

VEGETATION AND FLORA OF TWO INDIGENOUS FOREST REMNANTS IN WHAKAREWAREWA FOREST – KAKAPIKO BUSH AND MOERANGI BUSH

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Whakarewarewa Forest is well known to most Rotorua residents and also to people from further afield for its variety of recreational pursuits – namely mountain-biking, walking and horse-riding. Currently it is managed as an exotic production forest. In terms of indigenous vegetation the forest contains a variety of wetlands, some of which are relatively well known to botanists eg Five Mile Gate wetland.

However less visited and described by botanists are the few remaining indigenous forest remnants in Whakarewarewa Forest. The vegetation and flora of the two largest remaining remnants in Whakarewarewa forest, namely Kakapiko Bush and Moerangi Bush are described here.

1. Kakapiko Bush

On 17th September 2006 John Hobbs and myself visited Kakapiko Bush (NZMS 260 U16 970 278). Kakapiko Bush is a small native forest remnant lying at the NW base of Kakapiko lookout. It consists of 15 ha of mature primary native forest on flat to gently sloping terrain administered by the Department of Conservation. A forestry road dissects the remnant near the northern edge. The DoC area consists of a core area on the western side with a smaller ‘finger’ of forest running through a gully to the NE. An additional area of secondary native vegetation adjoins along the southern edge within the Crown Forestry License area managed by Timberlands Ltd.

Within the DOC administered area the forest type is comprised of mature tawa-mangao-(rewarewa) forest. Tawa (*Beilschmiedia tawa*) dominates throughout with mangao (*Litsea calicaris*) locally common and occasional rewarewa (*Knightia excelsa*). A

few large pukatea (*Laurelia novae-zelandiae*) are present in the gullies with one large hinau (*Elaeocarpus dentatus*) noted. One large kahikatea (*Dacrycarpus dacrydioides*) and two large rimu (*Dacrydium cupressinum*) are emergent over the canopy, representing the only mature podocarps remaining in Whakarewarewa Forest following the widespread clearance that would have taken place when the exotic forest was established at the start of the 20th century.

The subcanopy consists of mahoe (*Melicytus ramiflorus*), ponga (*Cyathea dealbata*), and pigeonwood (*Hedycarya arborea*) with supplejack (*Ripogonum scandens*) locally common. Pate (*Schefflera digitata*) is locally common in the gullies. Species common in the understorey include ponga, kawakawa (*Macropiper excelsum*), wheki (*Dicksonia squarrosa*), kanono (*Coprosma grandifolia*), pate, hen and chickens fern (*Asplenium bulbiferum*), pigeonwood and tawa. *Hymenophyllum demissum*, *Blechnum filiforme* and *Lastreopsis hispida* are common as ground covers.

Species of note include *Metrosideros colensoi* – a species not commonly seen in abundance in forests in the Rotorua District. Small leaved milk tree (*Streblus heterophyllus*) is locally common in and around the public walking track that runs through the reserve, mostly in the dry gullies.

The secondary vegetation at the southern end adjoining the DOC administered area consists of a narrow band of wineberry-(tutu) forest. Mamaku (*Cyathea medullaris*), mahoe, kanono, wheki, kawakawa and pigeonwood dominate the subcanopy and understorey with *Diplazium australe*, prickly shield fern (*Polystichum wauwanum*) and hook grass (*Uncinia uncinata*) also common in the understorey and as ground covers.

The area is dissected by an old overgrown logging track. To the south of here the secondary vegetation changes to mangaeo-mamaku-mahoe forest. The subcanopy is dominated by wheki, pigeonwood, mahoe, kawakawa and ponga. The understorey is dominated by kawakawa, mangaeo, wheki, nini (*Blechnum chambersii*) and pigeonwood. Saplings of Douglas fir (*Pseudotsuga menziesii*), which appear to be wildings are scattered

throughout but are mostly dead or dying, probably from a lack of light under the vigorously regenerating native vegetation. Several old logging roads/tracks are present. It appears these areas of secondary vegetation have developed following previous harvesting of surrounding exotic compartments which were not replanted and left to regenerate into native vegetation.

2. Moerangi Bush

Since September 2006, several site visits were made to different parts of Moerangi Bush (NZMS 260 U16 009 295). Moerangi Bush is, for the purposes of this description, all the native forest area (mostly administered by the Department of Conservation) between Moerangi and Bush Road's to the west across to the western edge of Lake Tikitapu and Tarawera Road. The area gently rises in the west to an unmarked high point of 729m on broadly flat topped ridges before dropping off steeply to Lake Tikitapu. The DoC area is bordered on the northern, western and southern boundaries by radiata pine and Douglas fir plantation forest managed by Timberlands Ltd. There is an access road to a radio repeater at the northern end of the block.

On the flat ridge tops above Lake Tikitapu the mature forest is relatively homogenous consisting mostly of tawa forest and tawa-rewarewa-mangao forest with occasional hinau with smaller areas of kamahi (*Weinmannia racemosa*) dominated forest, especially in the gully heads. The tawa dominated forest has a subcanopy with kamahi, wheki, ponga, tawa, supplejack, mahoe, pigeonwood and mangao common. The understorey is dominated with ponga, bush rice grass (*Microlaena avenacea*), kanono, crown fern (*Blechnum discolor*), hen and chicken fern, mangao, heruheru (*Leptopteris hymenophylloides*) pigeonwood and occasional mahoe. The vegetation is naturally fairly open in the understorey under the tawa canopy. Of note was raukawa (*Raukawa edgerleyi*) (Chronically Threatened-Gradual Decline (Hitchmough *et. al.* 2007)) which occurs very locally, with more than 14 plants noted near the radio repeater access road at the northern end, all epiphytic, mainly on tree ferns. Of particular note is the apparent absence of podocarps in all size classes in the tawa dominated forest on the ridge tops.

Toetoe (*Cortaderia fulvida*) grassland with scattered Spanish heath (*Erica lusitanica*) dominates the clearing around the repeater site.

The localised areas of kamahi forest have a subcanopy of mahoe, wheki and ponga with an understorey of crown fern, hen and chicken fern, ponga, hook grass and bush rice grass with occasional tawa saplings. The subcanopy species toro (*Myrsine salicina*), tawari (*Ixerba brexioides*) and katote (*Cyathea smithii*), more characteristic of high altitude forest, were noted on the northern end edge of the flat ridge before it drops off towards Lake Tikitapu.

The tawa-rewarewa-mangao forest type described above continues down the slope to Tarawera Road at the northern end of Lake Tikitapu but with pukatea also present in the canopy reflecting the damper conditions towards the lower slope. Several mid-sized rimu trees can be seen above the lake near the base of the bluffs – the only notable larger podocarps in this area.

In the south-western part of the reserve on the ridge tops adjoining the exotic plantation forest is an area of mature pole (rewarewa)-kamahi forest. Occasional lemonwood (*Pittosporum eugenioides*) and hinau are present in the canopy with kanuka (*Kunzea ericoides*) also noted. Wheki and ponga dominate the subcanopy with heruheru, bush rice grass and crown fern in the understorey. Kaikomako (*Pennantia corymbosa*) is also present.

On the steep slopes running down to Lake Tikitapu from the base of the bluff area the vegetation is mainly mature secondary rewarewa-kamahi forest. In many places this is tall forest with a subcanopy of ponga, mahoe, mamaku and wheki with supplejack locally abundant. In the understorey mahoe, hangehange (*Geniostoma ligustrifolium* var. *ligustrifolium*), kanono, wheki and rewarewa are common with occasional tawa. Of note here are at least three large rimu saplings growing near the lake edge track and a young

terrestrial northern rata (*Metrosideros robusta*) growing on the lake edge itself – the only live northern rata known in this block of forest.

Over the years many slips, some small and some very large have occurred on the steep faces and these have mostly developed into tutu-mamaku-mangao-mahoe-wheki forest-treefernland and shrubland. The subcanopy and understorey in these areas has karamu (*Coprosma robusta*), hangehange, wheki, pigeonwood, kanono, rangiora (*Brachyglottis repanda*) and some koromiko (*Hebe stricta* var. *stricta*) dominating. A particularly large slip can be easily seen from the lake near the southern boundary with the Douglas fir plantation where tutu and mamaku predominate in the canopy. These vegetation types are interspersed with localised areas of pure mamaku treefernland. Kamahi, hangehange, mahoe, ponga and wheki are present in the subcanopy and understorey in this vegetation type.

Also in the southern part of the block near the Douglas fir plantation is an area of forest dieback which has become very noticeable from the lake and foreshore in the past 10 years. This is mostly an area of kamahi forest which has completely died along with some more scattered mangao trees in the vicinity. While the causes are not certain this is likely to be due to possum browsing on kamahi. However some mangao trees have shown similar dieback throughout this area and some of the wider Bay of Plenty and elsewhere. The causes for this are unknown with possum browsing being just one possible factor.

3. Summary

While Moerangi Bush provides a scenic native forest backdrop to Lake Tikitapu the interior is seldom visited other than from the walking track around the lake. In contrast Kakapiko Bush is tucked away at base of Kakapiko Hill and is barely seen from anywhere in the vicinity, except the lookout above. In contrast it can be easily enjoyed by following one of the popular walks in Whakarewarewa Forest which traverses the reserve past several of the significant remaining podocarps. Kakapiko Bush's

conservation value lies not in its size but in the fact that it has the only remaining large podocarps left in Whakarewarewa Forest.

In contrast podocarps of any size or shape are largely absent from Moerangi Bush but its conservation value lies particularly in its size, being by far the most substantial indigenous forest remnant left in Whakarewarewa Forest and the important soil and water conservation value it has for Lake Tikitapu. This is further enhanced by being contiguous with the adjoining DoC administered reserves around Lake Tikitapu through to Lake Okareka and Lake Tarawera which make it part of a very substantial forest corridor around this part of the Rotorua lakes.

REFERENCE

Hitchmough, R.; Bull, L.; Cromarty, P.; (Comps) 2007. New Zealand Threat Classification System lists—2005. *Stand-alone publication No. 236*. Department of Conservation, Wellington.



Figure 1: Kakapiko Bush as seen from Kakapiko lookout to the south.

WHAKAREWAREWA FOREST (KAKAPIKO BUSH (K), AND MOERANGI BUSH (M)) VASCULAR PLANT SPECIES LIST

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Fern Allies

<i>Huperzia varia</i>		Hanging club moss
* <i>Selaginella kraussiana</i>	M	Selaginella
<i>Tmesipteris elongata</i>	M	Fork fern

Ferns

<i>Adiantum cunninghamii</i>	M	Common maidenhair fern
<i>Adiantum viridescens</i>	M	
<i>Anarthropteris lanceolata</i>		Lance fern
<i>Asplenium bulbiferum</i>		Hen and chickens fern
<i>Asplenium flaccidum</i>		Hanging spleenwort
<i>Asplenium oblongifolium</i>	M	Shining spleenwort
<i>Asplenium polyodon</i>		Sickle spleenwort
<i>Blechnum chambersii</i>		Nini
<i>Blechnum colensoi</i>		Peretao
<i>Blechnum discolor</i>		Crown fern
<i>Blechnum filiforme</i>		Thread fern
<i>Blechnum fluviatile</i>	M	Kiwakiwa
<i>Blechnum novae-zealandiae</i>		Kiokio
<i>Ctenopteris heterophylla</i>	M	
<i>Cyathea dealbata</i>		Silver fern
<i>Cyathea medullaris</i>		Mamaku
<i>Cyathea smithii</i>		Soft tree fern
<i>Deparia petersenii</i>	K	
<i>Dicksonia fibrosa</i>	M	Wheki-ponga
<i>Dicksonia squarrosa</i>		Wheki
<i>Diplazium australe</i>	K	
<i>Grammitis billardiarei</i>	M	Finger fern
<i>Histiopteris incisa</i>	M	Water fern
<i>Hymenophyllum demissum</i>		Irirangi
<i>Hymenophyllum dilatatum</i>	M	Filmy fern
<i>Hymenophyllum ferrugineum</i>	M	Rusty filmy fern
<i>Hymenophyllum flabellatum</i>	M	Filmy fern
<i>Hymenophyllum multifidum</i>	M	Filmy fern
<i>Hymenophyllum rarum</i>	M	Filmy fern
<i>Hymenophyllum sanguinolentum</i>	M	Piripiri
<i>Hymenophyllum scabrum</i>	M	Filmy fern
<i>Lastreopsis glabella</i>		
<i>Lastreopsis hispida</i>		Hairy fern

<i>Lastreopsis microsora</i> subsp. <i>pentangularis</i>	M	
<i>Leptopteris hymenophylloides</i>		Heruheru
<i>Microsorium pustulatum</i>		Hound's tongue fern
<i>Microsorium scandens</i>		Fragrant fern
<i>Paesia scaberula</i>	M	Lace fern
<i>Pneumatopteris pennigera</i>		Gully fern
<i>Polystichum wawranum</i>		Common shield fern
<i>Pteridium esculentum</i>		Bracken
<i>Pteris macilenta</i>		Sweet fern
<i>Pyrrosia eleagnifolia</i>		Leather-leaf fern
<i>Rumohra adiantiformis</i>		Leathery shield fern
<i>Trichomanes reniforme</i>	M	Kidney fern
<i>Trichomanes venosum</i>		Veined filmy fern

Gymnosperms

* <i>Chamaecyparis lawsoniana</i>	K	Lawson's cypress
<i>Dacrycarpus dacrydioides</i>	K	Kahikatea
<i>Dacrydium cupressinum</i>		Rimu
* <i>Pinus radiata</i>	M	Radiata pine
<i>Podocarpus totara</i>	M	Totara (Planted?)
<i>Prumnopitys ferrugineus</i>	M	Miro
* <i>Pseudotsuga menziesii</i>		Douglas fir
* <i>Sequoia sempervirens</i>	M	Redwood

Dicotyledonous Trees & Shrubs

<i>Alectryon excelsus</i>		Titoki
<i>Alseuosmia macrophylla</i>	M	Karapapa
<i>Aristotelia serrata</i>		Wineberry
<i>Beilschmiedia tawa</i>		Tawa
<i>Brachyglottis repanda</i>		Rangiora
* <i>Buddleja davidii</i>		Buddleia
<i>Carpodetus serratus</i>	M	Putaputaweta
<i>Coprosma grandifolia</i>		Kanono
<i>Coprosma grandifolia</i> x <i>C. lucida</i>	M	
<i>Coprosma lucida</i>	M	Glossy karamu
<i>Coprosma robusta</i>		Karamu
<i>Coriaria arborea</i>		Tutu
* <i>Cytisus scoparius</i>	M	Broom
* <i>Dendrobenthamia capitata</i>	M	Strawberry dogwood
<i>Elaeocarpus dentatus</i>		Hinau
* <i>Erica lusitanica</i>	M	Spanish heath
<i>Fuchsia excorticata</i>		Kotukutuku
<i>Gaultheria antipoda</i>	M	Snowberry
<i>Geniostoma ligustrifolium</i> var. <i>ligustrifolium</i>		Hangehange

<i>Griselinia littoralis</i>	M	Broadleaf
<i>Griselinia lucida</i>		Puka
<i>Hebe stricta</i> var. <i>stricta</i>	M	Koromiko
<i>Hedycarya arborea</i>		Pigeonwood
<i>Ixerba brexioides</i>	M	Tawari
<i>Knightia excelsa</i>		Rewarewa
<i>Kunzea ericoides</i>	M	Kanuka
<i>Laurelia novae-zeelandiae</i>		Pukatea
<i>Leptospermum scoparium</i>	M	Manuka
<i>Leucopogon fasciculatus</i>	M	Mingimingi
* <i>Leycesteria formosa</i>		Himalayan honeysuckle
<i>Litsea calicaris</i>		Mangeao
<i>Macropiper excelsus</i>	K	Kawakawa
<i>Melicytus ramiflorus</i>		Mahoe
<i>Metrosideros robusta</i>	M	Northern rata
<i>Myrsine australis</i>		Mapou
<i>Myrsine salicina</i>	M	Toro
<i>Nestegis lanceolatus</i>	K	White maire
<i>Pennantia corymbosa</i>	M	Kaikomako
<i>Pittosporum cornifolium</i>	M	Tawhirikao
<i>Pittosporum eugenioides</i>	M	Tarata
<i>Pittosporum tenuifolium</i> var. <i>colensoi</i>	M	Kohuhu
<i>Pittosporum tenuifolium</i> var. <i>tenuifolium</i>		Kohuhu
<i>Pseudopanax arboreus</i>		Five finger
<i>Pseudopanax crassifolius</i>	M	Lancewood
<i>Quintinia serrata</i>	M	Tawheowheo
<i>Raukawa edgerleyi</i>	M	Raukawa
* <i>Salix cinerea</i>	M	Grey willow
<i>Schefflera digitata</i>		Pate
<i>Solanum aviculare</i>		Poroporo
<i>Streblus heterophyllus</i>	K	Turepo
* <i>Teline monspessulana</i>	M	Montpellier broom
* <i>Ulex europaeus</i>	M	Gorse
<i>Weinmannia racemosa</i>	M	Kamahi

Dicotyledonous Lianes

<i>Clematis paniculata</i>		Clematis
<i>Metrosideros colensoi</i>		Hairy climbing rata
<i>Metrosideros diffusa</i>		White rata vine
<i>Metrosideros fulgens</i>		Rata vine
<i>Metrosideros perforata</i>		Rata vine
<i>Muehlenbeckia australis</i>	M	Pohuehue
<i>Parsonsia capsularis</i>	M	New Zealand jasmine
<i>Parsonsia</i> sp.	K	New Zealand jasmine

<i>Passiflora tetrandra</i>	K	Passion vine
<i>Rubus cissoides</i>	M	Bush lawyer
* <i>Rubus fruticosus</i> agg.	M	Blackberry

Dicotyledonous Herbs

<i>Acaena anserinifolia</i>		Piripiri
* <i>Bellis perennis</i>	M	Daisy
<i>Cardamine</i> sp. (<i>C. debilis</i> agg.)		Bitter cress
* <i>Centaureum erythraea</i>	K	Centaur
* <i>Cerastium fontanum</i> subsp. <i>vulgare</i>	M	Mouse-ear chickweed
* <i>Cirsium arvense</i>	M	Californian thistle
* <i>Cirsium vulgare</i>		Scotch thistle
* <i>Digitalis purpurea</i>		Foxglove
<i>Epilobium rotundifolium</i>	K	Willow herb
* <i>Gnaphalium coarctatum</i>	M	Jersey cudweed
<i>Gunnera monoica</i>	M	Solitary gunnera
<i>Haloragis erecta</i>		Shrubby haloragis
* <i>Hypochoeris radicata</i>		Catsear
* <i>Leontodon taraxacoides</i>	M	Hawkbit
* <i>Leucanthemum vulgare</i>	M	Ox-eye daisy
* <i>Lotus pedunculatus</i>	M	Lotus
* <i>Mycelis muralis</i>		Wall lettuce
* <i>Myosotis</i> sp.	M	Forget-me-not
<i>Nertera</i> sp. aff. <i>dichondrifolia</i>	M	
* <i>Plantago lanceolata</i>		Narrow-leaved plantain
* <i>Plantago major</i>	M	Broad-leaved plantain
* <i>Polycarpon tetraphyllum</i>	M	Allseed
<i>Pratia angulata</i>	M	Pratia
* <i>Prunella vulgaris</i>	M	Selfheal
<i>Pseudognaphalium luteo-album</i>		Jersey cudweed
* <i>Ranunculus reflexus</i>		Hairy buttercup
<i>Ranunculus repens</i>	K	Creeping buttercup
* <i>Senecio bipinnatisectus</i>	M	Australia fireweed
* <i>Senecio jacobaea</i>		Ragwort
<i>Solanum americanum</i>	M	Small flowered nightshade
* <i>Vicia sativa</i>	M	Vetch

Monocotyledonous Trees Shrubs & Lianes

<i>Cordyline australis</i>	M	Cabbage tree
<i>Cordyline banksii</i>	M	Forest cabbage tree
<i>Freycinetia baueriana</i> subsp. <i>banksii</i>	M	Kiekie
<i>Ripogonum scandens</i>		Supplejack

Orchids

<i>Drymoanthus adversus</i>	M	Green fleshy orchid
<i>Earina autumnalis</i>		Raupeka
<i>Earina mucronata</i>		Peka-a-waka
<i>Winika cunninghamii</i>	K	Winika
<i>Corybas acuminatus</i>	M	
<i>Corybas trilobus</i>	M	
<i>Pterostylis banksii</i>	M	Common greenhood

Grasses

* <i>Anthoxanthum odoratum</i>	M	Sweet vernal
<i>Cortaderia fulvida</i>		Toetoe
* <i>Holcus lanatus</i>		Yorkshire fog
<i>Microlaena avenacea</i>		Bush rice grass

Sedges

<i>Carex geminata</i>		Rautahi
<i>Carex maorica</i>	M	Cyperus sedge
<i>Carex solandri</i>	M	
<i>Uncinia uncinata</i>		Hook grass

Rushes

* <i>Juncus effusus</i>	M	Soft rush
* <i>Juncus tenuis</i>	M	Track rush

Other Monocotyledonous Herbs

<i>Astelia solandri</i>		Tree flax
<i>Collospermum hastatum</i>		
<i>Dianella nigra</i>	M	Blueberry