



Barrett Bush Management Plan



2012

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Prepared for Friends of Barrett Bush
(affiliated with Tui 2000 Inc.)

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Barrett Bush Characteristics

Native vegetation

Historic forest composition

The current vegetation pattern of Barrett Bush is the result of complex landscape changes of both recent and historic times. The most recent natural landscape changes occurred as the Waikato River meandered across the region, changing course over many years and depositing the alluvial plain that Barrett Bush grows on. More recent landscape changes have been the result of human activity as vegetation clearance and agricultural development has occurred throughout the district. Fortunately, Barrett Bush was set aside and the reserve now provides insight into original vegetation patterns as well as a refuge for biota characteristic of forests dominated by kahikatea.

Barrett Bush sits a shallow depression of an alluvial plain with a podocarp vegetation composition that is classed as a kahikatea semi-swamp forest (Clarkson et al. 2007). Clarkson et al. (2007) describe the typical natural vegetation of kahikatea semi-swamp forest:

“Semi-swamp forest dominated by kahikatea grew on the poorly drained shallow depressions. Several other species were present in varying amounts, including rimu, matai, pukatea, swamp maire, tawa, pokaka, and occasional cabbage tree. Prominent in the understorey were silver fern, mapou, hangehange, *Coprosma areolata*, and turepo, and tangles of kiekie and supplejack. The ground cover was dominated by ferns, herbs, grasses, and sedges including *Hymenophyllum demissum*, hen and chicken fern, *Astelia fragrans*, *A. grandis*, and *Microlaena avenacea*.”

Significance of Barrett Bush

As mentioned, Barrett Bush is a remnant patch of podocarp forest. Within the Hamilton Ecological District, approximately 250 hectares of podocarp forest remains. This represents only 0.3% of the original regional cover for this ecosystem type. In terms of size, Barrett Bush is the fifth largest remnant in the district and is thus very important for the conservation and restoration of a locally-depleted forest type.

Current forest composition

Three main vegetation types were described by Champion in 1988. Since then, significant improvements have been made to the forest through the restoration work of *Friends of Barrett Bush* and thus, revised descriptions of the current vegetation types are presented below.

NORTHERN BLOCK

Kahikatea and matai-totara forest up to 30 m in height, covering about 1ha. A few canopy pokaka are also present. The scattered subcanopy is dominated by totara, white maire, matai and mahoe that reach up to 15 m in height. Away from the boundary fence, the understory has abundant tree ferns (primarily silver fern) that range from 2 to 4 m in height; a dense patch of *Diplazium australe*; shrubs *Coprosma rotundifolia*, *C. areolata*, *Melicytus micranthus*, mahoe, poataniwha, and kawakawa throughout; young white maire, matai, tawa and titoki trees; as well as *Coprosma grandifolia*, small leaved privet and occasional flowering cherries. Species that have been planted in this area include kowhai, flax and kaikaiatua (*Rhabdothamnus solandri*) near the drain; pigeonwood, mapou, hangehange, totara, putaputaweta, lancewood, kahikatea, small-leaved *Coprosma* species and pukatea. Jerusalem cherry is abundant north of the drain. Ground cover is comprised of dense thread fern along with scattered *Diplazium australe*, *Pellaea rotundifolia*, *Stachys sylvatica*, *Oplismenus imbecillus*, *Carex* species and *Uncinia* species. Present in the canopy or climbing up other plants are kohia, NZ jasmine, peka-a-waka, drooping spleenwort and sickle spleenwort.

SOUTHERN BLOCK

Kahikatea and matai forest up to 30 m in height, covering around 1.6 ha with a scattered subcanopy of matai, white maire and rimu between 10 and 15 m tall. The understory varies across the forest width but includes the shrubs *Melicytus micranthus*, *Coprosma grandifolia*, *C. rotundifolia*, *C. areolata*, turepo, poataniwha, hangehange, Jerusalem cherry; the small trees mapou, small-leaved privet, mahoe, flowering cherry; young pukatea, titoki, white maire, tawa; *Diplazium australe*, silver fern (up to eastern boundary); juvenile kohia and a few young nikau. The groundcover includes *Oplismenus imbecillus*, *Stachys sylvatica*, thread fern, kahikatea and kohia seedlings, *Microlaena stipoides*, shining spleenwort, sickle spleenwort, *Carex* species and *Uncinia* species. Epiphyte and vine species include kohia (abundant), thread fern, mokimoki, kowaowao, *Metrosideros diffusa*, leather-leaf fern, one or two kiekie and kaiwharawhara.

EASTERN BLOCK

Kahikatea and matai/pokaka forest up to 30 m tall with a subcanopy of matai, white maire, rimu and cabbage trees. The understory includes lacebark, tanekaha, cabbage trees, white maire, totara, kahikatea, totara, pukatea, *Melicytus micranthus*, *Coprosma grandifolia*, *C. areolata*, karamu, kawakawa, *Diplazium australe*, silver fern (dense in from the fence), Jerusalem cherry and pate. Ground cover includes *Carex* species and *Uncinia* species (abundant), *Oplismenus imbecillus*, thread fern, *Stachys sylvatica*, sickle spleenwort and kahikatea seedlings. Epiphyte and vine species are peka-a-waka, kaiwharawhara, kohia and drooping spleenwort.

OLD LINK

This area was planted in 2000 and now has a closed canopy that is 4-6 m in height. Species here include totara, tree fuchsia, kahikatea, mahoe, karamu, small-leaved *Coprosma* species, koromiko, kanuka, titoki,

pigeonwood, cabbage trees, miro and lancewood. Invasive weeds include a small but dense *Convolvulus* infestation, Chinese privet and Jerusalem cherry. The closed canopy has suppressed weeds species and allowed the regeneration of native species, especially mahoe. The sheltered location of this block has helped with the success of the plantings and the area is now ready for secondary planting of species such as rimu, pokaka, matai and white maire.

NEW LINK

This area was planted from 2003 with a mix of species including cabbage trees, kahikatea, matai, titoki, totara, karamu, flax, pukatea and mahoe. The majority of these species were appropriate for the pasture area but many of the plants are losing vigour. The prevailing westerly wind dries the area and has restricted the growth of the native plants and prevented the establishment of a closed canopy. This in turn has resulted in ongoing competition from exotic grass species (see figure 4). The area needs dense border plantings to reduce the effects of the wind (see edge effects below) but the current border plantings are starting to die as they reach the end of their natural life spans (see figure 5). To achieve native dominance in the area, planting of early successional, fast-growing species such as kaunka, manuka, flax and cabbage trees is recommended. Each plant needs to be placed no more than 0.75 m apart, with the exception of the existing kahikatea plants which should be kept free of competing plants within a radius of 1.25 m.

WESTERN STRIP

Like the New Link, this area has been recently planted but differs in that it is sheltered from significant edge effects because it has an existing canopy of kahikatea and is bordered by a stand of kahikatea that is still on farm land (see figure 2). Plantings include karamu, pate, kaikomako and small leaved *Coprosma* species. Because the bordering kahikatea stand is still grazed by cattle and has no understorey (see figure 3) it is recommended that dense edge planting is also undertaken in this area. Suggested species are mahoe, hangehange, kawakawa, flax and at spacings of 0.75 m. Secondary species such as matai, pokaka and rimu could be planted in from the edge to enrich the area but are not considered to be as critical as the edge planting.

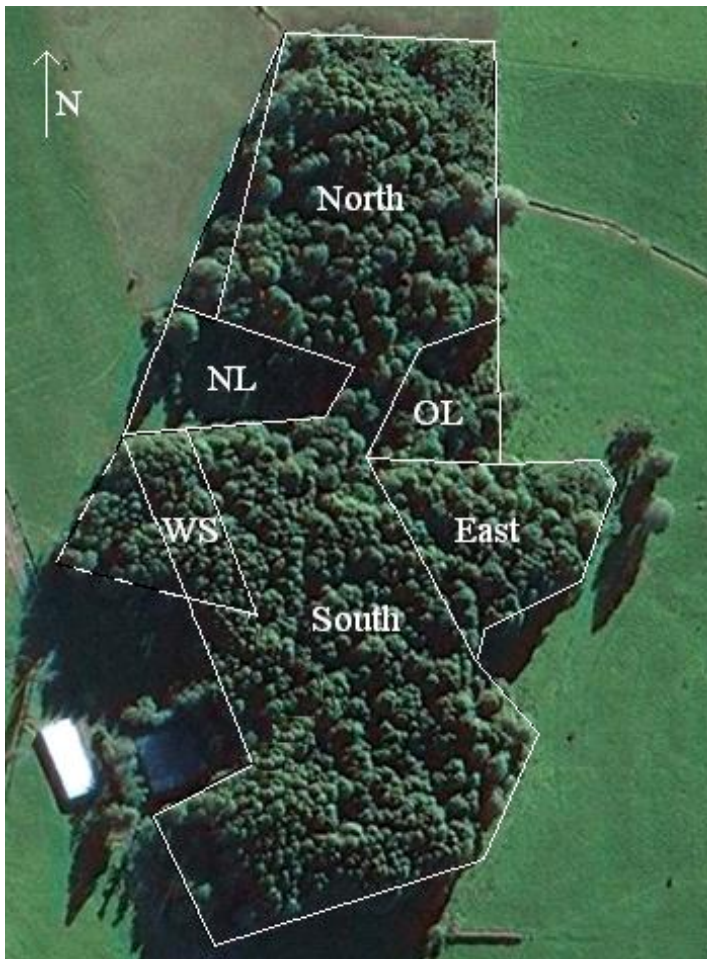


Figure 1. Aerial photo of Barrett Bush with approximate boundaries.

Legend

North: Northern Block

South: Southern Block

East: Eastern Block

WS: Western Strip

OL: Old Link

NL: New Link

Solid Lines: Boundary of Barrett Bush

Dotted Lines: Boundary of vegetation on farmer's land

Exotic vegetation

Barrett Bush has a relatively low density of exotic invasive species. The main exotic species that are present include Chinese privet (scattered but most abundant at the edges), Jerusalem cherry (most abundant in the Northern Block), flowering cherry (scattered), *Convolvulus* (most abundant in the Eastern Block), *Stachys sylvatica* (scattered), and blackberry (scattered). The most invasive species are the Chinese privet and *Convolvulus* but these will not present a threat to the native vegetation if they continue to be managed by *Friends of Barrett Bush*. The removal of invasive plants, especially trees and shrubs, needs to be immediately followed by the planting of suitable native species to prevent re-invasions, especially in edge areas because they are more vulnerable to reinvasion.

Topography and drainage

Barrett Bush Scenic Reserve is predominantly flat with a drain approximately 1 by 1 m running from the north-west corner to the eastern side for 100 m through the northern block of kahikatea and matai-totara (see figure 7). This drain is part of the farm infrastructure and has likely been in place for many years. Soil drainage has influenced the forest composition by preventing the regular flooding that historically led to the forest dominance by the wetland forest tree, kahikatea. As the soil dries out, kahikatea seedlings which are shade-intolerant can no longer compete with dry land species such as tawa, matai and totara and are slowly

losing their dominance in Barrett Bush. As is typical of kahikatea forest there is a lack of juvenile kahikatea trees in both the subcanopy and understorey. The alteration of the flooding regime has also made the forest patch more vulnerable to weed invasion. Remediation of this soil drainage is unlikely while the surrounding land use is agricultural. If it was possible to lift the water table in the future it would be important to do it gradually to prevent mass die-back of plants that have now adapted to the enhanced drainage regime. The forest management recommendations in this report have been made with consideration of these changing conditions and with the aim of supporting a functioning forest composition.

Edge effects

The destruction of forest throughout the Waikato and land conversion to agricultural pasture has left Barrett Bush isolated and very vulnerable to edge effects. The ratio of perimeter to area at Barrett Bush is much greater than that of undisturbed forests and means that the area of forest that abruptly meets pasture is much greater. The sharp transition between forest and pasture creates a zone where the humidity, soil moisture, and temperature are very different to the interior of the forest. These edge effects can occur up to fifty metres in from the forest boundary. Barrett Bush is only 220 m at the widest point (including the western kahikatea on farm land) and consequently the majority of the forest is influenced by edge effects. These effects are most significant on the western boundary because the prevailing wind is westerly.

Similar to soil drainage, edge effects reduce native survival and regeneration, and increase susceptibility to weed invasion. Recommended remediation involves dense planting of hardy, fast growing plants along forest boundaries to create a windbreak. Suitable species include manuka, kanuka, flax, kohuhu, mapou, totara and karamu.

Interesting and significant features

During the survey that was undertaken for this management plan, a few interesting and significant features were noted in Barrett Bush. The first is the kohia (NZ passionfruit, *Passiflora tetrandra*) vines growing in the more sheltered parts of the forest. These vines are abundant and often over 10 cm in diameter with many seedlings observed amongst leaf litter (see figure 9 & 10). The small mature pokaka population is also significant as a relict of a previously more abundant species. It is recommended that this species be included in plantings under early colonisers. Abundant populations of the small shrub manakura (*Melicytus micranthus*) and the creeping fern pānako (*Blechnum filiforme*) (see figure 6) were also noted.

Interesting plants in the Northern Block include the epiphytes peka-a-waka (*Earina mucronata*), kahakaha (*Collospermum hastatum*) and akapuka (*Griselinia lucida*); the latter two have been reintroduced and are growing on the ground in a few locations but the peka-a-waka is thought to be naturally occurring on totara trees near the eastern boundary. There are also a few kaikaiatua (*Rhabdothamnus solandri*) growing near the drain which are thought to have been planted (see figure 8).

Friends of Barrett Bush

The *Friends of Barrett Bush* have made significant improvements to the condition and ecological integrity of Barrett Bush over the last two decades. Through regular working bees and informed decision making they have reduced the threat posed by invasive plant and animal species and improved the condition of the native vegetation. Their ongoing commitment to Barrett Bush has halted its decline and enhanced the outlook for its ecological health into the future.

It is very important that the work this group does is continued and it is therefore crucial that volunteers continue to be attracted and retained. Four proposals for this purpose are presented below:

- Advertisements in local papers; Hamilton Press has a volunteering section
- Co-ordinate a group of students from relevant tertiary courses at the University of Waikato or Waikato Institute of Technology
- Contact Koromatua School to access the local school community
- Promotion at the Waikato Environment Centre; posters and contact details

Barrett Bush Management

The present plan is the third Management Plan for Barrett Bush. The first section presents the long-term vision for the reserve, the second section is a synthesis of the objectives from the 2001 and 2005 plans with an assessment of progress so far, and the third section presents the updated objectives for 2012.

Vision for Barrett Bush

The long-term vision for the project is an oval-shaped area of native lowland forest, the interior of which is protected by a thickened edge of hardy, wind-resistant native shrubs with a restored interior vegetation of native sub-canopy, shrubs and groundcovers. Expected gains from this project include:

- Protection of an important site of native biodiversity in the Hamilton - Waipa - mid-Waikato region;
- Protection of one or more plant associations (semi-swamp kahikatea forest) that are increasingly rare and threatened in the Waikato Ecological Region.
- Protection of an example of local biological heritage (as a biological record of the past history of the Hamilton basin);
- Improved scientific understanding of restoration techniques for native forest.

- Training in restoration management techniques for those involved in the project (volunteers, professionals and students) and transfer of the knowledge gained to similar sites elsewhere in New Zealand.
- Increased value of the reserve as an educational resource that is easily accessible to the urban and school population of Hamilton;
- An educational opportunity for Masters level research by one or more University of Waikato students.

Previous objectives

| Past Objective | Year | Progress |
|---|------|---|
| Complete and maintain perimeter fencing | 2001 | Complete |
| Control/remove privet | 2001 | Ongoing, great progress made |
| Develop measures to control <i>Stachys</i> | 2001 | Latest vegetation survey indicates that <i>Stachys</i> is largely under control |
| Remove Jerusalem cherry and other exotic weeds | 2001 | Ongoing, great progress made |
| Establish a Windbreak | 2001 | Incomplete |
| Control possum if necessary | 2001 | Ongoing, low possum numbers are consistently trapped |
| Assess the effect of rat control and control if necessary | 2001 | Trapping has been unsuccessful, poisoning has been trialled on small scales, trials ongoing |
| Propagation and re-planting | 2001 | This has not been undertaken |
| Path layout, specimen labelling, and interpretation | 2001 | This has not been undertaken |
| Medium to long term monitoring and recording of management activities | 2001 | Ongoing, management reports prepared in 2001, 2005 and 2012 |
| Formation of a parking area and formed access off Barrett Road | 2005 | This has not been undertaken |
| Provision of an interpretive panel at the parking area to explain the farming and ecological history of the Koromatua area; | 2005 | This has not been undertaken |
| Construction of a formed track through the reserve to minimise damage from public entry to the reserve | 2005 | Unformed path is sufficient for current visitors |
| Policies and objectives in relation to seed collection, propagation and restoration planting in the reserve | 2005 | This has not been undertaken |

Updated objectives

Priority ratings: O: ongoing, 1: high priority, complete within 12 months, 2: moderate priority, complete within 24 months, 3: low priority, complete when possible, 4: when/if deemed necessary.

| Objective | Priority | Comments |
|--|----------|---|
| Establish/thicken windbreak on the western boundary | 1 | Requires dense planting of early colonising species |
| Take action to attract new volunteers | 1 | Many options to explore for finding new volunteers |
| Establish/thicken windbreak on the eastern boundary | 2 | Requires dense planting of early colonising species |
| Plant dense colonisers in open pasture | 2 | Requires dense planting of early colonising species |
| Plant secondary successional plants under canopy of colonisers in new link, old link & western strip | 2 | Requires infill planting of species that arrive after the colonisers |
| Assess the practicalities of rat control and implement best option techniques | 2 | Rats are likely to be influencing plant, bird and insect populations in Barrett Bush. Rat control would be very beneficial if practicable |
| Continue possum control | O | Ongoing to maintain low populations |
| Remove Jerusalem cherry and other exotic weeds | O | This is likely to be ongoing |
| Propagation and re-planting of native species | 3 | There are many native species in Barrett Bush that produce seed. Collection and propagation of these seeds would help to sustain volunteer efforts but cost/benefits will need to be assessed |
| Path layout, specimen labelling, and interpretation | 4 | Currently there are few members of the public visiting Barrett Bush, this objective would only be relevant if visitor numbers changed |
| Medium to long term monitoring and recording of management activities | 4 | Recommend review of this management plan by 2017 |
| Formation of a parking area and formed access off Barrett Road | 4 | Currently unnecessary |
| Provision of an interpretive panel at the parking area to explain the history of the Koromatua area; | 4 | Currently there are few members of the public visiting Barrett Bush, this objective would only be relevant if visitor numbers changed |
| Construction of a formed track through the reserve to minimise damage foot traffic | 4 | Currently there are few members of the public visiting Barrett Bush, this objective would only be relevant if visitor numbers changed |

References and useful resources

Champion PD 1988. The ecology and management of kahikatea *Dacrycarpus dacrydioides* (A.Rich) de Laubenfels in the Waikato, North Island, New Zealand. Unpublished MSc thesis, University of Waikato, Hamilton, New Zealand.

Clarkson BD, Clarkson BR, Downs TM 2007. Indigenous Vegetation Types of Hamilton Ecological District. CBER Contract Report 58, The University of Waikato, Hamilton.

Clarkson BD, Merrett M, Downs TM 2002. Botany of the Waikato. Waikato Botanical Society, Hamilton.

Harding M 1997. Forest Heritage Fund: Waikato Protection Strategy. Forest Heritage Fund, Wellington.

Project Kahikatea: <http://www.projectkahikatea.net.nz/>

Waikato Regional Council forest fragment information:

<http://www.waikatoregion.govt.nz/Environment/Natural-resources/Biodiversity/Forest-fragments/>

The New Zealand Plant Conservation Network: <http://www.nzpcn.org.nz>

Key: what to plant where

Recommended spacing between plants: 0.75m, except for kahikatea which should have 1 to 1.25m spacings because this species needs high light and will be outcompeted by fast growing shrub and small trees species that are planted too close.

In open pasture plant:

Early colonising species:

kanuka

manuka

lacebark

karamu

kahikatea

harakeke

ti kouka

mapou

At the edges plant:

Dense, hardy species:

harakeke

karamu

manuka

kohuhu

mapou

Underneath mature early colonisers (when there is shade and no grass) plant:

Secondary tree species:

titoki

pukatea (in damp spots)

pokaka

white maire

matai

tawa

Secondary shrubs or small trees:

Coprosma rotundifolia

Coprosma areolata

Coprosma grandifolia

Melicytus micranthus

mahoe

poataniwha

kawakawa

Melicope simplex

Photos



Figure 2. Kahikatea stand on farmland, western boundary.



Figure 3. Double-fenced border between farmland kahikatea and western boundary, requires dense planting



Figure 4. New Link, abundant pasture grass and widely-spaced natives, requires infill planting of colonising species.



Figure 5. Border of New Link that needs enrichment planting because the existing plants are dying.



Figure 6. Abundant pānako (*Blechnum filiforme*).



Figure 7. Drain in the Northern Block.



Figure 8. Kaikaiatua (*Rhabdothamnus solandri*) flowers in Northern Block.



Figure 9. A large kohia (*Passiflora tetrandra*) vine.



Figure 10. Kohia (*Passiflora tetrandra*) seedlings.