Vascular Flora of Maungaraho Rock Scenic Reserve

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INTRODUCTION

Maungaraho Rock Scenic Reserve, administered by the Kaipara District Council, is an imposing geographic feature of the northern Kaipara. Lying to the north-east of the well known landmark, the Tokatoka volcanic plug, Maungaraho is an impressive outcrop of andesitic rock (Fig. 1) that is very popular with rock climbers[3] but otherwise seems little known to the New Zealand public.

Figure 1: Maungaraho Rock (right) lies north-east of Tokatoka (left) on the northern Kaipara Harbour.

During 21 July 1997 one of us (PdL) led an Auckland Botanical Society field trip to Maungaraho Rock and Tokatoka. The weather was not kind, and the purpose of the trip to prepare a plant checklist for Maungaraho was not achieved. Nor did members get to see in flower what is now known as *Hebe saxicola* (de Lange & Rolfe 2008), a species which PdL was then actively engaged in formally describing (see de Lange 1998 as *H. perbella*).

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3. Some years back there was one of those wonderfully banal Television 3 shows depicting celebrity wannabees doing some form of "outdoor activity". Maungaraho featured as the place where Lana Coc-Kroft was dragged screaming up the western side of the bluff (she may have broken a finger nail) by a team of rock climbers who gave every impression that they would rather have been somewhere else.

So it was that on 11 May 2008 we visited Maungaraho Rock with the intention of gathering further ecological information and images of what is now *Hebe saxicola* (de Lange & Rolfe 2008). In the process, we compiled a plant list for the reserve and made some notes about the vegetation. These notes, together with observations made by PdL on 3 January 1997 and 28 January 2010, form the basis of this article.

THE FLORA

We report a total of 238 vascular taxa and 2 informally recognised entities (in *Kunzea* and *Leptospermum*) from Maungaraho Rock Scenic Reserve (see Appendix). In addition to vascular plants, we also noted (and in some cases collected) a few liverworts (8), mosses (31) and lichens (9). Nine additional lichens were also collected and identified by D.B. Rogan (former technician at Auckland Museum Herbarium (AK)) who had participated in the Auckland Botanical Society Field Trip lead by PdL, and lodged his gatherings in AK. For completeness we have included his collections in the checklist appended to this article.

Maungaraho Rock Scenic Reserve is a notable hot spot for threatened and uncommon plants, and has one endemic, *Hebe saxicola* (see de Lange & Rolfe 2008; de Lange et al. 2009; de Lange et al. 2010). As well as this species, the reserve also supports populations of four other nationally threatened or at risk taxa (*Danhatchia australis*, *Korthalsella salicornioides*, *Picris burbidgeae*, and *Senecio scaberulus*) (see listings by de Lange et al. 2010). The bryophyte flora of the rock would also repay further investigation. So far our limited gatherings have revealed a wealth of interesting liverworts and mosses, including the uncommon liverwort *Acrolejeunea securifolia* subsp. *securifolia* and mosses *Ectropothecium sandwichense* and *Pyrrhobryum paramattense*.

The Auckland Botanical Society Field Trip to Maungaraho in 1997 and our joint visit in 2008 were mainly undertaken to gather information on *Hebe saxicola* (which had been included within *H. perbella* by de Lange 1998), which is confined to the rock and its immediate vicinity. Similarly, a brief visit to the rock by PdL in January 2010 only explored portions of the northern side of the rock. As such, much of the forested southern and western portion of the reserve has yet to be botanically investigated.

VEGETATION ASSOCIATIONS

The following notes describe the vegetation associations and physiography of the rock. These notes are intended to be a descriptive guide to the main vegetation types and are not based on quantitative sampling.

The northern portion of the reserve is very exposed. A long access road (formerly a quarry road) drives virtually to the foot of the bluff, being separated from it by a narrow (20–30 m wide) strip of secondary regrowth forest dominated almost exclusively by mānuka (*Kunzea* aff. *ericoides* (b))[4]. This forest—at places up to 15 m tall—has established on colluvium and boulder falls derived from the nearby bluff. The nature of the substrate and the northerly aspect means that in summer the vegetation of this area is often severely drought stricken. This may explain why the understorey is not very diverse, being mostly dominated by scratchy bushes of *Coprosma rhamnoides*, with tufts of *Gahnia lacera* and *Doodia australis* as the main ground cover. It is only amongst the boulders closer to the actual bluff that plant diversity improves, with the boulder faces supporting *Arthropteris tenella*, *Blechnum filiforme*, *Pyrrosia eleagnifolia*, rengarenga lily (*Arthropodium cirratum*), *Peperomia urvilleana*, taurepo (*Rhabdothamnus solandri*), pekapeka (*Dendrobium cunninghamii*), and, on the larger boulders, occasional shrubs of *Hebe saxicola*.

Along the north-western portion of the reserve, especially as it starts to swing to the south, the forest margin broadens, and here, particularly in the steep gullies that drain the main rock, a mixed forest canopy of puriri (*Vitex lucens*), nikau (*Rhopalostylis sapida*), taraire (*Beilschmiedia tarairi*), and karaka (*Corynocarpus laevigatus*) is present. Beneath this is a dense understorey of kiekie (*Freycinetia banksii*). It was also here, within light scrub abutting the western cliff face, that a few plants of the threatened native oxtongue (*Picris burbidgeae*) and *Senecio scaberulus*, and nationally uncommon *Korthalsella salicornioides* were found by PdL in January 1997. These seem to have vanished from this area now, though *Korthalsella* is still locally present on the mānuka and kahikātoa (*Leptospermum* aff. *scoparium* (a)) on the summit ridgeline of the rock itself. In this area, a track leads up to the foot of the western end of the rock where there is a small area of levelled ground at the beginning of one of the main rock climbing routes. It was here that both *Anthosachne multiflora* subsp. *multiflora* and *Trisetum arduanum* were noted in 1997. However, by 2008 this site had become overgrown with rats tail (*Sporobolus africanus*), and neither native grass was observed there or anywhere on the rock in the 2008 or 2010 visits, so they may now be locally extinct at Maungaraho.

4. Until the 1930s, "mānuka" was universally used by Māori for species of *Kunzea*, whilst kahikātoa was employed solely for members of the *Leptospermum scoparium* agg. Further, as the derivation of the name "kānuka" is ambiguous (see de Lange et al. 2007, p.5, and references therein), we have elected to use mānuka as it is still used today by northern Māori, and specifically those in the Kaipara under whose rohe Maungaraho falls.

The southern and south-western slopes leading up to the rock itself are dominated by forest comprised of taraire, puriri, nikau with occasional kahikatea (*Dacrycarpus dacrydioides*), rimu (*Dacrydium cupressinum*) and totara (*Podocarpus totara* var. *totara*). In this area, a few fruiting plants of *Danhatchia* were noted in January 2010 as well as the moss *Pyrrhobryum paramattense*. This species is another of New Zealand's "tropical" mosses, which is otherwise known in the North Island only from Waipoua Forest (Fife 1989). This same moss is abundant on Raoul Island (Beever et al. 1996), and reaches its world southern limit on Chatham Island (de Lange et al. 2008). It is easily confused with *P. mnioides* from which it differs by the leaves which gradually increase in size from the base of the plant to the tip (Beever et al. 1992). Because of this similarity, it is quite likely that it has been overlooked in northern New Zealand, and as such we have no doubt that with diligent searching it will be found elsewhere in this area.

Upslope, leading to the southern access way up the rock, this forest association rapidly reduces in stature and species diversity. However, in a few places, especially where boulder falls and chokes have evened out the slopes, tall mamangi (*Coprosma arborea*), and sprawling shrubs of *Coprosma macrocarpa* subsp. *minor*, hangehange (*Geniostoma ligustrifolium*) and taurepo are common. In some sites nearer the rock, and especially amongst the damper boulder falls along the southern side, the sedges *Carex lambertiana*, *C. spinirostris* and *Uncinia banksii* are common.

The rock itself presents distinct vegetation types that appear correlated to exposure and summer drought. Thus, the northern slopes tend to be sparsely vegetated by flowering plants and ferns. The most common of these are rengarenga lily, *Astelia banksii*, mingimingi (*Leucopogon fasciculatus*), mānuka, kahikātoa, *Leptecophylla juniperina*, and in places *Hebe saxicola*. The southern slopes, which are presumably much wetter, support a wealth of shrubs and plants suited to rupestral habitats, notably masses of whaririki (*Phormium cookianum* subsp. *hookeri*), *Collospermum hastatum*, *Astelia banksii*, assorted *Coprosma* spp., *Hebe macrocarpa* var. *macrocarpa*, *H. saxicola*, *H. stricta* var. *stricta*, mapou (*Myrsine australis*), stunted houhere (*Hoheria populnea*), taurepo and masses of filmy ferns (especially *Cardiomanes reniforme* and *Hymenophyllum sanguinolentum*).

In several places along the base of the cliff on the southern side, there are seepages present, and around one of these grows the uncommon tropical moss *Ectropothecium sandwichense*. At another site, where a dense weft of *Cheilolejeunea* and *Lopholejeunea* liverworts covers the rock, *Grammitis ciliata* and *Ctenopteris heterophylla* grow admixed. Here we found a few plants of what we concluded could only be the intergeneric hybrid

Ctenopteris heterophylla × *Grammitis ciliata* (Fig. 2). This identification was later confirmed by Dr B.S. Parris who critically examined our gathering. Previously Parris (1977) had recorded a herbarium example of *Ctenopteris billardierei* × *Grammitis billardierei* from Fiordland, but the specimen on which that record was based cannot now be located at CHR (B.S. Parris pers. comm.). Our find (albeit of a different hybrid combination) is therefore very significant, as tangible evidence that both genera can hybridise with each other.

Figure 2: *Ctenopteris heterophylla* × *Grammitis ciliata*.

The ridgeline of the rock itself supports low windswept vegetation dominated by mānuka, kahikātoa, mapou and totara (not only saplings but also aged "trees" reduced to sprawling tangled masses). The ground cover is often audibly "crunchy" as it is dominated by *Pulchrinodus inflatus*, a rather beautiful enigmatic golden yellow moss; enigmatic because it has not yet been found fertile and, until it is, its exact family placement remains unclear (Allen 1987). On the eastern end of the rock, a lone *Pinus pinaster* forms a prominent landmark. Sadly, it is along much of this ridgeline where pampas grass (*Cortaderia selloana*), willow-leaved hakea (*Hakea salicifolia*) and boneseed (*Chrysanthemoides monilifera*) are common.

The ridgeline is also where the main concentration of *Hebe saxicola* is present, and, below the summit trig station, there are a few plants of native oxtongue and *Senecio scaberulus*. Amongst the windswept scrub

of the ridgeline there are large areas of "bare" rock, and these are often thickly covered in mosses and lichens. Probably the most common mosses are species of *Bryum*, *Campylopus*, *Grimmia laevigata*, and *Schistidium apocarpum*. The most prominent lichens are species within the genera *Caloplaca*, *Lecanora*, *Parmelia*, *Parmotrema* and *Xanthoparmelia*. In a few areas, dark red patches of liverworts (*Frullania* spp.) are common, providing a nice contrast to the dark chocolate brown and golden coloured lichen *Pseudocyphellaria crocata*. On the southern side of the main ridgeline there are occasional patches of *Acrolejeunea securifolia* subsp. *securifolia*. This liverwort forms somewhat golden to greyish-white mats. It is a common tropical species of northern Australia and the Pacific basin, and was previously recorded from New Zealand from only one collection made by B.G. Hamlin from near Hicks Bay, East Cape (Gradstein 1975). Aside from Maungaraho Rock, over the last three years *Acrolejeunea securifolia* has been found on Raoul Island (where it is common (P. J. de Lange unpubl. data)); in the North Island at Te Paki (one site—see de Lange & Fife 2010) and again from near Hicks Bay (a new site (P.J. de Lange unpubl. data)), and from the Chatham Islands, its world southern limit, with records from Rekohu (Chatham Island) and Rangiauria (Pitt Island) (uncommon (P. J. de Lange unpubl. data)).

Finally, along the base of the north-eastern side of the rock, presumably where water drains from the rock, are a series of soaks and one large pond. In May 2008, the surface of the pond was choked in a thick mat of *Landlotia punctata*, frog weed (*Lemna minor* agg.) and water meal (*Wolffia australiana*). Through this mat, occasional sprigs of *Potamogeton cheesemanii* were also noted.

DISCUSSION

Maungaraho Rock is a significant reserve within the Kaipara District. Whilst it is notable as the only known site for *Hebe saxicola*, the rock also supports a range of other threatened, at risk or uncommon vascular plants and bryophytes. Unfortunately the rock is threatened by a number of weeds, especially pampas grass, boneseed and willow-leaved hakea. Pampas grass and boneseed were identified as serious threats to *Hebe saxicola* (see de Lange & Rolfe 2008) and it is important that they are controlled before they get out of hand. Willow-leaved hakea is confined to a small area of the main summit ridge, where it could be easily controlled. Rats tail is a potential threat to the indigenous vegetation of the rock ledges, and has probably displaced the indigenous grasses *Anthosachne multiflora* subsp. *multiflora* and *Trisetum arduanum*. It may also be a factor in the decline

of native oxtongue and *Senecio scaberulus*. The impact of this grass on the bryophyte and lichen flora of these habitats has also probably been severe. Certainly, the impression gained from the three visits PdL has made to the rock between 1997 and 2010 is that the overall quality and diversity of the drier north and north-western facing rock ledges has deteriorated where rats tail has spread.

In 1998, rock climbing had been identified as a potential threat to what was then known as *Hebe perbella* (now *H. saxicola*) (de Lange 1998). In the 2008 and 2010 visits it was noted that many of the tracks and rock climbing routes had become overgrown, and it would seem that the rock is hardly used for this activity anymore. Nevertheless it is important that provision is made by the administering body (the Kaipara District Council) to ensure that any future rock climbing is restricted to the less sensitive parts of the rock.

Fire remains the single largest threat to the rock which is frequently visited. In past visits, occasional burned out (presumably stolen) cars have been seen, and PdL has witnessed two small fires lit by visitors for "brew ups" close to the northern forest that fringes the car park. Should any fire get out of hand, especially in summer, the impact on the rock could be devastating.

ACKNOWLEDGEMENTS

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APPENDIX

I: indigenous total, N: naturalised total, *: naturalised species, AK: Auckland Museum herbarium, CHR: Landcare Research herbarium

LYCOPHYTES (2) (I:2 N:0)
Huperzia varia (unc)
Lycopodium volubile (unc)

FERNS (39) (I:38 N:1)
Arthropteris tenella (unc)
Adiantum cunninghamii
A. fulvum (unc)
A. hispidulum
Asplenium bulbiferum (unc)
A. flaccidium
A. gracillimum (unc)
A. oblongifolium
A. polyodon
**Azolla pinnata,* AK 302244
Blechnum filiforme
B. fluviatile (unc)
B. fraseri (unc)
Cardiomanes reniforme
Ctenopteris heterophylla (unc), AK 302261
C. heterophylla × *Grammitis ciliata* (unc), AK 302263
Cyathea cunninghamii (unc)
C. dealbata (unc)
C. medullaris
Doodia australis
Grammitis ciliata (unc), AK 302262
Hymenophyllum dilatatum (unc)
H. flexuosum (unc)
H. multifidum
H. rarum
H. revolutum
H. sanguinolentum
Lastreopsis glabella (unc)
L. hispida (unc)
Loxogramme dictyopteris (unc)
Microsorum pustulatum subsp. *pustulatum*
M. scandens
Pellaea rotundifolia (unc),
Pneumatopteris pennigera,
Polystichum neozelandicum subsp. *neozelandicum* (unc)
Pteridium esculentum
Pteris macilenta (unc)
P. tremula (unc)
Pyrrosia eleagnifolia

GYMNOSPERMS (5) (I:4 N:1)
Agathis australis (unc)
Dacrycarpus dacrydioides (unc)
Dacrydium cupressinum (unc)
**Pinus pinaster* (unc—one tree)
Podocarpus totara var. *totara*

MAGNOLIIDS (5) (I:5 N:0)
Beilschmiedia taraire
Hedycarya arborea
Litsea calicaris
Macropiper excelsum subsp. *excelsum*
Peperomia urvilleana

EUDICOTS (116) (I:76 N:40)
Alectryon excelsus subsp. *excelsus* (unc)
**Anagallis arvensis* subsp. *arvensis* var. *arvensis*
**A. arvensis* subsp. *arvensis* var. *coerulea*
**Bellis perennis*
Brachyglottis repanda (unc)
Calystegia sepium subsp. *roseata*
**Centaurium erythraea*
Centella uniflora
**Chrysanthemoides monilifera*
**Cirsium palustre*
**C. vulgare*
Clematis paniculata
**Conyza sumatrensis*
Coprosma arborea
C. areolata
C. crassifolia
C. grandiflora
C. lucida
C. macrocarpa subsp. *minor,* AK 258664
C. propinqua var. *propinqua* (unc)
C. rhamnoides
C. robusta
C. rotundifolia
C. macrocarpa subsp. *minor* × *C. robusta*

C. propinqua var. propinqua × *C. robusta* (unc)
**Crepis capillaries*
Corynocarpus laevigatus, AK 307589
**Daucus carota*
Dichondra repens
**Dysoxylum spectabile*
Epilobium nummularifolium
E. pubens
Euchiton audax (unc)
E. collinus
**Galium aparine*
**G. divaricatum*
**G. murale* (unc)
G. propinquum
**Gamochaeta coarctatis*
Gaultheria antipoda (unc)
Geranium homeanum
Gonocarpus incanus
Griselinia lucida
**Hakea salicifolia*
Haloragis erecta subsp. *erecta*
Hebe macrocarpa var. *macrocarpa,* AK 302259
H. saxicola, AK 230137
H. stricta var. *stricta,* AK 302258
Hoheria populnea (unc)
Hydrocotyle dissecta
H. elongata (unc)
H. heteromeria
H. microphylla
H. moschata var. *parviflora*
**Hypochoeris radicata*
Knightia excelsa
Korthasella salicornioides (unc), AK 232713
Kunzea aff. *ericoides* (b) (common species; tall trees, bark flaking in long tabular strips, branchlet hairs copious and antrorse-appressed, inflorescences initially corymbiform)
**Leonotodon taraxacoides*
Leptospermum aff. *scoparium* (a) (common northern North Island species; erect shrubs or small trees, leaves broadly lanceolate, apex not especially acutely-tipped, margins fringed with silky white hairs, flowers uniformly white)
Leptecophylla juniperina agg. (plants with broad lanceolate leaves up to 40 mm long)
Leucopogon fasciculatus agg. (northern form with lanceolate leaves up to 40 mm long)
L. fraserii
**Ligustrum sinense* (unc)
**Linum bienne*
**L. catharticum*
**L. usitatissimum*
Lobelia anceps
**Lotus pedunculatus*
Melicytus ramiflorus
**Mentha pulegium*
Metrosideros carminea (unc)
M. perforata
Muehlenbeckia australis
Myrsine australis
M. salicina (unc)
Nertera depressa
N. dichondrifolia
Olearia furfuracea
O. rani var. *rani* (unc)
Oxalis exilis
Persicaria decipiens
Picris burbidgeae (unc), AK 232960
**Phytolacca octandra*
**Plantago australe*
**P. lanceolata*
**P. major*
Pomaderris amoena
Pseudopanax arboreus
P. crassifolius
Ranunculus reflexus (unc)
**R. repens* (unc)
Rhabdothamnus solandri (unc)
Rubus cissoides (common northern form with narrow leaflets)
Schefflera digitata
**Senecio bipinnatisectus*
S. esleri
S. hispidulus
S. quadridentatus (unc)
S. scaberulus (unc), AK 233091

**Sison amomum*
Solanum nodiflorum (unc)
**S. chenopodioides* (unc)
**S. nigrum*
**Sonchus oleraceus*
**Stellaria media*
S. parviflora
**Torilis arvensis*
**Verbena bonariense*
**Veronica arvensis*
V. plebeia
**Vicia disperma*
**V. sativa*
Vitex lucens
Wahlenbergia vernicosa (unc)
W. violacea

MONOCOTS (73) (I:54 N:19)
Acianthus sinclairii
**Agrostis capillaris*
**A. stolonifera*
**Aira caryophyllea*
Anthosachne multiflora subsp. *multiflora,* AK 232709
Arthropodium cirratum, AK 309439
Astelia banksii
A. solandri
A. trinervia
**Axonopus compressus*
**Arum italicum,* AK 232792
Bromus arenarius, AK 232706
**B. willdenowii*
Bulbophyllum pygmaeum, AK 302260
Carex breviculmis
C. dissita
C. flagellifera
C. lambertiana
C. spinirostris
Collospermum hastatum
Cordyline australis
C. banksii (unc)
C. pumilio (unc)
**Cortaderia selloana*
**Cyperus eragrostis*
**Dactylis glomerata*
Danhatchia australis (unc), AK 315858
Dendrobium cunninghamii
Dianella latissima (unc)
D. nigra
Dichelachne crinita
Drymoanthus adversus (unc)
Earina aestivalis (unc)
E. mucronata
Eleocharis acuta
Ficinia nodosa
Freycinetia banksii
Gahnia lacera
**Holcus lanatus*
Isolepis reticularis
**Juncus effusus*
J. edgariae
**Landoltia punctata,* AK 302243
Lemna minor
Luzula picta s.s.
Microlaena stipoides
Microtis unifolia
Morelotia affinis
Oplismenus imbecillus subsp. *hirtellus*
Orthoceras novaezelandiae
**Ottelia ovalifolia*
**Paspalum dilatatum*
**P. distichum*
**Pennisetum clandestinum*
Poa anceps
**P. trivialis*
Phormium cookianum subsp. *hookeri* (unc)
P. tenax
Potamogeton cheesemanii (unc)
Rhopalostylis sapida
Rytidosperma biannulare
**R. racemosum*
R. unarede
**Schedonorus phoenix*
Schoenus apogon (unc)
S. maschalinus
S. tendo
Thelymitra longifolia
Trisetum arduanum, AK 233099
Uncinia banksii
U. distans (unc)
U. uncinata
Wolffia australiana, AK 302242

LIVERWORTS (8) (I: 8 N: 0)
Acrolejeunea securifolia subsp. *securifolia,* AK 313221
A. sp., AK 302309
Archilejeunea olivacea, AK 302311
Balantiopsis diplophylla var. *hockenii* , AK 302313
Cheilolejeunea sp., AK 302312
Chiloscyphus semiteres, AK 302308
Frullania pentapleura, AK 302313
Lopholejeunea plicatiscypha

MOSSES (31) (I: 31 N: 0)
Achrophyllum dentatum
Bryum billardierei var. *platyloma*
Calomnion complanatum
Campylopus clavatus
C. introflexus
Ceratodon purpureus
Cyathophorum bulbosum
Dicranoloma billardierei
Echinodium hispidum
Ectropothecium sandwichense, AK 302264
Fissidens asplenioides
F. megalotis
Grimmia laevigata, AK 323157
Hypnum cupressiforme
Hypopterygium filiculaeforme
H. didictyon
Leptostomum macrocarpum
Leucobryum javense
Macromitrium brevicaule, AK 309481
M. gracile
Orthorrhynchium elegans
Ptychomnion aciculare
Pulchrinodus inflatus , AK 302247
Pyrrhobryum paramattense, CHR 608238
Racopilum convolutaceum, AK 233234
Schistidium apocarpum, AK 302249
Sclerodontium pallidum, AK 323156
Thuidium furfurosum
T. sparsum
Triquetrella papillata
Weissia controversa

LICHENS (18) (I:18 N: 0)
Caloplaca spp.
Coccocarpia ?pellita, AK 233236
Clathroporina exocha, AK 233237
Degelia sp., AK 233235
Lecanora spp.
Parmelia spp.
Parmotrema reticulatum
Poeltiaria turgescens, AK 233240
Pseudocyphellaria carpoloma, AK 233239
P. chloroleuca, AK 302246
P. crocata
P. dissimilis, AK 302250
P. pickeringii, AK 302245
Ramalina celastri, AK 302251
Ramalina peruviana, AK 233238
Sticta squamata
Xanthoparmelia furcata
X. spp.