

*Trifolium dubium* Sibth.

Suckling clover. Europe, Caucasus. Abundant in New Zealand. Crib walls, Auckland University. Fabaceae: Fabioideae.

*Tropaeolum majus* L.

Garden nasturtium, Indian cress. Peru, northern Andes. Abundant garden weed in New Zealand. Moist, shady places. Often scrambling over scoria walls. Tropaeolaceae.

*Valerianella carinata* Lois.

Com salad. Europe. Annual herb. Rock wall, Wynyard Street. AK 9603. Valerianaceae.

*Veronica arvensis* L.

Field speedwell, wall speedwell. Europe. Abundant annual weed in New Zealand. Cultivated ground, banks, walls. Scrophulariaceae.

*Veronica persica* Poir.

Scrambling speedwell. Europe, W. Asia. Very common weed of cultivated ground. Rock walls, Manukau City centre. AK 240876. Scrophulariaceae.

*Viola odorata* L.

Violet. Europe, Turkey. Naturalised in Auckland. Rock walls, Allendale Road, Mt. Albert. Violaceae.

### **Acknowledgements**

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## **Mt Eden Rock Forests, Auckland City**

Dedicated to the memory of James (Jim) Gouldstone\*

**E. K. Cameron**

### **Introduction**

In the 19th century, rock forest on basaltic lava (c. 19,000 years old) on the north-eastern slopes of Mt Eden (Maungawhau) was estimated to cover less than 50 ha (Smale and Gardner 1999) (see Fig. 1). Only three small areas of Mt Eden rock forest remain, all within 0.5 km of each other. Urbanisation, roading and quarrying have eradicated most of the rest, but individual trees and small groups of trees can still be seen on other private land in the adjacent area. The best known and the only one freely accessible to the public, is the Withiel Thomas Reserve, on the north side of

Withiel Drive (see Cameron et al. 1997: 205). The other two areas are close by: Government House grounds on the western side of Mountain Road, and the former Goodfellow property, to the north, off Almorah Road (see Fig. 1). On a rather wet 17 July 1999 Auckland Bot. Soc. visited all three sites. We started with 38 people at Government House and ended with 22 at the Goodfellow property.

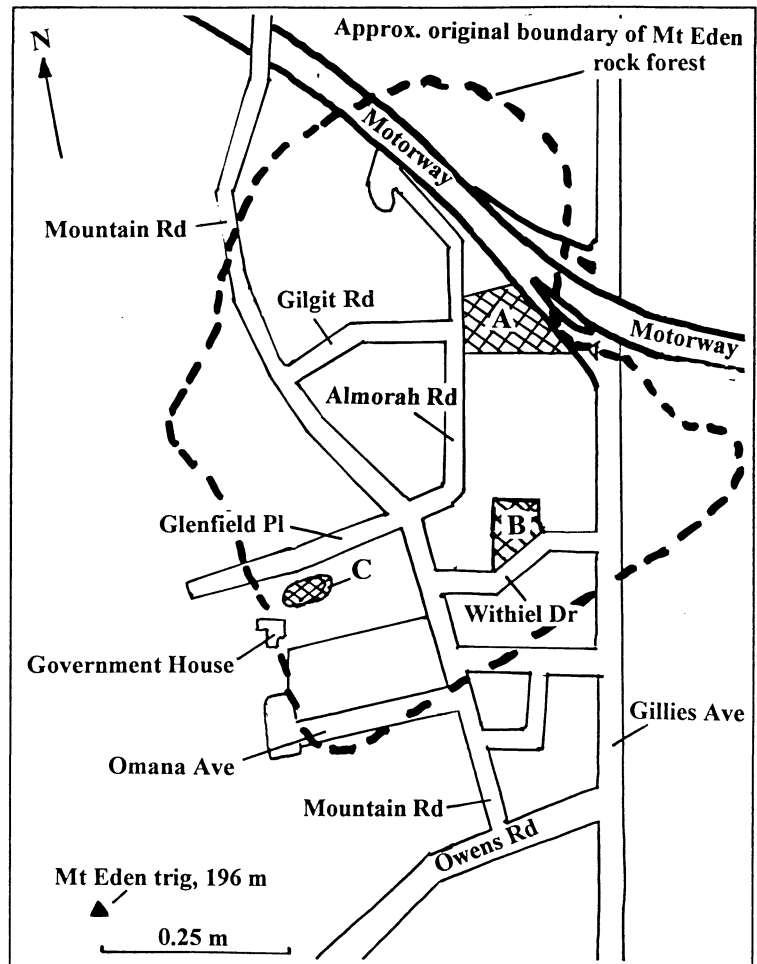
Kirk (1870) appears to be one of the first to document the vegetation on the Auckland scoria cones. In his general account of the Auckland isthmus flora he mentioned that there are

\* Jim Gouldstone (14 Jun. 1932 - 4 Oct. 1999) was a recent but keen Bot. Soc. member who had a passion for and an expert knowledge of small native land snails.

numerous ferns among the blocks of scoria on the scoria cones, and where there are trees and shrubs, they have “.. a luxuriance of growth for which one is altogether unprepared.” He mentioned that *Anarthropteris lanceolata* (as *Polypodium cunninghamii*) frequently had fronds over 30 cm long, and that the filmy ferns, *Hymenophyllum flexuosum* (as *H. javanicum*) and *Trichomanes endlicherianum* (as *T. humile*) “.. are often found in the most luxuriant state.” Kirk added that the same applied to the trees and shrubs growing in these seemingly unfavourable habitats; and that mangleo (*Litsea calicaris*), puka (*Griselinia lucida*), rangiora (*Brachyglottis repanda*), titoki (*Alectryon excelsum*) and houpara (*Pseudopanax lessonii*) were abundant. He also recorded the ferns *Pellaea falcata* and *P. rotundifolia* as abundant in sheltered rocky places, while *Asplenium flabellifolium* in many localities lined every crevice; *Astelia solandri* and peperomia (*Peperomia urvilleana*) as frequent on the rocks, and more rarely *Astelia banksii*.

Wall and Cranwell (1936: 30) and Cranwell (1981) recorded the lava field vegetation of Mt. Eden and Mt Wellington. They

described the Mt Eden bush as covering some acres, between Gilgit Rd and Gillies Ave (this includes the Goodfellow property), a relic of primeval forest in the midst of a modern suburb: “.. for almost 100 yards Almorah Road runs right through it ..” mangleo, puriri (*Vitex lucens*), kohekohe (*Dysoxylum spectabile*), karaka (*Corynocarpus laevigatus*), titoki, mahoe (*Melicactus ramiflorus*), pigeonwood (*Hedycarya arborea*), houpara (five-finger), and ngaio (*Myoporum laetum*) were the larger trees, with mahoe often dominant; mangleo was the tallest and sometimes 1 m in diameter; kawakawa (*Macropiper excelsum*) was the most abundant shrub, with plenty of rangiora and coastal karamu (*Coprosma* cf. *macrocarpa*). The larger trees and rocks were loaded with *Collospermum hastatum*, *Astelia solandri* and clumps of peperomia; *Asplenium lamprophyllum* often clothed the floor, and two species of filmy ferns (*Hymenophyllum dilatatum*, *H. flexuosum*) were present with white rata (*Metrosideros perforata*) and *Earina autumnalis* upon the rocks and trees. They stressed the general absence of climbers and tree ferns, and that nikau (*Rhopalostylis sapida*), mamaku (*Cyathea medullaris*) and king fern (*Marattia salicina*) had been planted. Cranwell (1981: 13) included a few sentences specifically on the Withiel Thomas Reserve, and reported that possums had



**Fig. 1. Location of the three Mt Eden rock forests:**  
**A = Goodfellow, B = Withiel Thomas, C = Government House.**  
**The broken line marks the approximate original extent of this forest type (based on Smale & Gardner 1999, fig. 1).**

killed many fine mangleo and weakened kohekohe in the general area.

Millener (1965) under Lava Field vegetation included the private Mt Eden bush and Mt Wellington lava fields. “This unique and very beautiful [Mt Eden] association, however, is almost certain to disappear within a generation or so.” Esler (1991) summarises the published isthmus lava forest information. Smale and Gardner (1999) published the first detailed vegetation structure and composition of the Withiel Thomas Reserve. They recorded 90 vascular species, 40% natural natives, 16% planted natives, 9% alien natives and 35% adventive. Twelve canopy species were recorded, with mahoe numerically dominant and puka dominant in terms of basal area.

#### Withiel Thomas Reserve

This bush area used to belong to Professor A.P. Withiel Thomas who lived adjacent to it on Mountain Road. Thomas developed the rocky paths, stone walls (using his Cornish background) and protected the forest for nearly 50 years until his son, Norman Thomas, “gifted” the 0.7 ha forest to

Auckland City in 1948. [Auckland City insisted on paying £5 or £10 for the property to avoid having to keep it as a reserve if they did not want to (F. Thompson pers. comm.).]

The canopy, on this mainly south-facing slope, is dominated by mangeao, titoki, puka and mahoe. Houpara is a common subcanopy tree, and kawakawa and coastal karamu form most of the understorey. The ground is mainly bare rock, with occasional ferns, shrub and tree seedlings, along with peperomia. The mat-forming exotic wandering Jew (*Tradescantia fluminensis*) was once common over the rocks in the Withiel forest, but is now scarce after recent Council weeding. Wandering Jew has been in the general area for a long time because Cheeseman (1919: 91) recorded that it "has become especially abundant on portions of the Mount Eden lava-fields." Climbing asparagus (*Asparagus scandens*), Japanese hill cherry (*Prunus serrulata*) and tree privet (*Ligustrum lucidum*) also require on-going control, along with acanthus (*Acanthus mollis*) which is abundant along the upper boundary by the road and is invading the south-western corner of the forest. Large tree privet were felled by the Council here in the 1980s (Smale & Gardner 1999). Also it would be good to carefully remove over time the inappropriate plantings (see Appendix 1, part B), which include individual native trees of northern tree rata (*Metrosideros robusta*), rimu (*Dacrydium cupressinum*), Hall's totara (*Podocarpus hallii*), *Tecomanthe speciosa* and the Australian Illawarra pine (*Podocarpus elatus*). Some date back to the time of Withiel Thomas. The lone 4 m tall parapara (*Pisonia brunoniana*) setting copious seedlings should also be removed, along with the inappropriate Council plantings by the road margin (i.e. karamu (*Coprosma robusta*) and *Pseudopanax laetus*), or replaced with locally sourced natural stock. For a complete species list see Appendix 1.

#### Government House grounds

There are many fine cultivated native and exotic trees in these grounds, some dating back to the 1870s when a Mr Heather planted trees on the property. Sir Frank and Lady Mappin bought the property in 1921 and built the house that exists there today. Using the natural features they worked constantly to develop the grounds, until the house and grounds were given to the Queen in 1966.

Relevant to this article is the rocky outcrop, north-east of the house (by Glenfell Place), which is clothed in native forest (c.0.4 ha). The canopy on this south-facing slope is dominated by karaka; mahoe is locally common, with occasional titoki, pigeonwood and puriri (*Vitex lucens*). There are two adult mangeao, the large one by the track is

65.8 cm DBH and c.20 m tall (Aug. 1999). Mangeao seedlings are locally common, which indicates the adult trees are different sexes. Kawakawa and coastal karamu dominate the understorey, with whau (*Entelea arborescens*) (up to 9 m tall) and mapou (*Myrsine australis*) occurring more locally. The ground is mainly bare, with occasional ferns. The garden staff have recently trapped Australian brushtail possums (*Trichosurus vulpecula*) and targeted the main weeds of this area: wandering Jew, tuber ladder fern (*Nephrolepis cordifolia*) and aluminum plant (*Galeobdolon luteum*). Adjacent adult bay laurel (*Laurus nobilis*) trees have seeded heavily into this area and also require targeting. The female bay laurels should be removed to stop the naturalisation by this shade tolerant species.

#### Former Goodfellow property, Almorah Road

In the first Auckland Bot. Soc. *Newsletter*, Marguerite Crookes (1943) reports of Bot. Soc. visiting Mr W. Goodfellow's Almorah Road property: "... members wandered in a patch of bush about 3 acres in extent which has remained virtually untouched since it formed part of the original plant covering of the Mt Eden lava fields. It is very similar in character to the gullies of Penrose and Mt Wellington lava fields. The ground is carpeted with masses of the beautiful *Asplenium lamprophyllum*, accompanied here and there by clumps of other common spleenworts." Crookes records that fine specimens of kohekohe, titoki, pigeonwood and mahoe are common, and a conspicuous feature is the truly magnificent specimens of mangeao. "Although the bush has been little touched, there have been one or two interesting introductions; noteworthy are fine specimens of king fern, .. and *Adiantum formosum* .."

The 1.47 ha former Goodfellow estate at 69 Almorah Rd, Epsom runs down from Almorah Rd to Gillies Ave by the motorway on-ramp and is mainly north-facing. It contains the largest remaining piece of Mt Eden rock forest. There is an old carriage-way some 70 m long from Gillies Avenue (the original access route) hewn out of the basalt (some 2.5 m deep by 4 m wide) up to the house. An old gas lamp indicates the era when this was accomplished. From the *New Zealand Herald* (13 February 1999: J1), the Goodfellow section contains a large, wooden two-storied mansion built earlier this century (pre-World War 1), a gymnasium and a small separate room. The Health Department bought the property in 1952 from Irene Lady Goodfellow, wife of businessman Sir William Goodfellow. The house and its grounds were compulsorily acquired under the Public Works Act and it became a hostel for dental trainees. Some of the property was taken for the Gillies Road on-ramp for the southern motorway in the 1960s (the forest

can still be viewed from this on-ramp, but the tree privet on the margin hides most of the native forest behind). In 1984 the property transferred to the Social Welfare Department, which leased it to Youthline House Trust to house rehabilitating drug addicts until 1997. During that time a gymnasium (now rather derelict) was built over the tennis court. Street kids occupied the building for a while after that, and currently students rent the property. Earlier this year the property went up for auction,

In April 1999 I recorded karaka and titoki as the main canopy trees; puriri was locally common; pigeonwood, mahoe and kohekohe occasional; and pohutukawa (*Metrosideros excelsa*) and mangeao had two trees each:

- karaka: main canopy tree, most abundant seedlings;
- titoki: next commonest canopy tree, lower trunk usually unbranched with a 25-30 cm DBH (one tree: 60.6 cm DBH);
- puriri: several large canopy trees, largest measured: 93.8, 82.7, 77.6, 56.4 cm DBH, no seedlings seen;
- pigeonwood: mainly as a narrow canopy tree, several >30 cm DBH (largest: 37.2 cm DBH), many lower trunks surrounded by a thicket of water shoots appressed to the trunk;
- mahoe: common but only occasionally making the canopy (largest: 51.6 cm DBH);
- kohekohe: few trees or seedlings, one standing tree dead (possum browsed?); and
- mangeao: seedlings scarce.

As in the other two forests, the shrub layer was dominated by kawakawa and coastal karamu. Hounds tongue (*Microsorium pustulatum*) and two spleenworts (*A. lamprophyllum*, *A. oblongifolium*) were the commonest ground ferns. King fern was locally common and looked very natural, with fronds up to 2.5 m long, in a rocky gully but Wall and Cranwell (1936: 30) say that it, along with nikau and mamaku, were planted. Crookes (1943) also stated that king fern was planted. Kiekie (*Freyinetia banksii*) is well established among the king fern, but Cranwell (1981: 14) casts some doubt whether this species is natural here. I suspect that it is natural because it is a most unlikely plant for anyone to cultivate and it also occurs at Withiel Thomas (Smale & Gardner 1999). See Appendix 1 for the complete species list.

There are several familiar rock forest weeds present; tree privet is common in the canopy, but mainly on the forest margins while wandering Jew covers over 50% of the ground. *Cordyline rubra* is an unusual species to see growing wild. There were many small plants (usually < 0.5 m tall) scattered throughout the forest. These were much further apart than could have been caused by suckering. Either the form here sets fruit (some Auckland plants set bright red fruit) or stems have been broken off and been dispersed (thrown?) from the larger cultivated specimens by the house and driveway. Fruit salad plant (*Monstera deliciosa*) had climbed over the rock wall of the carriage-way and 5 m up a titoki tree, spreading a considerable way from where it had been presumably originally planted. There are other potential weeds (not

but tender offers fell far short of the \$2.5 million valuation. The property is zoned to take 15 dwellings which would spell the end of most of the rock forest. What a fine public reserve this would make if the house were removed (it is dilapidated anyway), weeds and possums controlled, and the forest allowed to spread onto the modified areas. The forest can still be viewed from the low stone wall along the narrow part of Almorah Rd, as Cranwell (1981: 13) pointed out.

included in Appendix 1) that have been planted by the house, driveway or path, but have yet to establish in the forest. There are also tall cultivated specimens near the house which include Yunnan poplar (*Populus yunnanensis*) and several palms (*Howea belmoreana*, *H. forsteriana*, *Phoenix canariensis*, *P. ?reclinata*, *Syagrus romanzoffiana*, *Trachycarpus fortunei*).

#### Bryophytes and lichens

Wall & Cranwell (1936) mention the moss-covered lava of the Mt Eden bush. Although small, the mosses and leafy liverworts (frequently inter-mixed) form a green covering over many of the forest rocks. A common such moss was *Champtochaete pulvinata*. At Government House, the attractive, leafy liverwort *Lepidolaena taylorii* completely covered a few boulders c.1 m in diameter. Long, horizontal stems of the moss *Cyathophorum bulbosum* were occasional on the sides boulders. The two main rock forest lichens collected were both dark in colour (with a blue-green symbiont): *Leptogium* and *Pseudo-cyphelaria dissimilis*. See Appendix 1 for other species recorded (note this list will be incomplete because they were not extensively collected).

#### Rock forest land snails (J.K. Goulstone pers. comm., Aug. 1999)

Native land snails are few at Withiel Thomas, rich in the native remnant at Government House grounds, and even richer at the Goodfellow property. In a wonderful account Jim Goulstone records 24 species of land snails at Government House (Goulstone 1996) which he collected in his umbrella

during an open day. The list includes *Phenacohelix ponsonabyi* which has its type locality as Mt Wellington lava field. It hasn't been found at Withiel or Goodfellow.

#### Comparison of the three Mt Eden rock forest areas

In terms of the canopy species, puka stands out, being common at Withiel Thomas and absent at both Government House and Goodfellow. This species either grows on open ground (as it does at Withiel Thomas and Rangitoto Id), or as an epiphyte, which is its more usual growth form in other Auckland forests. Its preference for light indicates that the Withiel site was open when it established, i.e. that this forest is not a remnant, but probably established after clearing. The paucity of native land snails here strongly supports that this is the case. But puka was natural to Auckland volcanic cones, as it is today on Rangitoto Island, because it was one of the few tree species that Kirk (1870: 150) recorded as abundant on the scoria cones of the Auckland isthmus. Smale and Gardner (1999) found a low number of puka seedlings, mainly in the canopy gaps, and suggested that puka may regenerate in the gaps. Puka is possibly absent from the other Mt Eden forests because they are less modified (the snail information supports this) and were shaded out a long time ago.

Puriri is most common at Goodfellow on the north-facing slopes. This is probably because it is warmer than the south-facing slopes at Withiel Thomas and Government House.

Fifty-seven vascular species are accepted here as "natural" to these rock forests, Withiel Thomas with 48 species, Goodfellow 38 and Government House 33. If species that haven't been recorded here for over 15 years are excluded, the totals would be: 41, 33 and 33 respectively (note – that Goodfellow and Government House forests have had the least survey time). Twenty-five native species are common to all three areas, 14 are present at two sites, nine at only one site, and nine have not been recorded since 1981 or earlier. Some of these locally extinct plants could still be present in the smaller bush patches in private gardens in the general area.

#### Changes to the rock forest

Crookes (1943) recorded mangeao as conspicuous and truly magnificent at the Goodfellow property. Today only two trees survive there. In an adjacent property a tall, dead standing mangeao is present. Currently at Withiel Thomas there is at least one dead standing mangeao. Cranwell (1981) reported that possums have killed many fine Mt Eden mangeao. I cannot confirm this, but their numbers have decreased since the earlier reports this

century. The small numbers of kohekohe in all three areas almost certainly reflects how they are favoured by possums. Rangiora was reported as abundant on the Auckland isthmus scoria cones (Kirk 1871) and as plentiful in the Mt Eden bush by Wall and Cranwell (1936). But today it is on the verge of local extinction in the Mt Eden bush. Possums moderately prefer this species (M. Smale pers. comm.). *Asplenium lamprophyllum* and *Astelia solandri* are two other species which appear to have reduced severely from earlier reports, perhaps out-competed by wandering Jew.

Since 1981 there appear to have been nine local extinctions: six ferns, *Psilotum nudum*, white rata and *Earina autumnalis*. Five of these are not supported by herbarium records (see Appendix 1, part A). Some of these species possibly still survive on adjacent private land.

Millener (1965) mentions pohutukawa as the tree "... above all others in New Zealand able to colonise a broken rock substrate." Smale and Gardner (1999) briefly compare the colonising role of pohutukawa on Rangitoto Island and suggest that it may well have been important colonising Mt Eden. Oddly, Kirk (1870) does not include pohutukawa as a main species on the Auckland scoria cones at that time. Possibly it was already removed for boat building and firewood? Occasional large trees are present today in the Mt Eden rock forests, but it is difficult to tell whether they are natural, planted, or established after forest clearance by "urbanising" Europeans in the 19<sup>th</sup> century.

Apart from the continued decrease of forest on private land, the most noticeable change is the increase in weed species. In Appendix 1 (part B) 42 naturalised or planted species are recorded, Smale and Gardner (1999) add a further 26 species.

#### Other Rock Forest on the Auckland Isthmus

Kirk (1871) gives an insight to the vegetation on the volcanic cones of the isthmus at that time. The Mt Wellington lava field vegetation has been obliterated by quarrying and urbanisation. See Wilson (1927) and Wall & Cranwell (1936) for some record of the vegetation there. Penrose and Western Springs lava fields have long since been ruined (Wall & Cranwell 1936).

Cameron (1991) recorded a stand of native trees some 150 long x 10 m wide (c.0.15 ha) surviving among volcanic boulders (north-facing) on a steep slope near Ihumatao, Mangere. This was one of the few pieces of native vegetation surviving in the Mangere area. Karaka and titoki were the dominant trees, puriri and whau were occasional, and kawakawa and coastal karamu were the main

shrubs (see Cameron 1991 for the list of 15 native spp. recorded here). This area is part of the 100 ha Otuataua Stonefields which has been recently acquired as a historic reserve by Manukau City with support from other historic agencies. In May 1999 I returned to this area and added the following native forest species to the 1991 list (includes the adjacent smaller stands of trees): ferns (*Asplenium oblongifolium*, *Doodia australis*, *Pellaea rotundifolia*), trees (mahoe, ngaio, pigeonwood), herbs (*Dichondra repens*, *Microlaena stipoides*). Disappointingly no sign of the mawhai (*Sicyos australis*), recorded there in 1991 and 1992, could be found. Of the 22 native species recorded here, 19 are in common with the Mt Eden rock forest species. Not in common are: akeake (*Dodonaea viscosa*) and *Microlaena stipoides* (mawhai should be excluded because it is not a forest species). With this area now in public ownership it is now possible to totally exclude the stock in the adjacent paddocks; weed control is also long over-due.

### Conclusion

If these forest fragments are going to survive in the long term they will require: weed control; animal control (especially possum control); neighbours

taking an active part in controlling weeds on their property (and not dumping them in to forest areas); neighbours protecting rock forest species on their land; and Council covenanting the better forest pieces on private land (mainly adapted from Smale & Gardner 1999). The recent weeding, of mainly wandering Jew, at both Withiel Thomas (post Smale & Gardner) and Government House has resulted in spectacular regeneration of most rock forest species. This illustrates what can be achieved in these small bush areas.

The Auckland isthmus has already lost most of its rock forest vegetation, much of it obliterated only recently. The former Goodfellow property at Almorah Rd in Crown ownership is the last chance we have to preserve the largest and best remnant of Auckland's rock forest. Being mainly north-facing, it complements the two Mt Eden south-facing areas. This opportunity must not be allowed to slip through our fingers! Preservation of the south-facing, probably regenerated Withiel Thomas Reserve (<1 ha) is not sufficient representation of this once more widespread, unusual forest type on the Auckland isthmus.

### Acknowledgements

Mark Smale, Rhys Gardner for comments about the Mt Eden rock forest flora; Jim Goulstone for information on native land snails; managers of Government House grounds and Goodfellow property for access to these areas; Jessica Beever, John Braggins, Doug Rogan and Matt von Konrat for identifying the lower plant specimens collected; Fiona Thompson for historical information about the Withiel Reserve and her grandfather (Withiel Thomas); Pat Brownsey for checking if the two filmy ferns were vouchered at WELT; and Mark Smale, Doug Rogan and Cheryl Taylor for suggesting changes to the draft text.

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## Appendix 1. Plants of Mt Eden rock forest at three localities

### Key

- a = abundant  
 c = common  
 o = occasional  
 1 = local  
 s = scarce (< 5 plants seen)  
 cb = close by  
 m = margin of forest  
 AEW = collected by A.E. Wright, Aug 1971, not seen by me  
 AK = Auckland Museum herbarium voucher  
 LHM = recorded from Millener (1965)  
 LMC = recorded from Cranwell (1981), often with no specific Mt Eden rock forest locality  
 MWC = recorded by M.W. Crookes (1943), not seen by me

S&G = recorded by Smale & Gardner (1999), not seen by me

W&C = record from Wall & Cranwell (1936)

\* = naturalised species

\*\* = native species suspected to have established from cultivated specimens outside the forest area, often based on historical comments by Wall & Cranwell (1936)

\* = suspected to be planted native species

\*\* = suspected to be planted exotic species

**A. "NATURAL" NATIVE VASCULAR SPECIES** ("natural" meaning native species whose presence is unaided by humans, or established from planted native species considered natural to the area; canopy species in bold)

	Goodfellow	Withiel	Govt. House	AK
<b>Ferns</b>				
<i>Anarthropteris lanceolata</i> (lance fern)		l	lc	232703
<i>Arthropteris tenella</i>			l	240027
<i>Asplenium flaccidum</i> (hanging spleenwort)		o	o	
<i>A. lamprophyllum</i>	o	lc	s	214927
<i>A. olongifolium</i> (shining spleenwort)	o	o-lc	o	214835
<i>Blechnum filiforme</i> (thread fern)		AEW		219952
<i>Cyathea dealbata</i> (ponga) **	l		s	
<i>C. medullaris</i> (mamaku) **	x1	AEW	m	220139
<i>Doodia australis</i> (rasp fern)	l		o	
<i>Hymenophyllum dilatatum</i>	W&C, LMC			
<i>H. flexuosum</i>	W&C			
<i>Lastreopsis glabella</i>		AEW		223270
<i>L. microsora</i>		l	lc	129151
<i>Microsorium pustulatum</i> (hounds tongue)	o	lc	o	129138
<i>M. scandens</i> (fragrant fern)	s	S&G	o	
<i>Pellaea rotundifolia</i> (tarawera)		AEW		220428
<i>Pneumatopteris pennigera</i> (gully fern)		AEW		223163
<i>Polystichum richardii</i> (shield fern)		AEW		129152
<i>Psilotum nudum</i>	LMC	LMC		
<i>Pteris tremula</i>	o	s	o	220275
<i>Pyrrhosia eleagnifolia</i> (leather fern)	o	o	o	
<i>Tmesipteris elongata</i>		S&G		
<b>Dicots</b>				
<i>Alectryon excelsus</i> (titoki)	c	c	o	
<i>Brachyglottis repanda</i> (rangiora)	x1	x1		
<i>Calystegia tuguriorum</i>	x1			239509
<i>Coprosma</i> aff. <i>macrocarpa</i> (coastal karamu)	o-lc	c	c	239596
<i>Corynocarpus laevigatus</i> (karaka)	c	l	c	
<i>Dysoxylum spectabile</i> (kohekohe)	o	s, x2*	s	
<i>Entelea arborescens</i> (whau)	x3	x1, x3 cb o-lc		
<i>Geniostoma rupestre</i> (hangehange)	o	o	o	
<i>Griselinia lucida</i> (puka)		c		
<i>Hedycarya arborea</i> (pigeonwood)	o	o	o	242043
<i>Hoheria populnea</i> (lacebark)**		s	l	
<i>Litsea calicularis</i> (mangeao)	x2	c	s (seedlings c)	142677
<i>Macropiper excelsum</i> (kawakawa)	c	c	c	230985
<i>Meliclytus ramiflorus</i> (mahoe)	c	o-lc	o-lc	241943
<i>Metrosideros excelsa</i> (pohutukawa)	x2	x3	m	
<i>M. perforata</i> (white rata vine)	W&C			
<i>Myoporum laetum</i> (ngaio)	x2 cb	x2, x1*		
<i>Myrsine australis</i> (mapou)	o-lc	o		
<i>Peperomia urvilliana</i>	l	lc	l	242044
<i>Pittosporum crassifolium</i> (karo)**		x1		
<i>Pseudopanax crassifolius</i> (lancewood)		S&G		
<i>Pseudopanax crassifolius</i> x <i>P. lessonii</i>		o-lc	s	
<i>P. lessonii</i> (houpara)	s	c	s	239597
<i>Schefflera digitata</i> (pate)	s	x1*		
<i>Solanum aviculare</i> (poroporo)		S&G	l	
<i>Vitex lucens</i> (puriri)	lc	x1	o	
<b>Monocots</b>				
<i>Astelia banksii</i>	l	o-lc	o	
<i>A. solandri</i>	W&C, LHM	S&G		
<i>Carex</i> sp.		S&G		
<i>Collospermum hastatum</i>	l	S&G		
<i>Cordyline australis</i> (cabbage tree)		x1	s	
<i>Earina autumnalis</i>	LMC, cb			
<i>Freycinetia banksii</i> (kiekie)	l	S&G		
<i>Oplismenus imbecillius</i> (panic grass)		S&G		
<i>Rhopalostylis sapida</i> (nikau)**	o	lc (<2.5m)	o	

**B. VASCULAR NATURALISED SPECIES (\*), PLANTED NATIVES FROM OUTSIDE THEIR NATURAL GEOGRAPHICAL RANGE, PLANTED NATIVES UNLIKELY TO GROW NATURALLY IN THIS HABITAT (\*), AND PLANTED EXOTICS IN THE FOREST (\*\*)**

**Ferns**

<i>Adiantum formosum</i> *	MWC		lc	153368
<i>Asplenium bulbiferum</i> (hen & chicken fern)*			c	
<i>Dicksonia squarrosa</i> (wheki) *			s	
<i>Marattia salicina</i> (king fern)*	lc	x4	lc	223663
<i>Nephrolepis cordifolia</i> (tuber ladder fern)*		l	lc	
<i>Pteris cretica</i> *	s	s		239594
<i>Selagenella krausiana</i> (African club moss)*			lc	

**Conifers**

<i>Dacrydium cupressinum</i> (rimu) *		x1		
<i>Podocarpus elatus</i> (Illawara pine) **		x1		
<i>P. hallii</i> (Hall's totara) *		x1 (& wild seedlings)		

**Dicots**

<i>Acanthus mollis</i> (acanthus)*	l	lc	o	
<i>Acmena smithii</i> (acmena)*		s (seedlings)	l	242045
<i>Anredera cordifolia</i> (Madeira vine)*	l	cb, S&G	l	239590
<i>Cestrum nocturnum</i> (queen of the night)*	o	S&G		
<i>Coprosma robusta</i> (karamu)*		l		
<i>Cymbalaria muralis</i> (ivy-leaved toadflax)*			lc	
<i>Elaeagnus x reflexa</i> (elaeanthus)*			l	
<i>Erythrina x syskesii</i> (coral tree)*	m			
<i>Euonymus japonicus</i> (evergreen spindle)*	s	s		242046
<i>Galeobdolon luteum</i> (aluminium plant)*		S&G	l	239592
<i>Hedera helix</i> (ivy)*	lc		l	
<i>Homalanthus populifolius</i> (Queensland poplar)*		l	o	239591
<i>Laurus nobilis</i> (bay laurel)*		s	c	158768
<i>Ligustrum lucidum</i> (tree privet)*	lc	l	o	
<i>Meryta sinclairii</i> (pukanui)*		x1		
<i>Metrosideros robusta</i> (tree rata)		x1		
<i>Oxalis incarnata</i> (lilac oxalis)*		l		
<i>Paraserianthes lophantha</i> (brush wattle)*		l		
<i>Pisonia brunoniana</i> (parapara)*		x1 (& seedlings)		239599
<i>Plectranthus ciliatus</i> *	lc			239511
<i>Pouteria costata</i> (tawapou)*		x1		
<i>Prunus serrulata</i> (Japanese hill cherry)*	o	c (seedlings)	s	242042
<i>Pseudopanax discolor</i> *		x2		
<i>P. laetus</i> *		x3		
<i>Tecomanthe speciosa</i> *		x1		

**Monocots**

<i>Alocasia brisbanensis</i> (elephant's ear)*	o	S&G		
<i>Arthropodium cirratum</i> (rengarenga)*			o	
<i>Asparagus scandens</i> (climbing asparagus)*		c		239502
<i>Cordyline rubra</i> *	o		l	239513
<i>Hedichyum gardnerianum</i> (kahili ginger)*	o	s		
<i>Monstera deliciosa</i> (fruit salad plant)*	l	m	o	239514
<i>Tradescantia fluminensis</i> (wandering Jew)*	a	c	lc	

**C. NON-VASCULAR SPECIES (not recorded for Goodfellow)**

**Bryophytes on rock**

<i>Champtochaete pulvinata</i> "maculosa form"		a	a	240021, 242346
<i>Cyathophorum bulbosum</i>		o	o	242286
<i>Frullania solanderiana</i>		lc		242358
<i>Lepidolaena taylorii</i>			lc	240029
<i>Lunularia cruciata</i> *			l	240025
<i>Pendulothecium punctatum</i>		lc		242363

**Lichens on rock**

<i>Leptogium ? cyanescens</i>		o	c	240021
<i>Parmotrema chinense</i>			l	240024
<i>Pseudocyphellaria dissimilis</i>		lc		242049

Note: Smale and Gardner (1999) include the extant Wall & Cranwell (1936), Millener (1965, 1979) and Cranwell (1981) records in their Withiel list, whereas I've taken these earlier records to be more related to the Goodfellow (Almorah Road) area (unless otherwise stated). For Withiel Thomas Reserve they recorded 26 additional species (not listed above), which I didn't see in any of the 3 above areas. These included 9 planted, 16 naturalised, and 1 "natural" native species (*Coprosma repens* – I think this is more likely to be planted or derived from a planted specimen). In the text they recorded *Asparagus asparagoides*, in their appendix, *A. plumosa* (= *A. setaceus*); I saw only *A. scandens* which was unrecorded by them. *Andraea coreopsis* in their appendix I've assumed to be *Anredera cordifolia*. Their list excludes the extinct historical records of Wall and Cranwell (1936), Cranwell (1981) and the 1971 Wright herbarium records.