

Arnold's Bush (Piarere) joint field trip 24 February 2019

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Figure 1: Arnold's Bush from the north. (Photo: Dr Yanbin Deng)

A good muster from Waikato and Rotorua Botanical Societies gathered on a late summer's day to visit Arnold's Bush, Piarere (sometimes mis-spelt 'Pairere'), a 3.8 ha fragment of what was once a 400 ha kahikatea (*Dacrycarpus dacrydioides*) forest in the 'Hinuera Gap'. Interestingly, this represents about 1% remaining of the original, the figure applying to kahikatea forest as a whole in the Waikato Region. We were particularly pleased to have along several generations of the Arnold family, who farmed the property from 1952 till 1969. They have provided some valuable additional information about the history of the Bush.

Arnold's Bush is one of several places in the Waikato visited and described in the 1950s and 1960s in *Transactions of the Royal Society of New Zealand* by Hamilton Boys High School teacher, the late Michael Gudex MSc MA. This was a remarkable achievement because, after contracting poliomyelitis in his late 20s, he was left with impaired mobility. Although long unfenced, stock probably hardly penetrated the interior of Arnold's Bush, which was fenced sometime after 1969. The outer margin

was fenced much later, evidently around the mid-1990s. The Bush occupies a river flat fed continually by springs at the base of the Ongatiti Ignimbrite ('Hinuera Stone') bluffs to the west, and is still seasonally waterlogged, in fact underwater at times in winter and spring. Thus, in contrast to most other kahikatea forest left in the region which suffers from desiccation due to drainage of the surrounding landscape, it is an example of 'wet' kahikatea forest as described by de Lange (2014). Despite this, Gudex described it in 1962 as "considerably drier" than on his first visit 12 years earlier due to drains having been dug around it. A shallow drain had been re-dug on the northern and western side in the months before our visit, and a line of marginal kahikatea trees was dying or dead, probably from dumping of spoil on their rootplates, possibly from desiccation during the recent summer drought as well.

The original property of 122 ha was part of the huge Matamata Estate, balloted out by the Crown in 1904. The successful buyer was Harry Storey Wyatt, an English labourer and carpenter who had arrived in Cambridge in 1888 at the age of 19 and became a horse breeder. Adjacent Piarere School, now closed, was opened in 1911 to serve the children of local farming families. The height of the stand, estimated at over 30 m in 1962, suggests that the stand may pre-date clearance of the larger forest and therefore be of pre-European origin. Neighbouring smaller unfenced kahikatea stands indicate the likely former extent of the forest. Harry Wyatt, who also owned land at Fencourt near Cambridge, died unmarried in 1939. The property was subsequently sold, then in 1952 bought by J.G. Arnold, after whom the Bush is now named.

Our group soon split into several smaller groups, and some folk had to leave early to attend to other business. We spent the morning in cool showery weather marvelling at the array of understory shrubs and combing the Bush for species, enjoying a late lunch in an adjacent paddock in the afternoon sunshine before visiting the nearby ignimbrite bluffs which are such a feature of the Hinuera Gap. They still support some plant species not present in the Bush itself, not surprising given their inaccessibility to stock and the very different habitat they present from the adjacent flats. Farm manager Alan Haines arrived on his quad bike and entertained us with the light and sound system installed in an amazing grotto-like space amongst the bluffs.

Gudex (1962) pointed out a number of unusual features of Arnold's Bush, almost all of them still evident:

(1) The occurrence of seven species of native conifer in a relatively small area.

All are still present.

- (2) The great height of the trees, estimated by Gudex in 1962 as “much over 100 feet”.
(3) The great number of pokaka (*Elaeocarpus hookerianus*) trees, some with trunks over 2.5’ in diameter, on the eastern side of the Bush.

The number of trees is undoubtedly smaller now and as in other kahikatea fragments in the Waikato, there is no replacement.

- (4) The profusion of divaricating shrubs, especially small-leaved mahoe (*Melicactus micranthus*), poataniwha (*Melicope simplex*), milk tree (*Streblus heterophyllus*), small-leaved *Coprosma* species, and juvenile matai (*Prumnopitys taxifolia*).

All are still present, although juvenile matai are now rare.

- (5) The absence of mature tree ferns and palms, attributed to cattle grazing.

Nikau (Rhopalostylis sapida) is now present, albeit only as juveniles.

- (6) The absence of pukatea (*Laurelia novae-zealandiae*), *Coprosma grandifolia*, *C. lucida*, ramarama (*Myrtus bullata*), *Metrosideros perforata*, *Oplismenus imbecillus*, and *Alseuosmia* species.

The absence of pukatea, a characteristic species of this forest type, at Piarere is puzzling. The tree is common in other inland valley floors and basins in the region, which presumably are as cold – if not colder than – Piarere.

Oplismenus imbecillus and Metrosideros perforata (bluffs only) are now present.

- (7) A “fair” regeneration of all the podocarps except kahikatea.

Very little regeneration of any conifer species is now evident.

Gudex (1962) did not record adventive species. In common with many other kahikatea fragments in the region, several threatening weed species are present which are spreading inexorably through the Bush and which, if left uncontrolled, will destroy most of the value of this forest. All were noted on the author’s first visit in 2001. They comprise two lianes, ivy (*Hedera helix*) and Japanese honeysuckle (*Lonicera japonica*) and two trees, flowering cherry (*Prunus serrulata*) and Taiwan cherry (*Prunus campanulata*).

Gudex recorded 99 indigenous vascular plant species in the Bush and on the nearby bluffs in 1962; we recorded 129 species and hybrids. The additional species are mostly herbs and as always, it is difficult to know whether species were missed in the earlier survey or whether they have arrived since then. One can safely say only that of the species present earlier, rewarewa (*Knightia excelsa*) and the filmy fern

Hymenophyllum sanguinolentum have been lost, while nikau (*Rhopalostylis sapida*), titoki (*Alectryon excelsus*) and karaka (*Corynocarpus laevigatus*) have arrived.

The 129 indigenous vascular plant species is similar to the number (122) found in White Pine Bush at Whakatane West, a 4 ha old-growth stand that was never logged or grazed (Smale 1984). However, it is considerably less than the 180 species recorded by Peter de Lange (2014) in total from 4 ‘wet’ kahikatea forest fragments in the region.

Arnold’s Bush is certainly one of the best examples of wet kahikatea forest left in the Waikato lowlands. As such, it deserves concerted effort to control invasive weeds which, if left to spread, will destroy most of the value of this remarkable place in the foreseeable future.

We are grateful to current owner Lance O’Sullivan and farm manager Alan Haines for kindly allowing us to visit the property.

References

- de Lange P.J. 2014. The indigenous flora of the ‘dry’ kahikatea forest remnants of the southeastern Hamilton Basin. *Wellington Botanical Society Bulletin* 55: 2-31.
- Gudex M.C. 1962. The native flora of Arnold’s Bush, Piarere. *Transactions of the Royal Society of New Zealand: Botany* 1: 29-32.
- Smale M.C. 1984. White Pine Bush – an alluvial kahikatea remnant in eastern Bay of Plenty, New Zealand. *New Zealand Journal of Botany* 22: 201-206.

Arnold’s Bush species list

Graeme Jane and John Hobbs

y = yes, recorded; n= not recorded on that visit (shaded). *C = comments at end of list

Species	Gudex 1962	RBS/WBS 2019	MCS 2001/2018	Location	Comment
Conifers	7	6			
<i>Dacrycarpus dacrydioides</i>	y	y			
<i>Dacrydium cupressinum</i>	y	y			
<i>Phyllocladus trichomanoides</i>	y	y		bluffs only	
<i>Podocarpus laetus</i>	y	y			
<i>Podocarpus totara</i>	y	n	y		
<i>Prumnopitys ferruginea</i>	y	y			
<i>Prumnopitys taxifolia</i>	y	y			

Monocot trees and shrubs	1	3	
<i>Cordyline australis</i>	y	y	
<i>Cordyline banksii</i>	n	y	
<i>Rhopalostylis sapida</i>	n	y	
Dicot trees and shrubs	35	37	
<i>Alectryon excelsus</i> var. <i>excelsus</i>	n	y	
<i>Aristotelia serrata</i>	y	y	
<i>Beilschmiedia tawa</i>	y	y	
<i>Carpodetus serratus</i>	y	y	
<i>Coprosma areolata</i>	y	y	
<i>Coprosma rhamnoides</i>	y	y	
<i>Coprosma robusta</i>	y	y	
<i>Coprosma rotundifolia</i>	y	y	
<i>Coprosma tenuicaulis</i>	y	y	
<i>Coriaria arborea</i> var. <i>arborea</i>	y	y	
<i>Corynocarpus laevigatus</i>	n	y	
<i>Elaeocarpus dentatus</i> var. <i>dentatus</i>	y	y	
<i>Elaeocarpus hookerianus</i>	y	y	
<i>Fuchsia excorticata</i>	y	y	
<i>Geniostoma ligustrifolium</i> var. <i>ligustrifolium</i>	y	y	
<i>Hebe stricta</i> var. <i>stricta</i>	y	y	
<i>Hedycarya arborea</i>	y	y	
<i>Knightia excelsa</i>	y	n	
<i>Leptospermum scoparium</i> var. <i>scoparium</i>	y	y	
<i>Leucopogon fasciculatus</i>	y	y	
<i>Litsea calicaris</i>	y	y	
<i>Melicope simplex</i>	y	y	
<i>Melicytus micranthus</i>	y	y	
<i>Melicytus ramiflorus</i>	y	y	
<i>Mida salicifolia</i>	y	y	
<i>Myrsine australis</i>	y	y	
<i>Myrsine salicina</i>	y	y	
<i>Neomyrtus pedunculata</i>	n	y	
<i>Nestegis cunninghamii</i>	y	y	
<i>Nestegis lanceolata</i>	y	y	
<i>Piper excelsum</i> ssp. <i>excelsum</i>	y	y	
<i>Pittosporum eugenioides</i>	y	y	
<i>Pittosporum tenuifolium</i> s.l.	y	y	
<i>Pseudopanax arboreus</i>	y	y	bluffs only
<i>Pseudopanax crassifolius</i>	y	y	
<i>Raukua anomalus</i>	n	n	y
<i>Schefflera digitata</i>	y	y	

<i>Streblus heterophyllus</i>	y	y	
<i>Weinmannia racemosa</i>	y	y	bluffs only
Monocot lianes	2	2	
<i>Freycinetia banksii</i>	y	y	bluffs only
<i>Ripogonum scandens</i>	y	y	
Dicot lianes	9	10	
<i>Calystegia sepium</i> ssp. <i>roseata</i>	n	y	
<i>Clematis paniculata</i>	y	y	
<i>Clematis forsteri</i>	y	n	*C1
<i>Metrosideros diffusa</i>	y	y	
<i>Metrosideros perforata</i>	n	y	bluffs only
<i>Muehlenbeckia australis</i>	y	y	
<i>Parsonsia capsularis</i> var. <i>capsularis</i>	y	y	
<i>Parsonsia heterophylla</i>	y	y	
<i>Passiflora tetrandra</i>	y	y	bluffs only
<i>Rubus australis</i>	y	y	
<i>Rubus schmidelioides</i> var. <i>schmidelioides</i>	y	y	
<i>Veronica stricta</i>	y	n	
Ferns	27	35	
<i>Asplenium bulbiferum</i> ssp. <i>bulbiferum</i>	y	y	
<i>Asplenium bulbiferum</i> X <i>flaccidum</i>	n	y	
<i>Asplenium bulbiferum</i> X <i>hookerianum</i>	n	y	
<i>Asplenium flaccidum</i> s.s.	y	y	
<i>Asplenium hookerianum</i> var. <i>hookerianum</i>	y	y	
<i>Asplenium oblongifolium</i>	y	y	
<i>Asplenium polyodon</i>	y	y	
<i>Blechnum chambersii</i>	y	y	
<i>Blechnum filiforme</i>	y	y	
<i>Blechnum membranaceum</i>	n	y	bluffs only
<i>Blechnum minus</i>	n	y	*C2
<i>Blechnum novae-zealandiae</i>	y	y	
<i>Blechnum parrisiae</i>	y	y	
<i>Cyathea dealbata</i>	y	y	
<i>Cyathea medullaris</i>	n	y	
<i>Deparia petersenii</i> ssp. <i>congrua</i>	n	y	

<i>Dicksonia fibrosa</i>	n	y	
<i>Dicksonia squarrosa</i>	y	y	
<i>Diplazium australe</i>	y	y	
<i>Hymenophyllum demissum</i>	y	y	
<i>Hymenophyllum nephrophyllum</i>	y	y	bluffs only
<i>Hymenophyllum sanguinolentum</i>	y	n	
<i>Lastreopsis glabella</i>	y	y	
<i>Lastreopsis hispida</i>	n	y	
<i>Lastreopsis microsora</i> ssp. <i>pentangularis</i>	y	y	
<i>Leptopteris hymenophylloides</i>	y	y	
<i>Microsorium pustulatus</i> ssp. <i>pustulatus</i>	y	y	
<i>Microsorium scandens</i>	y	y	
<i>Pellaea rotundifolia</i>	y	y	
<i>Pneumatopteris pennigera</i>	y	y	
<i>Polystichum vestitum</i>	y	y	
<i>Pteridium esculentum</i>	y	y	
<i>Pyrrosia eleagnifolia</i>	y	y	
<i>Rumohra adiantiformis</i>	n	y	
<i>Trichomanes endlicherianum</i>	y	y	bluffs only
<i>Trichomanes venosum</i>	y	y	
Orchids	3	3	
<i>Earina autumnalis</i>	y	y	
<i>Earina mucronata</i>	y	y	
<i>Thelymitra longifolia</i>	y	y	
Grasses	2	3	
<i>Microlaena avenacea</i>	y	y	
<i>Microlaena stipoides</i>	y	y	
<i>Oplismenus hirtellus</i>	n	y	
Sedges	3	13	
<i>Carex cyanea</i>	y	y	
<i>Carex dissita</i>	n	y	
<i>Carex geminata</i>	y	y	
<i>Carex imbecilla</i>	n	y	
<i>Carex lambertiana</i>	n	y	
<i>Carex lessoniana</i>	n	y	
<i>Carex ochrosaccus</i>	n	y	
<i>Carex solandri</i>	n	y	
<i>Carex subdola</i>	n	y	
<i>Carex subviridis</i>	n	y	
<i>Carex umbricola</i>	y	n	

*C3

<i>Carex uncinata</i>	n	y	
<i>Carex virgata</i>	n	y	
<i>Machaerina tenax</i>	n	y	
Rushes and allies	1	1	
<i>Juncus edgariae</i>	y	y	
Other monocot herbs	3	5	
<i>Astelia grandis</i>	n	y	
<i>Astelia hastata</i>	y	y	
<i>Astelia solandri</i>	y	y	
<i>Dianella nigra</i>	y	y	
<i>Phormium tenax</i>	n	y	
Dicot herbs	7	11	
<i>Acaena anserinifolia</i>	y	y	
<i>Callitriche muelleri</i>	n	y	
<i>Cardamine dolichostyla</i>	y	y	As <i>C. debilis</i>
<i>Dichondra repens</i>	n	y	
<i>Epilobium rotundifolium</i>	y	y	
<i>Geranium homeanum</i>	y	y	As <i>G. australe</i>
<i>Lobelia angulata</i>	n	y	
<i>Nertera depressa</i>	y	y	
<i>Nertera dichondrifolia</i>	y	n	*C4:
<i>Oxalis exilis</i>	y	y	*C5
<i>Ranunculus glabrifolius</i>	n	y	y
<i>Solanum nodiflorum</i>	o	y	
	97		
Adventives			
<i>Agrostis stolonifera</i>		y	
<i>Anthoxanthum odoratum</i>		y	
<i>Berberis glaucocarpa</i>		y	bluffs only
<i>Bidens frondosa</i>		y	
<i>Bromus catharticus</i> ssp. <i>catharticus</i>		y	
<i>Calystegia silvatica</i>		y	
<i>Calytriche stagnalis</i>		y	
<i>Cirsium arvense</i>		y	
<i>Crocasmia X crocosmiiflora</i>		y	
<i>Cyperus eragrostis</i>		y	
<i>Dactylis glomerata</i>		y	
<i>Digitaria sanguinalis</i>		y	
<i>Echinochloa crus-gallii</i>		y	
<i>Erechtites hieraciifolia</i>		y	
<i>Erica lusitanica</i>		y	bluffs only

<i>Erigeron sumatrensis</i>	y	
<i>Euphorbia peplus</i>	y	
<i>Galium aparine</i>	y	
<i>Galium palustre</i>	y	
<i>Geranium robertianum</i>	y	
<i>Ginkgo biloba</i>	y	planted
<i>Hedera helix</i>	y	
<i>Holcus lanatus</i>	y	
<i>Hypericum androsaenum</i>	y	bluffs only
<i>Juncus articulatus</i>	y	
<i>Lapsana communis</i>	y	
<i>Ligustrum sinense</i>	y	
<i>Lonicera japonica</i>	y	
<i>Lycopus euraopaeus</i>	y	
<i>Mycelis muralis</i>	y	
<i>Myosotis laxa</i> ssp. <i>caespitosa</i>	y	
<i>Panicum capillare</i>		
<i>Panicum schinii</i>	y	
<i>Paspalum dilatatum</i>	y	
<i>Persicaria hydropiper</i>	y	
<i>Persicaria macuolsa</i>	y	
<i>Phytolacca octandra</i>	y	
<i>Prunella vulgaris</i>	y	
<i>Prunus campanulata</i>	y	
<i>Prunus serotina</i>	y	
<i>Prunus serrulata</i>	y	
<i>Quercus robur</i>	y	
<i>Ranunculus repens</i>	y	
<i>Rubus fruticosus</i> agg.	y	
<i>Rumex conglomeratus</i>	y	
<i>Rumex pulcher</i>	y	
<i>Rumex flammula</i>	y	
<i>Senecio bipinnatesectus</i>	y	
<i>Solanum nigrum</i>	y	
<i>Solanum pseudocapsicum</i>	y	
<i>Sonchus arvensis</i>	y	
<i>Taxodium distichum</i>	y	planted
<i>Viola riviniana</i>		

*Comments: C1 - possible misidentification of juvenile *C. paniculata*

C2 - included then in *B. novae-zealandiae*

C3 - probably mis-identification of another species

C4 - may have been the more recently named *N. villosa*

C5 - as *O. corniculata*