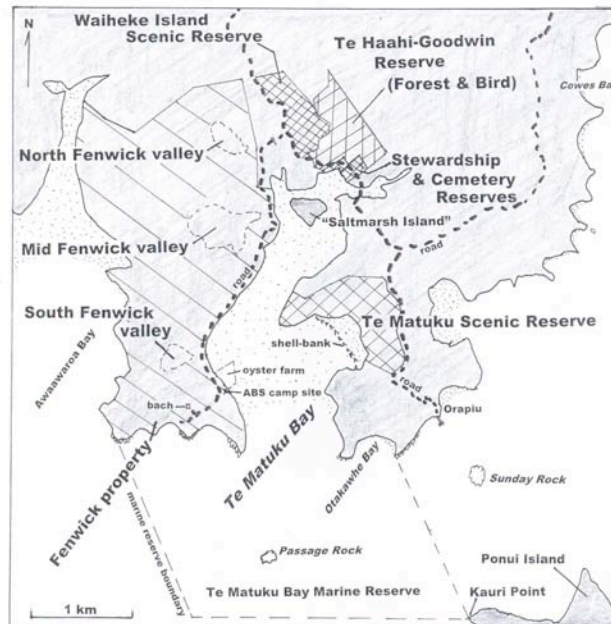


Fig. 1. Location of Te Matuku Bay, south-eastern Waiheke Island and areas surveyed by the Auckland Botanical Society. Drawn by EKC.

recently (Cameron et al. 2007). Hayward et al. (1997) surveyed the intertidal biota of Te Matuku Bay, and the Te Matuku Marine Reserve (690 ha) was gazetted in August 2005. This reserve includes the whole of the Bay, out past Passage Rock and across to Kauri Point on Ponui Island (see Fig. 1). In 2001 when a mining

company told Rob Fenwick that his Waiheke property contained a fortune in high-quality aggregate, Fenwick promptly covenanted his property in perpetuity to prevent future subdivision and mining and gifted to ACC part of the forested property as a public walkway (*N.Z. Herald*, 23 Aug 2001: A9). In October 2008 ABS again visited southeast Waiheke, this time staying at Otakawhe Bay near Orapiu – their observations are recorded separately by Wilcox & Jane (2009). Unless otherwise stated all observations below were made during the ABS trip 26-31 January 1994.



Fig. 2. The Waiheke Central School at the head of Te Matuku Bay, built 1882 – looking down the Bay. Auckland Museum Pictorial collection, DU 436.1187. Reproduced with permission of the Waiheke Island Historical Society.

26-31 January 1994 ABS visit

Most of the ABS group traveled across by public ferry on Wednesday 26 January 1994 and returned at the end of Auckland's Anniversary weekend on Monday 31 January 1994. We took across the Auckland Museum, Beever, and MacArthur vans with the gear, food and some of the participants. The object of the long weekend was to survey the forested catchments of Te Matuku Bay in the southeastern corner of Waiheke Island. These were under a variety of tenure: Fenwick property on the west side (3 bush valleys); Forest & Bird Te Haahi-Goodwin Reserve and the Department of Conservation (DoC) Cemetery Reserve and a Stewardship Area at the northern end; and the Crown-owned Te Matuku Scenic Reserve on the eastern side managed by DoC (Fig. 1). One day was also spent visiting the Stony Batter Reserve (DoC) at the northeastern part of the island (well outside the catchment of Te Matuku Bay). Most evenings were spent compiling species lists with the group in the scientific tent and identifying and pressing/packaging collections made during the day. We were blessed with hot sunny weather, except for the last day when it rained.

Apart from the Te Haahi-Goodwin Reserve (Slaven 1986) there were no existing plant lists for the area. While most of the group studied the wild vascular plants, Jessica Beever (with assistance from Juliet

Richmond) focused on the mosses and she has reported on these (Beever 1995). Eighty-three vascular plant voucher specimens were collected during the survey and are cited in Appendix 1. After the field trip a draft vascular plant list from our visit was circulated to interested parties and the additional records were included in the revised Te Haahi-Goodwin Management Plan by White (2000).



Fig. 3. Te Matuku Scenic Reserve and shell-bank across the bay, eastern Te Matuku Bay, taken from the Fenwick 'bach' at south end of the peninsula. Note – campsite and Norfolk pines in foreground. Unless otherwise stated all photos: EKC, 26-31 January 1994.

The kumara pits along the western ridge of Te Matuku Bay (Fenwick property) are an indication of past Maori settlement. The Bay was the centre of early European settlement on Waiheke Island with the Waiheke Central School house being built at the head of the Bay in 1882 (Fig. 2). Te Matuku Bay was also known as McLeod's Bay, after the original European owner, Robert McLeod, who was given the land when he married the daughter of the local Maori chief. McLeod's homestead and hotel (later burnt down) was situated beside the two Norfolk pines (*Araucaria heterophylla*) (Fig. 3) which still stand near the farmer's cottage where we camped in January 1994. McLeod built the pub at a good anchorage for shallow bottomed scows half way between Coromandel and Auckland to service the gold and kauri trade at the end of the 19th and the beginning of the 20th centuries (R. Fenwick pers. comm.). When Rob Fenwick bought his 361 ha Te Matuku property in 1987, the once-sheep farm pasture was already reverting to scrub and gorse (*Ulex europaeus*). The only surviving native bush was in the damp, mainly east-facing gullies and associated steep faces – it was these bush valleys surrounded by scrub that we surveyed. In addition to the 500 wild poll Angus cattle, the previous owner had released a large mob of feral goats shortly before he was forced to sell in a mortgagee sale. The last of the wild cattle in the bush had been killed or removed just prior to our arrival, the goats were gone and the boundaries had been recently fenced.

Participants (19): Catherine Beard, Jessica & Ross Beever, Ewen Cameron (leader - standing in for

Anthony Wright who was called away on business but managed to return for the final evening), Helen Cogle (weekend only), Michele Dickson, Lisa Forester, Juliet Herrick (food & camp mum), Frank Hudson (pre-weekend only), Cathy Jones (on crutches with a bandaged leg), Alistair MacArthur, Alan Oldale, Sandra Perry, Juliet Richmond, Josh Salter, Ian Wilson, and Maureen Young (pre-weekend only), and possibly two others (unrecorded).



Fig. 4. Camping in tents on Fenwick's property at Te Matuku Bay (SW end) – Auckland Botanical Society's last camp in tents. Note – the reverting pasture behind.

26 January (Wednesday): setting up camp, and south Fenwick valley

We arrived at the Fenwick Property, adjacent to a small oyster farm, and set up camp on the flat pasture by the estuary (Fig. 4), including digging a long-drop toilet. The Offshore Islands Research Group's large scientific tent and other camping gear were well utilized. That afternoon we had time to survey the adjacent valley, "south Fenwick valley" (map 260 S11 994824, 0-136 m asl).



Fig. 5. Te Matuku Bay from the Scenic Reserve on the east side. Note - our campsite is across the bay and the forested south Fenwick valley is right of centre on the far side of the Bay; looking WSW.

South Fenwick valley (including notes from Ross Beever) (Figs. 1, 5)

This was the shortest of the three valleys surveyed on the Fenwick property. The lower valley was open and weedy, dominated by woolly nightshade (*Solanum mauritianum*) to 6m tall, with Mexican devil (*Ageratina*

adenophora) understorey; occasional mahoe to 2.5m tall amongst the woolly nightshade; with gorse and manuka (*Leptospermum scoparium*) common, the latter to 6m tall. Two willow trees, each a different species (*Salix cinerea* & *S. fragilis*), were present in the damp valley bottom along with raupo (*Typha orientalis*), *Isachne globosa*, native sedges (*Baumea rubiginosa*, *Carex* spp., *Cyperus ustulatus*, *Eleocharis acuta*, *Isolepis* spp.), rushes (*Juncus* spp.), *Persicaria decipiens*, and many naturalised exotics including Indian strawberry (*Duchesnea indica*), mints (*Mentha* spp.), *Myosotis laxa* and *Ranunculus flammula*.

In the mid and upper valley large emergent pohutukawa (*Metrosideros excelsa*) on valley slopes (one was 1.86m dbh branching at c.6m), above a dense canopy of tawa (*Beilschmiedia tawa*) (0.23m, 0.34m dbh – with fruit plopping to the ground), kohekohe (*Dysoxylum spectabile*) (0.42m, 0.26m dbh) and taraire (*Beilschmiedia tarairi*) (0.38m, 0.32m, 0.25m dbh) at c.12-16m tall. Associates included supplejack (*Ripogonum scandens*) (common), kawakawa (*Macropiper excelsum*) (many seedlings and saplings in canopy gap), leather fern (*Pyrrosia eleagnifolia*) (on canopy branches), nikau (*Rhopalostylis sapida*) (occasional adults, seedlings com.), ponga (*Cyathea dealbata*) (abundant as subcanopy, many dead through shading?), *Collospermum hastatum* (com. on pohutukawa), pigeonwood (*Hedycarya arborea*) (occ. subcanopy), karaka (*Corynocarpus laevigatus*) (adult scarce, seedlings occ.), puriri (*Vitex lucens*) (sapling scarce), *Parsonsia heterophylla*, *Doodia australis* (occ.), *Microsorium scandens* (terrestrial), *Oplismenus hirtellus* (occ.), *Microsorium pustulatum* (on pohutukawa), hangehange (*Geniostoma ligustrifolia*) (occ. seedlings), *Lastreopsis* spp. (com.), *Blechnum filiforme* (climbing & terrestrial), kowhai (*Sophora chathamica*) (occ. seedlings), mapou (*Myrsine australis*) (epiphyte in pohutukawa), *Coprosma rhamnoides*, kawakawa and *Asplenium gracillimum*, *Adiantum diaphanum* and *Pteris tremula* (all occ.). The valley abutted pasture by the saddle in the ridge, with the upper forest margin of *Muehlenbeckia complexa*, gorse, woolly nightshade, manuka, large pohutukawa (branched at 1m) and a large kowhai.

27 January (Thursday): Te Matuku Scenic Reserve and adjacent shell-bank

Te Matuku Scenic Reserve (Fig. 3)

We used the vans to visit the recently acquired DoC Te Matuku Scenic Reserve (53 ha) on the east side of Te Matuku Bay (map 260 S11 010830, 0-90 m). We made our way down to the coast (and returned) via northern gully – just to the south of the reserve's northern boundary ridge. This gully (with a creek) contained the best developed forest in the reserve with a canopy 16-24 m tall. Much of the reserve was still regenerating manuka-kanuka (*Kunzea ericoides*) shrubland with gorse, woolly nightshade and *Erica lusitanica*. The main canopy trees in the Scenic

Reserve were taraire, tawa, kohekohe, karaka, with a few rewarewa (*Knightia excelsa*), totara (*Podocarpus totara*), and puriri (a few cut puriri stumps were also seen). A single dead standing pukatea (*Laurelia novae-zelandiae*) tree was noted, but no living plants



Fig. 6. The over 600 m-long shell-bank by the Te Matuku Scenic Reserve (foreground), tip of the Fenwick peninsula (middle right), and the mainland Maraetai coast (behind); looking SW.

were seen. Nikau, supplejack and ponga dominated the subcanopy, with local regeneration of kohekohe, taraire and nikau abundant; *Lastreopsis velutina* and *Pteris saxatilis* were locally frequent ground ferns. Near the top of the northern ridge (S-facing) was a single large kauri, 65cm dbh, c.22m tall, and to the east of this isolated tree was a small stand of smaller kauri (x4 medium size, x1 ricker) with frequent kauri associates: *Alseuosmia quercifolia* (x1), towai (*Weinmannia silvicola*), *Lindsaea trichomanoides* and *Lygodium articulatum*. Ross made the find of the day: two plants of *Danhatchia australis* under 16m tall taraire canopy with nikau – which was the first record of this orchid for the island. In 2002 it was also seen on Spencer's land (NE Waiheke) at several forested localities by Holly Cox and Cameron Kilgour - AK 280127.

Shell-bank (Figs. 6, 7)

The over 600 m-long shell-bank enclosing a tidal lagoon adjacent to the Scenic Reserve is a feature of the bay. The open shell-bank was dominated by needle tussock (*Austrostipa stipoides*) and locally *Ficinia nodosa*; other plants present included *Gladiolus undulatus*, six small clumps of pampas grass (*Cortaderia jubata* x5, *C. selloana* x1) which were uprooted (Fig. 7), and a rich moss flora which was recorded by Jessica (Beever 1995). The shell-bank is within the Marine Reserve and, although mangroves (*Avicennia marina*) are common at the head of the Bay, oddly the tidal lagoon behind the shell-bank (which is open at the SE end), contained no mangroves. However, a sward of saltmarsh vegetation occurred behind the shell-bank consisted of oioi, *Baumea juncea* and sea rush. Thirty-four vascular plant species (21% native) were recorded on the shell-bank (see Appendix 1, coded "B"), many

naturalised species were present in small numbers. The presence of gorse, pampas grasses, kikuyu grass (*Pennisetum clandestinum*) and buffalo grass (*Stenotaphrum secundatum*) posed a threat to the open nature of the shell-bank.



Fig. 7. Auckland Botanical Society members amongst *Austrostipa stipoides* tussocks assisting a pampas clump out of the shell-bank, eastern side of Te Matuku Bay.

28 January (Friday): Stony Batter Historic Reserve

From the blocked off "Spencer" road we tramped the 3.5 km walk over farmland on an extremely hot day to the WWII gun emplacements and tunnels at Stony



Fig. 8. A kereru midden the size of a dinner plate, surrounded by broadleaf tree seedlings (mainly taraire), under a favoured pigeon perch in taraire forest at Stony Batter Reserve.

Batter Reserve. The views were stunning over both coasts. The gun battery consisted of three 9.2-inch guns which were removed in 1958 with only a practice shot ever being fired (Cameron et al. 1997).

We were amazed how clean the concrete tunnels were, as if they had just been made, and thankful to Alistair who had lugged in a heavy battery and was able to light up the long tunnels like a Christmas tree. By the exit tunnel of the no. 3 gun emplacement was

a wonderful broadleaf taraire-dominated forest stand (covering c.200m x 60m), in a gully which appeared to have been fenced for 2-3 years. Other canopy species included kohekohe, tawa, karaka, puriri, pigeonwood, mahoe, totara, rewarewa, kanuka and pohutukawa. Nikau and taraire in particular were regenerating well. A kereru midden (Fig. 8) present here was admired (photos of it were later used to construct a pigeon roost site, midden and associated seedlings in the Land Gallery at the Auckland Museum). Some karaka seedlings in the midden answered our question as to whether pigeons eat karaka fruit. After the hot return walk to the vehicles we headed to Onetangi Beach for a much welcomed swim in the surf.



Fig. 9. The Auckland Botanical Society visit made the local newspaper. *Gulf News* (25 Feb 1994: p. 50), Forest & Bird Te Haahi-Goodwin Reserve, 29 Jan 1994 (reproduced with permission).

29 January (Saturday): Forest & Bird Te Haahi-Goodwin Reserve

This day was advertised by Forest & Bird in the local *Gulf News* (21 Jan 1994: 42) indicating that ABS... "Invite local native plant enthusiasts to accompany them through the Te Haahi Goodwin Reserve... [and]...to bring along plants you want identified by these experts."

We were joined by several Waiheke residents including local conservationists Don Chapple and Russell St Paul (Fig. 9). The reserve is not tracked but we were in good hands with our local guides. These notes are brief because the flora and vegetation is well recorded by White (2000) and there is also an account of the fungi by White & Shirley (2002).

The reserve landscape was quite dissected by a connecting network of small streams. This was the best forest we saw in the catchment of the Bay, with broadleaf forest in the gullies dominated by taraire, kohekohe, nikau and occasional puriri, with kauri and tanekaha (*Phyllocladus trichomanoides*) common on the upper slopes. Near the road there were younger regenerating areas of manuka and kanuka. One kauri had a good-sized hollow trunk with a feral honeybee nest that made measuring its circumference

challenging. The largest kauri we measured was 1.07 m dbh. We counted ten hard beech trees (2-40 cm dbh, the largest of which was dead, Fig. 10) amongst kauri and tanekaha pole regeneration 16-18 m tall, with kanuka up-slope.



Fig. 10. Dead standing beech tree 40 cm dbh, the largest that we saw, amongst kauri in Te Haahi-Goodwin Reserve.

There was a small wetland on the northwest side of the Orapiu Road nearly opposite the Cemetery Reserve in the Te Haahi-Goodwin Reserve where *Carex lessoniana*, *C. secta*, *C. lessoniana*, *C. virgata*, *Cyperus ustulatus* were present. The ten wetland species present here (8 native) and moth vine (*Araujia sericifera*) are coded separately in Appendix 1 (as "FW").

30 January (Sunday): mid Fenwick valley, Cemetery Reserve and Stewardship Area, and "Saltmarsh Island"

Mid Fenwick valley (Figs. 11, 12)

The lower valley was a drained wetland and the head of the valley was the largest bushed valley that we visited on the Fenwick property (map 260 S11 997837, 0-100 m). A single large grey willow (*Salix cinerea*) 7 m tall, and a single medium-sized maire tawake (*Syzygium maire*) (with ripe fruit on upper branches) were present in the grazed wetland from which cattle had recently been removed. Kanuka and

woolly nightshade fringed the sides of the wetland, which included sedges (*Baumea rubiginosa*, *Carex lessoniana*, *C. maorica*, *C. secta*, *C. virgata*, *Cyperus brevifolius*, *C. ustulatus*, *Eleocharis acuta*, *Schoenoplectus tabernaemontani*), grasses (*Glyceria maxima*, *Isachne globosa*, *Penistum clandestinum*), ferns (*Blechnum novae-zelandiae*, *Deparia petersenii*, *Diplazium australe*), Mexican devil, mistflower (*Ageratina riparia*), and many others (see Appendix 1). Presumably the absence of raupo was a reflection of the past amount of stock grazing.



Fig. 11. "Saltmarsh Island" surrounded by open water and low mangroves, upper Te Matuku Bay at high tide, looking NW from the Te Matuku Scenic Reserve on the west side. Note – the valley on the far left is the mid-Fenwick valley.

The forest in the head of the valley was dominated by taraire and tawa, with occasional karaka, kohekohe, puriri and fringed by kanuka; *Collospermum hastatum* was an abundant epiphyte; kauri amongst kanuka was locally present on the north side; nikau and ponga were abundant in the understorey, with supplejack especially common in the gully bottom; the ground was relatively bare with occasional shrubs of *Coprosma rhamnoides*; the stream banks were also rather bare, with the occasional filmy ferns (*Hymenophyllum* & *Trichomanes* spp.). Of the three Fenwick valleys visited this one contained the most native vascular species (see Table 1 and Appendix 1).

At the tidal mouth of the valley there was a low saltmarsh of *Samolus repens*, glasswort (*Sarcocornia quinqueflora*), *Selliera radicans*, *Chenopodium ambiguum*, *Isolepis cernua*, *Lilaeopsis novae-zelandiae*, *Lobelia anceps*, *Austrostipida stipoides*, *Ficinia nodosa* and sea rush (*Juncus kraussii*). Exotic species included *Atriplex prostrata*, *Plantago coronopus*, and the sward-forming *Carex divisa*. Twenty-one species (57% native) were recorded here (see Appendix 1, coded "M").

Cemetery Reserve (0.7 ha) and adjacent Stewardship Area (2.2 ha) (Fig. 1)

The DoC Cemetery Reserve is a narrow flat strip (c.5 m asl) between the Orapiu Road and the top of Te Matuku Bay (map 260 S11 010843, 0-20 m) which drops steeply down to mangroves. The adjacent Stewardship Area to the east straddles both sides of the road. The pioneer Anglican cemetery has 14 visible plots, with marked dates ranging from 1886-1937 (Anon 1995). A kanuka canopy c.8 m tall covers most of the Cemetery and adjacent Stewardship Area south of the road. Regenerating tanekaha 2-6 m tall and kowhai are scattered along the coastal fringe. The open shrub understorey included mingimingi (*Leucopogon fasciculatus*), akepiro (*Olearia furfuracea*), hangehange and commonly mapou. There was a mature tree of *Cupressus lucitanica* by the graves and a seedling nearby. The clubmoss *Lycopodium deuterodensum* was locally abundant and *L. volubile* was also present. See Appendix 1 for the full species list of these combined areas on south side of the road (coded "C").



Fig. 12. Looking SW down the Te Matuku Bay at low tide, from the Orapiu Road. The top of mid Fenwick valley can be partly seen in from the left.

"Saltmarsh Island" (Figs. 1, 11)

This very low-lying island (tenure: uninvestigated land) at the head of Te Matuku Bay (map 260 S11 007839, c.0-0.5 m) would be inundated during high spring tides and is surrounded by the Marine Reserve. The island is 350 m across x 300 m and is dominated by pure areas of manuka 2 m tall and mangroves up to 4m tall. There are some open areas with almost pure swards of sea rush with glasswort. A 30cm-tall tanekaha was a surprising find, and two pohutukawa were present. The margins were mainly low mangroves with glasswort and the slightly higher island ground than the surrounding tidal mudflats was eroding at the edges. It was surprising that *Olearia solandri* didn't appear to be present in what appeared to be ideal habitat for it. Thirty-three species were recorded for the island (64% native); see Appendix 1 for the full species list (coded "I").

Final evening

Arriving back at camp, Anthony Wright, Rob and Jennie Fenwick had arrived, and we were kindly invited up to the Fenwick 'bach' for pre-dinner drinks and nibbles. This was a very nice way to spend our last night, enjoying the stunning view from the ridge top with such amenable hosts. We hardly needed dinner after that, and it was noted that Anthony preferred to stay on the hill rather than sling a hammock down with ABS!

31 January (Monday): north Fenwick valley (due west of road ford)

We found time in the morning for a 2 hour survey in the north Fenwick valley (map 260 S11 999845, c.10-120 m) before breaking camp and departing in the rain. There was a ford on the lower part of this valley where the Fenwick road crossed, and narrow swampy areas of raupo, with native bindweed (*Calystegia sepium* subsp. *roseata*), peppermint (*Mentha × piperita*), and *Potamogeton cheesemanii*. There were two parts to this forested valley and time only permitted us to survey the more eastern branch. The whole valley was surrounded by kanuka, with broadleaf species (taraire, tawa, kohekohe and puriri) dominating much of the valley. There was a single large kahikatea (*Dacrycarpus dacrydioides*) and abundant seedlings.

On the NE ridge kauri (≤ 18 m tall, 50(-80) cm dbh) dominated amongst smaller-sized tanekaha and kanuka. A single multi-trunked beech tree (c.11 m tall) was present below the kauri amongst tanekaha. The kauri association also included the following trees and shrubs: mingimingi (abund.), prickly mingimingi (*Leptecophylla juniperina*) (abund.), akepiro, *Mida salicifolia*, *Coprosma lucida*, *C. arborea* (saplings loc. abund.), pohutukawa (x1) and rewarewa. On the ground: *Gahnia pauciflora* (abund.), *Schoenus tendo* (abund.), *Cordyline banksii*, kiekie (*Freycinetia banksii*), *Rubus australis*, and many ferns including *Lindsaea linearis*, *L. trichomanoides*, *Cardiomanes reniforme*, and *Lygodium articulatum*. The yellow paint lichen (*Chrysothrix candelaris*) was noticeably abundant on the nikau trunks.

The vascular plant Flora

A few post-1994 additions have been added from: observations by Petra White and Ivan Kitson (pers. comm., 2000) at the Te Haahi-Goodwin Reserve; records during a Forest & Bird trip to Te Haahi-Goodwin Reserve on 10 March 2002 organised by Petra White and attended by EKC; and from voucher records (lodged in AK herbarium) collected during the 2002 ACC Waiheke Island vegetation survey on private and public land, including the Te Matuku catchment. Records from the October 2008 ABS trip based at Otakawhe Bay are not included here (for those additions see Wilcox & Jane 2009).

The recorded vascular flora of the catchment of Te Matuku Bay totals 386 species, 68% of them native species (see Table 1). Although more species were recorded from the Fenwick property than from the more intact native forest at the head of the bay, a larger number of native species were recorded from the latter (195 versus 179 native species).

Coastal species such as tawapou (*Planchonella costata*), karo (*Pittosporum crassifolium*), and taupata (*Coprosma repens*) are surprisingly absent from Te Matuku Bay along with cabbage tree (*Cordyline australis*) – all these species are present elsewhere on Waiheke Island such as at Stony Batter. Their absence is presumably a reflection of past land clearances, fire, stock browsing and rats eating their seed suppressing regeneration, although we only investigated the sheltered coast – all inside the Bay. Some terrestrial orchids may have been missed because of the time of the year of the survey. The vegetation survey on Waiheke Island during 2002 by ACC recorded some additional species in the upper catchment of Te Matuku Bay catchment (coded "ACC" in Appendix 1). *Pomaderris rugosa* has been recorded from eastern Te Matuku Bay (Wilcox et al. 2002), *Coprosma propinqua* and *Cortaderia fulvida* have been observed in a small wetland just west of the Cemetery Reserve (Ivan Kitson pers. comm., 1999), and eel grass (*Zostera muelleri*) is recorded for the Te Matuku Bay on the DoC website (Sept 2008) – none of these have been included in the species list (Appendix 1) because their exact locality is unknown to the author. Oddly, *Apium* "white denticles" wasn't seen in the saltmarshes of Te Matuku Bay but it was present close by in a saltmarsh at Otakawhe Bay (AK 229257).

Hard beech was seen in two places in January 1994: a single tree in the N Fenwick valley; and a group of 10 trees in the Te Haahi-Goodwin Reserve, the largest which was dead (Fig. 10). Five trees were also seen on Ngati Paoa land north of the Te Haahi-Goodwin Reserve during the ACC 2002 survey (AK 255827). Beech is now only known locally on the island which is a far cry from Kirk's (1878) "considerable quantity at sea level".

Naturalised species

Thirty-two percent of the Te Matuku Bay vascular flora that were found are naturalised species, with the larger number occurring on the Fenwick property (Table 1). This is not surprising considering that until recently most of this land was actively grazed and is still quite open in most places. After seeing so many weed species on the island, by the end of our second day when visiting the adjacent Otakawhe Bay and seeing climbing asparagus (*Asparagus scandens*) out of control, we decided Waiheke should have a new name, "Weed-heke"! Aggressive environmental weed species present in the Te Matuku Bay catchment that would be good to control included: Bangalow palm (*Archontophoenix cunninghamii*) – a single wild

seedling, amongst nikau seedlings was collected by the ACC team in a native forested stream gully north of Te Matuku Bay (AK 257656); buffalo grass; *Carex divisa*; *C. divulsa*; carpet grass (*Axonopus fissifolius*); climbing asparagus of which we saw fairly local patches in N Fenwick valley and the Scenic Reserve, and there were occasional seedlings of in the Te Haahi-Goodwin Reserve 1999-2002 (P. White pers. comm., 2002), but unfortunately it was well established around Orapiu; *Glyceria maxima*; kikuyu grass; *Leycesteria formosa*; Mexican devil; mist flower; moth vine, pampas grasses (*Cortaderia jubata* & *C. selloana*), *Ranunculus flammula* which was present in the wetlands of N and mid Fenwick valleys – this species is still quite local in the Auckland region, known mainly from the Hunua Ranges, however, the first Auckland collection appears to be Cowes Bay on Waiheke in 1956 by M.E. Sexton (AK 252406); smilax (*Asparagus asparagoides*) and woolly nightshade (see Appendix 1 for where the species were recorded). Several aggressive environmental weeds known from elsewhere on Waiheke Island appeared to be absent from the Te Matuku catchment: boneseed (*Chrysanthemoides monilifera*), rhamnus (*Rhamnus alaternus*), Japanese honeysuckle (*Lonicera japonica*), wandering Jew (*Tradescantia fluminensis*), *Polygala myrtifolia* and banana passion fruit (*Passiflora tarminiana*).

Fauna

These observations were noted in passing and not actively sought.

Mammals: Waiheke Island has never had brush-tailed possums; goat droppings Te Haahi-Goodwin Reserve – there are still feral goats in the general area (P. White, pers. comm., Apr 2009); cattle droppings occasional in Scenic Reserve and "Saltmarsh Island"; and rabbit droppings Te Matuku Scenic Reserve by the shell-bank. Rat trapping has been carried out on the Fenwick property since 2005; and also in the Te Haahi-Goodwin Reserve since at least 2002. A few feral pigs have been present on the Fenwick property since it was purchased (R. Fenwick, pers. comm., 2009).

Birds: Te Matuku Bay is an important estuary for resident and migratory wading bird species. Around the Bay we observed: pied shag, reef heron (2), harrier, variable oystercatcher (4), spur-winged plover, pied stilt, black-backed gull, red-billed gull,

Caspian tern, white-fronted tern (c.10), native pigeon, kingfisher, welcome swallow, silvereye, grey warbler, blackbird, skylark, fantail, tui and myna.

Notable insects: we observed a red admiral butterfly at Stony Batter, a painted lady in the Te Matuku Scenic Reserve, and Asian paper wasps were frequent around the Te Matuku estuary margins.

Conclusions

In an 1859 Charles Heaphy sketch (Monin 1992: fig. 30) Te Matuku Bay is depicted with a few scattered trees along the western coast, bare slopes behind (Fenwick land) with trees in the distance, and Robert McLeod's settlement on the coast (where we camped). This shows that most of this western coast was cleared before this time. This is supported by the present youthful-looking vegetation, with only a few large trees of puriri and pohutukawa looking to be 150 years old or more, and probably none of pre-European age survive on the Fenwick property. In fact the largest kauri seen was in the Te Haahi-Goodwin Reserve (1.07 m dbh) was probably only c. 200 years old (J. Ogden pers. comm., based on similar-sized kauri at a similar altitude on Great Barrier Island).

Rob Fenwick (pers. comm., 2008) informed me that the woolly nightshade passive experiment (leaving it to see if it is naturally replaced by regenerating native forest) has generally been a success – in moister soils young ponga, mapou, mahoe, etc, have now overtaken the woolly nightshade and have crowded it out; in drier places, the woolly nightshade has prevailed; manuka and kanuka does not seem able to successfully compete with this nightshade.

After a long history of forest clearances, stock grazing and most likely fire, most of the Te Matuku Bay catchment is now rapidly regenerating back to a natural state. This combined with the unbroken protected sequence from forest, freshwater wetlands, saltmarsh to the subtidal Marine Reserve, makes the whole catchment an outstanding conservation asset. Te Matuku Bay is a wonderful example of a private individual, a Society and the Crown working together in achieving a marvellous outcome for restoring biodiversity. However, several weed species, rats, cats, rabbits, hedgehogs, pigs and mustelids will require ongoing management.

Acknowledgements

Rob and Jennie Fenwick for allowing us to camp on their property; Rob Fenwick for local information; Forest and Bird Society Hauraki Islands Branch for allowing us to survey their reserve; all landowners and managers for allowing us to collect voucher plant specimens; Ross Beever for his field notes of the first day and comments on a draft of this article; all ABS members for observations and comments; additional records from Petra White and Ivan Kitson (local residents), Holly Cox and Cameron Kilgour (ACC); John Ogden for suggesting a possible age of the largest kauri seen; Rhys Gardner for assisting with difficult specimen identifications; Auckland Museum pictorial staff for assistance with images; Waiheke Island Historical Society for permission to reproduce Fig. 2; and *Gulf News* for permission to reproduce Fig. 9.

References

- Anon. 1995: Conservation Management Strategy 1995-2005. Vol. III Inventory. Department of Conservation, Auckland Conservancy Management Planning Series no. 12.
- Beever, J.E. 1995: Mosses of Waiheke Island, Hauraki Gulf, northern New Zealand. *Tane* 35: 113–120.

- Cameron, E.; Hayward, B.; Murdoch, G. 1997: A Field Guide to Auckland – exploring the region's natural and historic heritage. Godwit, Auckland.
- Cameron, E.K.; de Lange, P.J.; McCallum, J.; Taylor, G.A.; Bellingham, P.J. 2007: Vascular flora and some fauna for a chain of six Hauraki Gulf islands east and southeast of Waiheke Island. *Auckland Botanical Society Journal* 62: 136-156.
- English, Phillip 2001: Waiheke landowner sinks miners' hopes. *NZ Herald* (23 Aug 2001): A9.
- Fitzgibbon, T.D.; Slaven, D.C. 1988: Sites of Ecological Significance – Waiheke Island. *Department of Conservation Northern Region Technical Report Series no. 2*. 133p.
- Hayward, B.W.; Stephenson, A.B.; Morley, M.S.; Smith, N.; Thompson, F.; Blom, W.; Stace, G.; Riley, J.L.; Prasad, R.; Reid, C. 1997: Intertidal biota of Te Matuku Bay, Waiheke Island, Auckland. *Tane* 36: 67–84.
- Kirk, T. 1879: Notes on the botany of Waiheke, Rangitoto and other islands in the Hauraki Gulf. *Transactions of the New Zealand Institute* 11: 444–454.
- Lee, M. 1999: Biota of seven islets off Waiheke Island, Inner Hauraki Gulf. *Tane* 37: 99–136.
- Monin, Paul 1992: Waiheke Island: a history. The Dunmore Press.
- Slaven, D. 1986: Management Plan Te Haahi-Goodwin Reserve. Royal Forest & Bird Protection Society.
- White, P. (compiler) 2000: Te Haahi-Goodwin reserve management plan, November 2000. Royal Forest and Bird Protection Society, Wellington. 47p.
- White, P.; Shirley, C. 2002: Fungi in the Te Haahi-Goodwin Reserve, Waiheke Island. *Auckland Botanical Society Journal* 57: 32–33.
- Wilcox, M.D.; Jane, G. 2009: Waiheke Island: Labour Weekend, 24-27 October 2008. *Auckland Botanical Society Journal* 64: 1–9.
- Wilcox, M.D.; Spence, A.; White, P. 2002: Botanical features of Whakanewha Regional Park Waiheke Island. *Auckland Botanical Society Journal* 57: 34–46.

Table 1. Totals in different plant groups for vascular plants in adjacent land to Te Matuku Bay, Waiheke Island. NF = north Fenwick property, MF = mid Fenwick, SF = south Fenwick, F = combined Fenwick, N = north (Forest & Bird and DoC land), E = east (Scenic Reserve). Totals exclude the *Pseudopanax* hybrid.

| | NF valley | MF valley | SF valley | F combined | N | E | Totals |
|---------------------------------------|----------------------|----------------------|----------------------|-----------------------|-------------|-------------|---------------|
| Native ferns & fern allies | 25 | 35 | 24 | 47 | 56 | 40 | 71 |
| Native conifers | 4 | 6 | - | 6 | 7 | 6 | 7 |
| Native dicots | 37 | 58 | 33 | 72 | 75 | 64 | 103 |
| Native monocots | 30 | 39 | 24 | 54 | 57 | 40 | 82 |
| Naturalised conifers | - | - | - | - | 3 | 2 | 4 |
| Naturalised dicots | 25 | 40 | 54 | 60 | 25 | 44 | 76 |
| Naturalised monocots | 14 | 23 | 15 | 32 | 11 | 21 | 43 |
| Totals | 135 | 171 | 150 | 271 | 234 | 217 | 386 |
| % native | 71.1 | 80.7 | 54.0 | 66.1 | 83.3 | 69.1 | 68.1 |

Appendix 1. Vascular flora of Te Matuku Bay catchment, Waiheke Island.

Key

- * = naturalised species
- x = observed during the ABS Jan 1994 field trip
- A = present in adjacent area
- ACC = herbarium specimen collected by Auckland City Council, 2002, adjacent to the area ABS surveyed
- AK** = Auckland Museum herbarium
- B = shell bar (by Te Matuku Scenic Reserve)
- C = Cemetery Reserve & adjacent Stewardship area (S side of road only)
- EC = recorded by EKC during a day trip 10 Mar 2002 (not observed in Jan 1994)
- FW = small freshwater wetland (west side of Te Haahi-Goodwin Reserve by Orapiu Rd)
- I = low "Saltmarsh Island" in head of Te Matuku Bay
- M = saltmarsh
- MF** = mid Fenwick valley
- N** = all northern areas (incl. Te Haahi-Goodwin, Cemetery, "Saltmarsh Id" & Stewardship areas)
- NF** = north Fenwick valley
- PW = from White (2000) – not seen by ABS
- SF** = south Fenwick valley
- W** = west area (Te Matuku Scenic Reserve & shell-bank)

| | NF | MF | SF | N | W | AK vouchers |
|--|----|----|----|-------|---|-------------|
| Ferns and fern allies (71 + 0) (= native + naturalised) | | | | | | |
| <i>Adiantum cunninghamii</i> | x | | x | x | x | |
| <i>Adiantum diaphrum</i> | | | x | | | |
| <i>Adiantum fulvum</i> | | x | | x | x | |
| <i>Adiantum hispidulum</i> | | x | x | x | x | |
| <i>Adiantum viridescens</i> | | | | x | | |
| <i>Arthropteris tenella</i> | | | x | | | |
| <i>Asplenium bulbiferum</i> | | x | | x | x | 256038 |
| <i>Asplenium flaccidum</i> | x | x | x | x | x | |
| <i>Asplenium gracillimum</i> | | | x | | | 229269-70 |
| <i>Asplenium oblongifolium</i> | | | | x | x | |
| <i>Asplenium polyodon</i> | x | x | x | x | x | |
| <i>Blechnum chambersii</i> | | x | x | x | x | |
| <i>Blechnum discolor</i> | | | | EC | | |
| <i>Blechnum filiforme</i> | x | x | | x | x | |
| <i>Blechnum fluviatile</i> | | x | | | | 229303 |
| <i>Blechnum fraseri</i> | | | | x | | |
| <i>Blechnum membranaceum</i> | | x | x | x | | |
| <i>Blechnum norfolkianum</i> | | | | ACC | | 257657 |
| <i>Blechnum novae-zelandiae</i> (incl. <i>B. minus</i>) | | x | x | x | x | |
| <i>Cardiomanes reniforme</i> | x | | | x | | |
| <i>Cyathea dealbata</i> | x | x | x | x | x | |
| <i>Cyathea medullaris</i> | x | x | x | x | x | |
| <i>Deparia petersenii</i> | x | x | | x, FW | x | |
| <i>Dicksonia squarrosa</i> | | | | x | x | |
| <i>Diplazium australe</i> | | x | | | x | |
| <i>Doodia australis</i> | x | x | x | x | x | |
| <i>Doodia mollis</i> | | | | ACC | | 255832 |
| <i>Gleichenia microphylla</i> | | | | x | | |
| <i>Grammitis ciliata</i> | | | | x | | |
| <i>Histiopteris incisa</i> | | | x | | x | |
| <i>Huperzia varia</i> | | | | x | | |
| <i>Hymenophyllum demissum</i> | x | x | | x | x | |
| <i>Hymenophyllum dilatatum</i> | | | | x | | |
| <i>Hymenophyllum ferrugineum</i> | | | | x | | |
| <i>Hymenophyllum flabellatum</i> | x | | | | | |
| <i>Hymenophyllum multifidum</i> | | | | EC | | |
| <i>Hymenophyllum rarum</i> | | | | PW | | |
| <i>Hymenophyllum sanguinolentum</i> | x | x | | x | | |
| <i>Hymenophyllum scrabrum</i> | | | | x | | |
| <i>Hypolepis ambigua</i> | | x | x | | | |
| <i>Lastreopsis glabella</i> | | x | x | | x | |
| <i>Lastreopsis hispida</i> | | x | | x | x | |
| <i>Lastreopsis microsora</i> | | | x | | x | |
| <i>Lastreopsis velutina</i> | | | x | | x | |
| <i>Leptopteris hymenophylloides</i> | | x | | | x | |
| <i>Lindsaea linearis</i> | x | | | x | | |
| <i>Lindsaea trichomanoides</i> | x | x | | x | x | 229214 |
| <i>Loxogramme dictyopteris</i> | | | | x | x | 229216 |
| <i>Lycopodiella cernua</i> | | | | PW | | |
| <i>Lycopodium deuterodensum</i> | | | | x, C | | |
| <i>Lycopodium volubile</i> | | | | C | | |
| <i>Lygodium articulatum</i> | x | x | | x | x | |
| <i>Microsorium pustulatum</i> | x | x | x | x | x | |
| <i>Microsorium scandens</i> | x | x | x | x | x | |
| <i>Paesia scabreula</i> | | x | | x | x | |
| <i>Pneumatopteris pennigera</i> | x | x | | x | x | |
| <i>Polystichum ?neozelandicum</i> | | | | | x | |
| <i>Pteridium esculentum</i> | x | x | x | x, C | x | |

| | | | | | | |
|----------------------------------|---|---|---|------|---|-----------|
| <i>Pteris macilenta</i> | | x | x | x | x | 229300-01 |
| <i>Pteris saxatilis</i> | | | | | x | 229252-53 |
| <i>Pteris tremula</i> | x | x | x | x | x | |
| <i>Pyrrosia eleagnifolia</i> | x | x | x | x | x | |
| <i>Schizaea bifida</i> | | | | x | | |
| <i>Schizaea fistulosa</i> | x | | | x, C | | |
| <i>Tmesipteris elongata</i> | x | x | | x | x | |
| <i>Tmesipteris lanceolata</i> | | x | | x | x | 229305 |
| <i>Tmesipteris sigmatifolia</i> | x | | | | | 229218 |
| <i>Tmesipteris tannensis</i> | | | | PW | | |
| <i>Trichomanes elongatum</i> | x | x | | x | x | 229302 |
| <i>Trichomanes enlicherianum</i> | | x | | x | x | 229236 |
| <i>Trichomanes venosum</i> | | | | PW | | |

Conifers (7 + 4)

| | | | | | | |
|------------------------------------|---|---|--|---------|---|--------|
| <i>Agathis australis</i> | x | x | | x, C | x | |
| <i>Chamaecyparis lawsoniana*</i> | | | | C | | 255955 |
| <i>Cupressus macrocarpa*</i> | | | | | B | |
| <i>Dacrycarpus dacrydioides</i> | x | x | | x | x | |
| <i>Dacrydium cupressinum</i> | | | | x | | |
| <i>Phyllocladus trichomanoides</i> | x | x | | x, C, I | x | |
| <i>Pinus pinaster*</i> | | | | x | | 255990 |
| <i>Pinus radiata*</i> | | | | x | x | |
| <i>Podocarpus totara</i> | x | x | | x | x | |
| <i>Prumnopitys ferruginea</i> | | x | | x | x | |
| <i>Prumnopitys taxifolia</i> | | x | | x | x | |

Dicots (103 + 76)

| | | | | | | |
|--|---|---|---|------|------|----------------|
| <i>Acaena anserinifolia</i> | | | x | | x | |
| <i>Acaena novae-zelandiae</i> | | | x | | | |
| <i>Achillea millefolium*</i> | | x | | | | |
| <i>Ageratina adenophora*</i> | x | x | x | | | |
| <i>Ageratina riparia*</i> | | x | | | x | |
| <i>Alectryon excelsus</i> | | x | | x | x | |
| <i>Alseuosmia macrophylla</i> | | | | PW | | |
| <i>Alseuosmia quercifolia</i> | x | x | | x | x | 218802, 218804 |
| <i>Anagallis arvensis</i> var. <i>arvensis*</i> | x | x | x | | B, M | |
| <i>Araujia sericifera*</i> | | | x | FW | x B | 229268 |
| <i>Artriplex prostrata*</i> | | M | | | B | |
| <i>Aster subulatus*</i> | | | | I | x | |
| <i>Avicennia marina</i> | | M | | I | | |
| <i>Beilschmiedia tarairi</i> | x | x | x | x | x | |
| <i>Beilschmiedia tawa</i> (incl. <i>B. tawaroa</i>) | | x | x | x | x | 229271 |
| <i>Brachyglottis kirkii</i> var. <i>angustior</i> | | | | x | | |
| <i>Brachyglottis repanda</i> | x | x | | x | x | |
| <i>Cakile edentula*</i> | | | | | B | |
| <i>Callitriche muelleri</i> | | x | | x | x | |
| <i>Callitriche stagnalis*</i> | | x | | | | |
| <i>Calystegia sepium</i> subsp. <i>roseata</i> | x | x | x | FW | x | |
| <i>Calystegia soldanella</i> | | | | | B | |
| <i>Calystegia tuguriorum</i> | | | | | x | |
| <i>Carduus tenuiflorus*</i> | | x | x | x | B | |
| <i>Carmichaelia australis</i> | | | | x | | |
| <i>Centaurium erythraea*</i> | x | x | | x, I | x B | |
| <i>Centella uniflora</i> | x | x | x | | | |
| <i>Cerastium glomeratum*</i> | | | | | x | |
| <i>Chenopodium ambiguum</i> | | M | | I | | 229294 |
| <i>Cirsium arvense*</i> | | | x | | | |
| <i>Cirsium vulgare*</i> | x | x | x | x | x B | |
| <i>Clematis cunninghamii</i> | | | | PW | | |
| <i>Clematis paniculata</i> | x | x | | x | x | |

| | | | | | | |
|-------------------------------------|---|---|---|---------|------|--------|
| <i>Conyza sumatrensis</i> * | x | x | x | x | x | |
| <i>Coprosma arborea</i> | x | x | | x | x | |
| <i>Coprosma grandifolia</i> | | | | x | | |
| <i>Coprosma lucida</i> | x | | | x | | |
| <i>Coprosma macrocarpa</i> | | | x | | x | |
| <i>Coprosma rhamnoides</i> | x | x | x | x | x | |
| <i>Coprosma robusta</i> | | | | x | | |
| <i>Coprosma spathulata</i> | | | | x | x | |
| <i>Coriaria arborea</i> | | | | C | x | |
| <i>Corynocarpus laevigatus</i> | | x | x | x | x | |
| <i>Cotula coronopifolia</i> | | x | x | | | |
| <i>Crepis capillaris</i> * | x | x | x | | x | |
| <i>Daucus carota</i> * | x | | | | | |
| <i>Dichondra repens</i> | | x | x | | x, B | |
| <i>Digitalis purpurea</i> * | | | | | B | |
| <i>Drosera</i> sp. | | | | PW | | |
| <i>Duchesnea indica</i> * | x | x | x | | | |
| <i>Dysoxylum spectabile</i> | x | x | x | x | x | |
| <i>Elaeocarpus dentatus</i> | | | x | x | x | |
| <i>Entelea arborescens</i> | | | | x | | |
| <i>Epilobium ciliatum</i> * | | | x | | | 229318 |
| <i>Erechtites valerianifolia</i> * | | | x | | | |
| <i>Erica lusitanica</i> * | x | | | C | x | 255956 |
| <i>Euchiton collinus</i> | | x | x | x | x | |
| <i>Euphorbia peplus</i> * | x | x | | | | |
| <i>Foeniculum vulgare</i> * | | | | | B | |
| <i>Fumaria muralis</i> * | | | | | x | |
| <i>Galium aparine</i> * | x | | x | | | |
| <i>Galium propinquum</i> | | x | | | | 229298 |
| <i>Gamochaeta coarctata</i> * | | x | | | | |
| <i>Gamochaeta simplicicaulis</i> * | | x | x | x | | |
| <i>Gaultheria antipoda</i> | | | | PW | x | |
| <i>Genistoma ligustrifolium</i> | x | x | x | x, C | x | |
| <i>Geranium gardneri</i> * | | | | x | x | |
| <i>Geranium homeanum</i> * | x | x | x | | | 218807 |
| <i>Geranium purpureum</i> * | x | x | x | | | |
| <i>Gonocarpus incanus</i> | x | x | | x | | |
| <i>Griselinia lucida</i> | | | | x | x | |
| <i>Haloragis erecta</i> | | | | | x | |
| <i>Hebe macrocarpa</i> | | | | C | | |
| <i>Hebe stricta</i> | | | | x | x | |
| <i>Hedycarya arborea</i> | x | x | x | x | x | |
| <i>Helminthotheca echinoides</i> * | | | | | x | |
| <i>Hypericum japonicum</i> | | | | | x | 229251 |
| <i>Hypochaeris radicata</i> * | x | x | x | x, I | x, B | |
| <i>Knightia excelsa</i> | x | x | | x | x | |
| <i>Kunzea</i> aff. <i>ericoides</i> | x | x | x | x, C | x | |
| <i>Lactusa serriola/virosa</i> * | | | | I | x | |
| <i>Lagenifera pumila</i> | | x | | | | 229299 |
| <i>Lapsana capillaris</i> * | | | x | | | |
| <i>Lathyris latifolia</i> * | | | | C | | 229223 |
| <i>Laurelia novae-zelandiae</i> | | | | | x | |
| <i>Leontodon taraxacoides</i> * | | x | | C, I | x, B | |
| <i>Lepidium didymum</i> * | | | A | | | 229288 |
| <i>Leptecophylla juniperina</i> | x | x | | x, C | x | |
| <i>Leptospermum scoparium</i> | x | x | x | x, I | x, M | |
| <i>Leucopogon fasciculatus</i> | x | x | | x, C, I | x | |
| <i>Leycesteria formosa</i> * | | | A | | x | |
| <i>Lilaeopsis novae-zelandiae</i> | | M | | | | |
| <i>Linum bienne</i> * | | | | | x | |
| <i>Linum trigynum</i> * | | x | | C | x, B | |

| | | | | | | |
|--|---|---|---|---------|------|----------------|
| <i>Litsea calicularis</i> | | | x | | x | |
| <i>Lobelia aniceps</i> | | M | x | x, I | | |
| <i>Lotus angustissimus*</i> | | x | | C | | |
| <i>Lotus pedunculatus*</i> | x | x | x | x, I | x | |
| <i>Lotus suaveolens*</i> | | | | I | B | |
| <i>Ludwegia palustris*</i> | | x | | | x | |
| <i>Macropiper excelsum</i> | x | x | x | x | | |
| <i>Melicope ternata</i> | | x | x | | | |
| <i>Melicytus ramiflorus</i> | x | x | x | x | x | |
| <i>Melilotus indicus*</i> | | | | | B | |
| <i>Mentha × piperata</i> var. <i>piperata*</i> | x | | x | | | 229310, 229314 |
| <i>Mentha pulegium*</i> | x | x | x | | x | |
| <i>Metrosideros diffusa</i> | x | x | | x | x | |
| <i>Metrosideros excelsa</i> | x | x | x | x, I | x | |
| <i>Metrosideros fulgens</i> | x | x | | x | x | |
| <i>Metrosideros perforata</i> | x | x | | x | x | |
| <i>Metrosideros robusta</i> | | | | x | | |
| <i>Mida salicifolia</i> | x | x | | x | x | |
| <i>Muehlenbeckia complexa</i> | | x | x | I | x, M | |
| <i>Myosotis laxa*</i> | | x | x | | | |
| <i>Myrsine australis</i> | x | x | x | x, C, I | x | |
| <i>Myrsine salicina</i> | | | | x | | |
| <i>Nertera dichondrifolia</i> | | | | x | | 255960 |
| <i>Nestegis cunninghamii</i> | | | | PW | | |
| <i>Nestegis lanceolata</i> | x | x | | x | x | |
| <i>Nestegis montana</i> | | | | PW | | |
| <i>Nothofagus truncata</i> | x | | | x | | 229215, 22919 |
| <i>Olearia furfuracea</i> | x | | | x, C | | |
| <i>Olearia rani</i> | x | x | | x | x | |
| <i>Oxalis exilis</i> | | | | | x | |
| <i>Parsonsia heterophylla</i> | | x | x | x | x | 229309 |
| <i>Passiflora tetrandra</i> | | | x | | | |
| <i>Persicaria decipiens</i> | | x | x | | | |
| <i>Physalis peruviana*</i> | | | x | | x | |
| <i>Phytolacca octandra*</i> | x | x | x | | x | |
| <i>Pittosporum cornifolium</i> | | x | | x | | |
| <i>Pittosporum tenuifolium</i> | x | x | | x, C | x | |
| <i>Plagianthus divaricatus</i> | | | | I | M | |
| <i>Plantago coronopus*</i> | | M | | | | |
| <i>Plantago lanceolata*</i> | x | x | x | x | x, B | |
| <i>Polycarpon tetraphyllum*</i> | | | A | | | |
| <i>Pomaderris amoena</i> | x | | | x, C | | |
| <i>Prunella vulgaris*</i> | x | x | x | x, C | x | |
| <i>Pseudopanax arboreus</i> | x | x | | x, C | x | |
| <i>Pseudopanax crassifolius</i> | | x | | x | x | |
| <i>Pseudopanax crassifolius</i> × <i>P. lessonii</i> | | | | x | x | |
| <i>Pseudopanax lessonii</i> | | | | | x | |
| <i>Ranunculus amphitrichus</i> | | x | | | | 221399 |
| <i>Ranunculus flammula*</i> | | x | x | | | 229306 |
| <i>Ranunculus reflexus</i> | | x | | FW | x | |
| <i>Ranunculus repens*</i> | x | | | | | |
| <i>Ranunculus scleratus*</i> | | x | x | | | 229230 |
| <i>Rosa rubiginosa*</i> | | x | x | | B | 218805 |
| <i>Rubus australis</i> | x | | | x | | |
| <i>Rubus cissoides</i> | x | x | x | x | x | |
| <i>Rubus fruticosus</i> agg.* | | x | x | | | |
| <i>Rumex conglomeratus*</i> | | x | x | | x | |
| <i>Salix cinerea*</i> | | x | x | | x | 218473 |
| <i>Salix fragilis*</i> | | | x | | | 218806 |
| <i>Samolus repens</i> | | M | | I | M | |
| <i>Sarcocornia quinqueflora</i> | | M | | I | B, M | |

| | | | | | | | |
|---------------------------------|---|----|---|---|-------|------|----------------|
| <i>Schefflera digitata</i> | | | x | | x | | |
| <i>Selliera radicans</i> | | | M | | | B, M | |
| <i>Senecio bipinnatisectus*</i> | | | | x | x | x | |
| <i>Senecio hispidulus</i> | | | | | | x | |
| <i>Senecio jacobaea*</i> | x | x | x | | C | x | |
| <i>Senecio vulgaris*</i> | | | A | | | | |
| <i>Solanum aviculare</i> | | | | | | x | |
| <i>Solanum linnaenum*</i> | | | | | | x, B | |
| <i>Solanum mauritianum*</i> | x | x | x | | x | x | |
| <i>Solanum nodiflorum</i> | x | | | | | x | |
| <i>Sonchus asper*</i> | | | | | | x | |
| <i>Sonchus oleraceus*</i> | | | M | x | I | x | |
| <i>Sophora chathamica</i> | | | | x | C, FW | x | 255970, 256033 |
| <i>Stellaria media*</i> | | | | x | | | |
| <i>Streblus heterophyllus</i> | | | x | | | | 229293 |
| <i>Syzygium maire</i> | | | x | | x | | 229297 |
| <i>Taraxacum officinale*</i> | x | | | | | | |
| <i>Trifolium repens*</i> | | | x | x | | x | |
| <i>Ulex europaeus*</i> | x | xM | x | | x | x, B | |
| <i>Verbena litoralis*</i> | | | | | FW | | |
| <i>Veronica plebeia</i> | | | | | | x | |
| <i>Vitex lucens</i> | x | x | x | | x | x | |
| <i>Wahlenbergia violacea</i> | | | | x | | | 214269 |
| <i>Weinmannia silvicola</i> | | | | | x, C | x | |
| <i>Xanthium spinosum*</i> | | | A | | | | |

Monocots (82 + 43)

| | | | | | | | |
|--|-----|---|---|---|------|---|--------|
| <i>Acianthus sinclairii</i> | | | | | EC | | |
| <i>Agrostis capillaris*</i> | x | x | x | | x | x | |
| <i>Agrostis stolonifera*</i> | x | | | | | | 229311 |
| <i>Allium vineale*</i> | | | | | | B | |
| <i>Anthoxanthum odoratum*</i> | x | x | x | | | x | |
| <i>Apodasmia similis</i> | | | M | | C, I | M | |
| <i>Archontophoenix cunninghamiana*</i> | ACC | | | | | | 257656 |
| <i>Asparagus asparagoides*</i> | | | | | | x | |
| <i>Asparagus scandens*</i> | | | | x | EC | x | |
| <i>Astelia banksii</i> | | | | x | C | x | 229290 |
| <i>Astelia solandri</i> | | | | | x | x | |
| <i>Astelia trinervia</i> | | | | | x | | |
| <i>Austrostipa stipoides</i> | | | M | | I | B | |
| <i>Axonopus fissifolius*</i> | x | | | | | | |
| <i>Baumea juncea</i> | | | | | I | M | |
| <i>Baumea rubiginosa</i> | | | x | x | | | |
| <i>Baumea tenax</i> | | | | | PW | | |
| <i>Baumea teretifolia</i> | | | | | PW | | |
| <i>Bolboschoenus medianus</i> | | | | | | M | |
| <i>Bothriochloa macra*</i> | | | | | | x | 229258 |
| <i>Briza minor*</i> | | | x | | | | |
| <i>Bromus willdenowii*</i> | | | | x | | | |
| <i>Carex breviculmis</i> | x | x | | | | x | |
| <i>Carex dissita</i> | x | x | x | | x | x | |
| <i>Carex divisa*</i> | | | M | | | | |
| <i>Carex divulsa*</i> | | | | x | | x | |
| <i>Carex flagellifera</i> | | | | x | I | x | |
| <i>Carex inversa</i> | | | | x | | x | |
| <i>Carex lambertiana</i> | x | x | | | PW | x | 229250 |
| <i>Carex lessoniana</i> | x | x | x | | FW | x | |
| <i>Carex longibrachiata*</i> | x | x | | | | | 229222 |
| <i>Carex maorica</i> | | | x | x | | | 218809 |
| <i>Carex ochrossacus</i> | x | | | | | | 229220 |
| <i>Carex secta</i> | | | x | | FW | | 229234 |

| | | | | | | |
|----------------------------------|---|---|---|--------|------|----------------|
| <i>Carex solandri</i> | x | x | x | | x | |
| <i>Carex testacea</i> | | | | | x | |
| <i>Carex virgata</i> | x | x | x | x, FW | x | |
| <i>Collospermum hastatum</i> | x | | x | x | x | |
| <i>Cordyline australis</i> | | | | PW | | |
| <i>Cordyline banksii</i> | x | x | | x | x | |
| <i>Cordyline pumilio</i> | | | | x | x | |
| <i>Cortaderia jubata*</i> | | | A | | B, M | |
| <i>Cortaderia selloana*</i> | | x | | I | B | |
| <i>Corybas cheesemanii</i> | | | | x | | 284129 |
| <i>Cynosurus cristatus*</i> | | | | | x | |
| <i>Cyperus brevifolius*</i> | | x | | | | |
| <i>Cyperus ustulatus</i> | x | x | x | FW, I | x M | |
| <i>Cyrtostylis oblonga</i> | | | | PW | | 250740 |
| <i>Dactylis glomerata*</i> | x | x | x | | x | |
| <i>Danhatchia australis</i> | | | | | x | 229255 |
| <i>Dianella nigra</i> | x | | | x | x | |
| <i>Dichelachne crinita</i> | | x | | x | x | |
| <i>Diplodinium alobulum</i> | | | | PW | | |
| <i>Diplodinium brumale</i> | | | | ACC | | 257655 |
| <i>Diplodinium trullifolium</i> | | | | ACC | | 257654 |
| <i>Drymoanthus adversus</i> | x | x | | | | |
| <i>Earina mucronata</i> | | x | | x | x | |
| <i>Eleocharis acuta</i> | | x | x | | | 229223 |
| <i>Ficinia nodosa</i> | | M | | I | xBM | |
| <i>Freycinetia banksii</i> | x | x | | x | | |
| <i>Gahnia lacera</i> | x | x | | x, C | x | |
| <i>Gahnia pauciflora</i> | x | | | x | x | |
| <i>Gahnia setifolia</i> | | x | | x, C | | |
| <i>Gahnia xanthocarpa</i> | | | | x | | |
| <i>Gladiolus undulatus*</i> | | | | | B | |
| <i>Glyceria maxima*</i> | | x | | | | 229295 |
| <i>Holcus lanatus*</i> | x | x | x | | | |
| <i>Ichthyostomum pygmaeum</i> | | | | x | | 229312 |
| <i>Isachne globosa</i> | | x | x | | | 229316 |
| <i>Isolepis cernua</i> | | M | | I | M | |
| <i>Isolepis prolifera</i> | | | x | | | |
| <i>Isolepis reticularis</i> | | x | x | x | x | 229235, 229254 |
| <i>Isolepis sepulcralis*</i> | | x | | | | 229224 |
| <i>Juncus acuminatus*</i> | | x | | | | 229227 |
| <i>Juncus articulatus*</i> | | x | x | | | 229292, 229315 |
| <i>Juncus australis</i> | x | x | | PW | x | |
| <i>Juncus dichotomus*</i> | | x | | | | 229226 |
| <i>Juncus edgariae</i> | x | x | x | | x | 229317 |
| <i>Juncus effusus*</i> | x | x | x | x, FW | x | |
| <i>Juncus fockei*</i> | | | | EC | | 255957 |
| <i>Juncus kraussii</i> | | M | | I | M | |
| <i>Juncus planifolius</i> | | | | EC(FW) | | |
| <i>Juncus prismatocarpus</i> | | x | x | EC | | 229225 |
| <i>Juncus sarophorus</i> | x | | | | | 229229 |
| <i>Juncus tenuis*</i> | | | | C | | |
| <i>Lachnagrostis filiformis</i> | | | | I | | 229307-08 |
| <i>Lagurus ovatus*</i> | | | | | B | |
| <i>Lemna minor</i> | | x | | | | |
| <i>Lepidosperma australe</i> | | | | x | | |
| <i>Lolium perenne*</i> | | | x | | | |
| <i>Microlaena stipoides</i> | x | x | x | | x | |
| <i>Morelotia affinis</i> | | | | C | | |
| <i>Nematoceras macranthum</i> | | | | C | | 229313 |
| <i>Nematoceras trilobum agg.</i> | | | | | x | |
| <i>Oplismenus hirtellus</i> | x | x | x | x | x | |

| | | | | | | |
|---------------------------------------|----|----|---|----|------|--------|
| <i>Parapholis incurva</i> * | | | | | x | |
| <i>Paspalum dilatatum</i> * | x | x | x | x | x, B | |
| <i>Pennisetum clandestinum</i> * | x | xM | x | I | x, B | |
| <i>Petalochilus chlorostylus</i> | x | | | x | | |
| <i>Phormium tenax</i> | | | x | | | |
| <i>Poa anceps</i> | | | | | B | |
| <i>Polypogon fugax</i> * | | | | | B | |
| <i>Polypogon monspeliensis</i> * | | M | | | | |
| <i>Potamogeton cheesemanii</i> | x | | | | | 229228 |
| <i>Pterostylis agathicola</i> | | | | PW | | 250315 |
| <i>Pterostylis banksii</i> | | x | | PW | x | |
| <i>Rhopalostylis sapida</i> | x | x | x | x | x | |
| <i>Ripogonum scandens</i> | x | x | x | x | x | |
| <i>Rytidosperma biannulare</i> | | | | EC | | 255959 |
| <i>Rytidosperma gracile</i> | x | x | | x | | |
| <i>Rytidosperma pilosum</i> * | x | x | | | | |
| <i>Rytidosperma racemosum</i> * | x | | | | x | 229249 |
| <i>Rytidosperma unarede</i> | | x | | | | |
| <i>Schedonorus arundinaceus</i> * | x | x | x | I | | |
| <i>Schoenoplectus tabernaemontani</i> | x | x | | | | |
| <i>Schoenus tendo</i> | x | | | x | | |
| <i>Sporobolus africanus</i> * | | M | | C | B | |
| <i>Stenotaphrum secundatum</i> * | | M | x | | B, M | |
| <i>Thelymitra longifolia</i> agg. | | | | ?x | A | |
| <i>Thelymitra pauciflora</i> | ?x | | | | | |
| <i>Typha orientalis</i> | x | | x | | | |
| <i>Uncinia banksii</i> | | x | | PW | | 229304 |
| <i>Uncinia uncinata</i> | x | x | x | x | x | |
| <i>Vulpia bromoides</i> * | | x | | | | |
| <i>Watsonia ?aletroides</i> * | | | | C | | 256031 |

***Grammitis rawlingsii* Parris** an association with hard beech?

Maureen Young & Barbara Parris

Maureen Young

Grammitis rawlingsii, one of the so-called strap ferns, has a tufted habit, and a stipe winged to the base and sparsely hairy. In the field, the long, almost parallel-sided fronds, and the habit of growing on mossy mounds in kauri forests, make it an easy species to "get one's eye in for". To confirm the identity, use a hand lens to look at a frond with green sori, and there will be brown hairs ringing the sori in the manner of artificial eyelashes. This useful character is of little value if the sporangia have shed spores, as the tangled mass of ruptured brown sporangia makes the hairs practically impossible to see.

Specimens from the Hunuas (Mangatangi Trig Track and Mt William), together with a couple of collections from Mt Hobson, Great Barrier Island, have the appearance and habitat of *G. rawlingsii*, including the affinity for the moss, *Leucobryum candidum*, but lack the characteristic dark soral hairs. This entity is currently known as *G. aff. rawlingsii*, with its status as yet uncertain, pending resolution of the status of \pm hairless versus hairy *G. ciliata* and some other taxonomic problems with the genus in NZ (Barbara Parris pers. comm.).

The type locality for *G. rawlingsii* is the Toatoa Track, Waipoua Forest, where it was found in 1970 by Barbara Parris (not by G.B. (Joe) Rawlings as noted by Alan Esler (Esler 2006)). It is hard to find there now, but in 2006 I did manage to find one plant. The species was described in a taxonomic revision of the genus by Parris and Given (1976), and at that time the only known site was the type locality. Since then it has been found from the Hihi Peninsula near Mangonui in the north, to the Kauaeranga Valley in the south, with strongholds on the North Shore, near Warkworth, and Great and Little Barrier Islands.

Over the years I have noticed that although this fern is invariably found in kauri forest, around Warkworth and on the North Shore at least, it is also associated with hard beech (*Nothofagus truncata*). The hard beech component of northern forests is dwindling, no doubt due to global warming, and dead trees are often found near beech population sites. The common name comes from the fact that the wood contains silica. This blunted the saws of the old bushmen; it also means that dead trees take a long time to rot away. The outer sap wood slowly decays and becomes a good substrate for mosses, often the common milk moss, *Leucobryum candidum*, while the inner heart