Waikereru Weed Management Plan

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Aspirations

This weed management plan works towards the sustainable maintenance of biodiversity at Waikereru Ecosanctuary. It aims to work with natural systems to provide a practical and economical plan to control the invasive species present at the sanctuary in conjunction with the long-term management aspirations of the Waikereru Ecosanctuary – enhancing and maintaining the local biodiversity in a cost-efficient way. The goal of this plan is to create a self-managing, functioning ecosystem that provides ecosystem benefits with minimal inputs, e.g., little weed control, by working with the regeneration already occurring at the sanctuary. Rather than focusing on the complete eradication of invasive species, which would be pointless in a catchment with many nearby infestations providing seed sources, the focus should be on protecting the ecological integrity of the natural regeneration occurring on slopes. This would be done by keeping invasive species at low densities rather than their complete eradication. Infestations will need to be monitored, and some controlled over time rather than all at once.

Introduction

Waikereru Ecosanctuary is a 110 ha reserve located in Waimatā valley 6.5 km north of Gisborne. The ecosanctuary has a range of biodiversity values, including functioning ecosystems and threatened species, outlined in Ford et al. (2022). Due to past long-term weed control the sanctuary has smaller weed infestation than surrounding properties. However, there are weed infestations such as old man's beard (*Clematis vitalba*) that risk the integrity of the kānuka (*Kunzea robusta*) regeneration on the slopes of the reserve that are providing erosion mitigation and providing ecological benefits. This report summarises field work undertaken over the period of the 2nd to 5th of April 2024. This plan identifies and priorities weed species and infestations for management.

Methods

The site was traversed by foot and has been separated into management units based on Figure 1. These are the alluvium catchment (A) Long Bush running along the west side of the Waimata river, which is separated from the three other hillside catchments (B-D) by the Riverside Road. All invasive species were way pointed with notes taken on their abundance and threat. The way points were loaded onto the app trap.nz so the weed control team are aware of the weed's locations.

All pink ragwort (*Senecio glastifolius*) encountered were pulled. All small *Pinus radiata* were either pulled or cut and pasted, and trees too large for removal by these methods were GPSed. Most plants of Jerusalem cherry (*Solanum pseudocapsicum*) and inkweed (*Phytolacca octandra*) encountered were pulled unless the infestations were too large, in which case they were controlled. One large vine of old man's beard was cut and pasted during the survey.

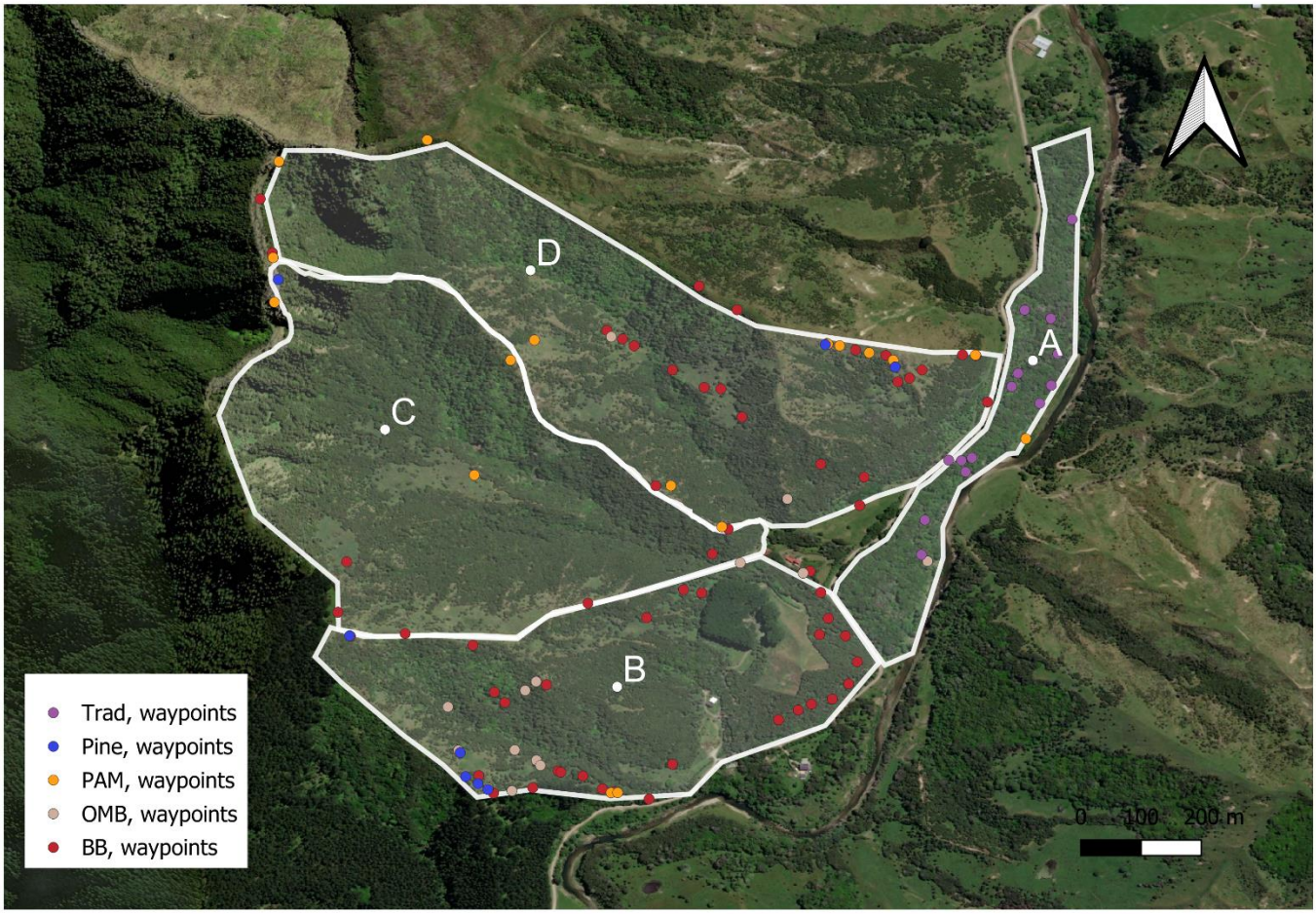

Figure 1. Vegetation map of Waikereru Ecosanctuary. with the alluvium (A) Long bush running along the west side of the Waimata River and separated from the three other hillside catchments (B-D) by Waimata Road. Trad = wandering willie (*Tradescantia fluminensis*). Pine = pine (*Pinus radiata*), PAM = Pampas grass (*Cortaderia selloana*), OMB = Old man's beard (*Clematis vitalba*) and BB = black berry (*Rubus fruiticosus* agg.) (QGIS).

Recommendations

Two main strategies are recommended for the management of weeds at Waikereru Ecosanctuary, control and surveillance. Control involves prioritizing the control of smaller infestations before they spread and systematically controlling larger infestations. Surveillance involves checking for future infestations and potential new weed species. Table 1 outlines 29 weeds recommended for control, ranked by priority, with their location based on Figure 1. This ranking is based on the size of infestations, the threat the species pose to the local biodiversity and the ease of control. Invasive species are discussed in further detail below. It is identified that weed spreading by two made methods, vegetatively or by seed.

Table 1. List of invasive weeds by priority of control with locations and occurrence notes.

Weeds species (29)	**Location based on Figure 1 (A-D)**	**Notes**
old man's beard (*Clematis vitalba*)	B, C, D	Localised infestations
wandering willie (*Tradescantia fluminensis*)	A	Localised infestations
periwinkle (*Vinca major*)	A	Localised infestations
moth plant (*Araujia hortorum*)	Salmond homestead and roadside	Localised infestations – one plant seen and removed
Japanese honeysuckle (*Lonicera japonica*)	D	Local - rare
German ivy (*Delairea odorata*)	A	Local
pampas grass (*Cortaderia selloana*)	A, B, C, D	Localised infestations
radiata pine (*Pinus radiata*)	B, C, D	Localised infestations
cotoneaster (*Cotoneaster glaucophyllus*).	D	Rare
barberry (*Berberis glaucocarpa*)	D	Rare
box elder (*Acer negundo*)	B	Rare
sycamore (*Acer pseudoplatanus*)	A	Rare
black alder (*Alnus glutinosa*) and	A	Localised infestations
white poplar (*Populus alba*)	A	Localised infestations
willow (*Salix* sp.)	A	Localised infestations
poplar (*Populus* sp.)	A	Localised infestations
Himalayan honeysuckle (*Leycesteria formosa*)	Roadside	Rare
woolly nightshade (*Solanum mauritianum*)	B	Rare
sweet briar (*Rosa rubiginosa*)	B, D	Local
pink ragwort (*Senecio glastifolius*)	A, B, C, D	Widespread - scattered
Jerusalem cherry (*Solanum pseudocapsicum*)	A, B	Widespread - scattered
inkweed (*Phytolacca octandra*)	A, B, C, D	Localised infestations
blackberry (*Rubus fruiticosus* agg.)	A, B, C, D	Localised infestations
grey sedge (*Carex divulsa*)	A, B, C, D	Localised infestations
Cretan brake (*Pteris cretica*)	D	Rare
montbretia (*Crocosmia* x *crocosmiiflora*)	A	Local
mouse-ear-hawkweed (*Pilosella officinarum*)	B, C, D	Local
field horsetail (*Equisetum arvense*)	A	Locally abundant
Mexican daisy (*Erigeron karvinskianus*)	A, B, C, D	Widespread

Long bush A

There are a number of weeds species present in the fertile alluvial forest of Longbush (Figure 1). This area including the roadside had the greatest variety of weeds in the Ecosanctuary. The largest threat is shade-tolerant species invading the forest understorey and preventing natural regeneration of the forest. This includes wandering willie (*Tradescantia fluminensis*), periwinkle (*Vinca major*), grey sedge (*Carex divulsa*) and Jerusalem cherry (*Solanum pseudocapsicum*).

On the margins of the Waimata River a range of weedy riparian are present in the flood zone including sycamore (*Acer pseudoplatanus*), black alder (*Alnus glutinosa*), white poplar (*Populus alba*), poplar (*Populus* sp.), willow (*Salix* sp.). Field horsetail (*Equisetum arvense*) is also locally common on the rivers edge.

Slopes B – D

The slopes are mainly dominated by regenerating kānuka forest but have localised weed infestations, the most serious being old man's beard. There are also large patches of black berry (*Rubus fruiticosus* agg.) and Mexican daisy (*Erigeron karvinskianus*) is common on the dry slopes.

Salmond's homestead garden and the 1769 garden

A few localised weeds are present around the Waikereru gardens. It is recommended that the weed control team, work with the gardeners to identify and control local weed infestations.

Seed Islands

Targeting maintenance should be undertaken at the research 'seed islands'. Especially of species not widely controlled such as blackberry.

Weed species management

Old man's beard (*Clematis vitalba*)

Mature vines of old man's beard are scattered throughout the slopes (B – D) of the sanctuary (Figure's 1-4). Many of these vines were mature in the kānuka canopy, easily visible at the time of surveying because of their large fluffy seedheads. This plant is deciduous, losing its leaves in winter. The control of this species is high priority because of the risk it poses to the integrity of the regenerating forest on the slopes of the reserve. Once controlled populations will require repeat visits to ensure they do not persist. Old man's beard is similar to the native clematis species present, *Clematis cunninghamii* and *Clematis paniculata*, but native species can be distinguished by the smaller size of the vine, the three leaflets (five leaflets in *C. vitalba*) and the evergreen habitat. It could also be mistaken for the native pohuehue (*Muehlenbeckia australis*), or native jasmine (*Parsonsia capsularis*) and care should be undertaken to identify plants before controlling them. The seed source is most likely from the neighbouring properties so surveillance should be done to ensure new populations are not establishing. An effective way to survey for this species would be to use a drone when this species is flowering or fruiting.

Wandering willie (*Tradescantia fluminensis*)

Patches of wandering willie are present in the alluvial forest of Longbush and there has been a long history of control here (Figure's 1 & 5). This species is common throughout the Waimata River catchment and has a high risk of re invasion along the river. Because of its rampant growth and risk to the native understorey, control is important. However, this undergrowth is known to host a population of the endemic and regionally threatened snail *Rhytida greenwoodi*. This species lives amongst *Tradescantia* at Longbush and is the only confirmed location for this carnivorous snail between Opotiki and Wellington. There is extensive native undergrowth that should support the snail as the wandering willie is removed. Priority should be given to controlling wandering willie in the forest understorey pushing patches to the margins. This should be carried out with the snail population in mind, e.g. not blanket spraying the *Tradescantia*. Methods to remove *Tradescantia* but protect the snail include controlling in winter when the animals are mostly dormant, not it the weed. It is recommended that the recently introduced biocontrols for this species are taken to this site to help reduce its impact on the native biodiversity.

Periwinkle (*Vinca major*)

Patches of periwinkle are present on the stream banks of and forest margin and understorey of Longbush. These are recommended for control before they spread further with a focus of patches under the forest understorey pushing these back towards the river.

Moth plant (*Araujia hortorum)*

One plant of moth plant was found in the Salmond homestead garden and removed; previously one had been found nearby. A second plant was seen along the roadside and removed. Further surveillance will be needed to ensure this vine species does not spread into the natural forests.

Japanese honeysuckle (*Lonicera japonica*)

A few small patches of Japanese honeysuckle are present on the northern slopes of the Ecosanctuary (Figure 6). They are recommended as high priority for control before while infestations are still small. Surveillance of this species is needed throughout the reserve as birds spread the seed.

German ivy (*Delairea odorata*)

Localised infestations of German ivy are found in Longbush and have historically been controlled along the river margin in the early 2000's and what is left is remnant from this. Further control and surveillance are recommended.

Pampas grass (*Cortaderia selloana*)

Pampas is scattered in low numbers across the reserve (Figure 1) on the slopes of Waikereru (Figure 7) aswell as on the margin of Longbush (Figure 9). Pampas hinders natural regeneration on dry slopes but will ultimately be outcompeted by native vegetation. Since its density is so low and to ensure quicker regeneration on the slopes this species is priority for control.

Pine (*Pinus radiata*)

Pines are scattered across the slopes of Waikereru (Figure 1). All seedlings and saplings encountered were removed during this survey. Seedlings were common on the southern boundary of polygon B on the margin of a pine plantation (Figure 8). Large trees were way-pointed and should be priority for control. This included some large trees on the upper slopes of polygon D.

Barberry (*Berberis glaucocarpa*), Large-leaved cotoneaster (*Cotoneaster glaucophyllus*).

These species were rare on the slopes of the northern polygon (D) and were controlled. They should be a priority for control when found and are easily removed. Cotoneaster is common near to the reserve on the roadside so poses a re invasion risk.

Box elder (*Acer negundo*) and sycamore (*Acer pseudoplatanus*)

Plants of box elder are rare on the slopes of Waikereru. All plants seen were controlled except for one inaccessible plant found in a thicket of blackberry in polygon B. Sycamore was scattered on the riparian margins of Longbush. Both these species should be easily eradicated from the Ecosanctuary, but on-going surveillance of new populations should also be undertaken. There is a huge infestation of sycamore upstream of the Waimata River meaning high risk of re-invasion (S. Sawyer personal, communication).

White poplar (*Populus alba*), Willow (*Salix* sp.), Poplar (*Populus* sp.)

Localised patches of these tree species are present along the riverbanks of the Waimata River bordering Longbush (Figures 9). These species have a high risk of re invasion from nearby populations along the river. Seedlings of black alder, white poplar and willow are seen in the native riparian plantings, the result of disturbance from the recent large flooding events. These seedlings should be priority for control before they outcompete the plantings. Black alder (*Alnus glutinosa*) is also present but is identified as riverbank stabiliser species because of its large root system (Figure 10). This was especially obvious after cyclone Gabrille (S. Sawyer personal, communication).

Himalayan honeysuckle (*Leycesteria formosa*)

One plant was found and controlled on the southern roadside of the Ecosanctuary, and infestations are present on Riverside Road at the Southern end of the sanctuary. Surveillance of this species is recommended.

Woolly nightshade (*Solanum mauritianum*)

One plant of woolly nightshade was found in the lower slopes of Waikereru. This species should be under surveillance for new occurrence and is locally abundant south of Waikereru along Riverside Road.

Sweet briar (*Rosa rubiginosa*)

This shrub was found in multiple areas on the slopes of Waikereru and all plants found were controlled. This species is easily controlled and should be easily eradicated from the Ecosanctuary.

Pink ragwort (*Senecio glastifolius*)

This species was scattered across the reserve and all plants seen were removed (Figure 11). It is easily pulled and should be when come across, preferably before the plant produces seen. It is present throughout the catchment, the wind born seeds have high risk of re invasion.

Jerusalem cherry (*Solanum pseudocapsicum*)

This species is common in Longbush and on the lower slopes of Waikereru. Smaller infestations were removed, and larger ones were way pointed. Thes species should be controlled and is easily hand pulled.

Inkweed (*Phytolacca octandra*)

Inkweed was local throughout the reserve as was controlled when come across. Because it is easily controlled and not widespread it is recommended for control.

Black berry (*Rubus fruiticosus* agg.)

Black berry is scattered across Waikereru (Figure 1) with large patches present on the slopes (Figure 12). These patches prevent the regeneration of native species such as kānuka. Patches also persist for some time on the margins in shaded forests as shown in Figure 13. To encourage quicker regeneration of slopes larger patches of black berry could be sprayed by targeted control from helicopter then planted. Otherwise over time these slopes will eventually regenerate into native forest.

Grey sedge (*Carex divulsa*)

This species is found throughout the Ecosanctuary. It poses a significant threat to the native understorey at Longbush by outcompeting native *Carex* species. It should be controlled in the shaded understorey of Longbush's alluvial forest where it is dominant. The dark tussock from and separated seed heads along the spikelet distinguish this species from native members of the genus (Figures's 14 and 15).

Cretan brake (*Pteris cretica*)

One plant of the exotic fern *Pteris cretica* was found and removed from catchment D (Figure 16). Previous plants found of this species have been removed (M. Rutherford personal, communication). Further surveillance should be undertaken, and all plants found controlled.

Montbretia (C*rocosmia* x *crocosmiiflora*)

Patches of monbretia are present in Longbush on the river margin and in forest lights wells. However, control of this species is not a high priority because of the high risk of re invasion from croms. Patches in the forest out of the flood zone should be controlled.

Mouse-ear-hawkweed (*Pilosella officinarum*)

Small patches of mouse-ear-hawkweed were found on the dry slopes of Waikereru. These small patches would be easy to control before they spread further but as the slopes will eventually regenerate into forest this species is not a priority for control.

Field Horsetail (*Equisetum arvense*)

This species was locally abundant on the riverbanks of Longbush (Figure 17). It is notoriously difficult to control and has a high risk of re invasion from disturbance events either side of the river so is ranked low in priority.

Mexican daisy (*Erigeron karvinskianus*)

Mexican daisy is common on the dry open slopes of the reserve. This species is identified as a threat in Ford et al. (2022) to the At Risk – Declining *Jovellana sinclairii*, which is locally common at Waikereru. It is recommended the daisy is monitored and if this species persists on dry bluffs that are not regenerating or is obviously outcompeted rare native species it is recommended for control.

Further surveillance and recommendations

Further surveillance is recommended on the edge of the Ecosanctuary as there are many weed infestations either side of the reserve along Riverside Road and upstream of the Longbush Reserve including willow, poplar, black alder sycamore, blackberry, black locust (*Robinia pseudoacacia*) and large-leaved cotoneaster (*Cotoneaster glaucophyllus*). During flood events material can be brought down from further up the catchment so the risk of re invasion is high. The same is the case for many of the weedy species with bird dispersed fruit so regular surveys are needed to find new weed infestations.

Invasive species that are not present at Waikereru but found on the neighbouring properties include agapanthus (*Agapanthus orientalis*), elephant's ears (*Alocasia brisbanensis*) and English ivy (*Hedera helix* subsp. *helix*). There is future scope for weed control along roads and working with neighbours to eradication weed species in the catchment.

No plants of gorse (*Ulex europaeus*) were seen during this or pervious (Ford et al., 2022) surveys. If an infestation is found it is recommended plants are removed before they spread further. This is recommended for all new weed species infestations at small scales.

Figure 2. Old man's beard (*Clematis vitalba*) growing on rank pasture of slopes.

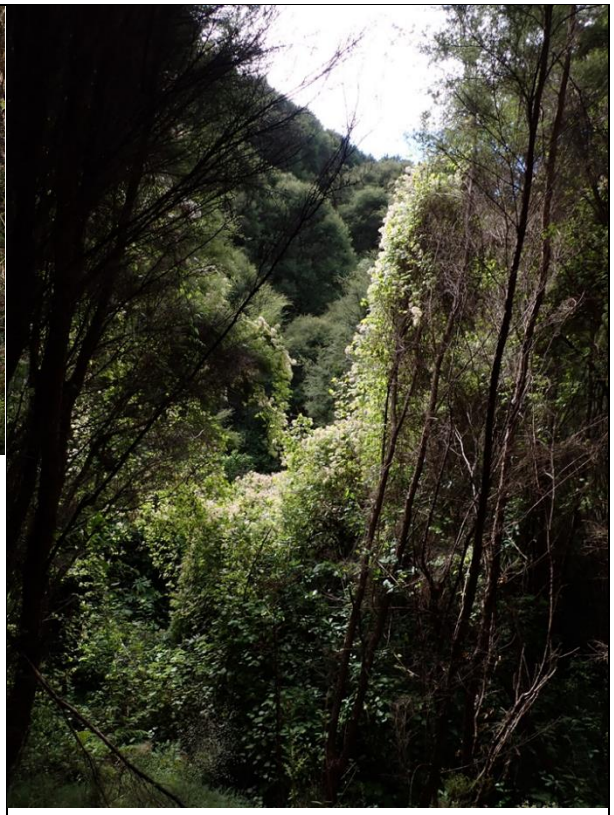

Figure 3. Old man's beard on the kānuka canopy.

Figure 4. Old man's beard vines in the kānuka understorey.

Figure 5. Wandering willie (*Tradescantia fluminensis*) in the understorey of alluvial forest of Longbush.

Figure 6. Patch of Japanese honeysuckle *(Lonicera japonica)* on ridge under kānuka.

Figure 7. A tussock of Pampas (*Cortaderia selloana*) on the slopes of Waikereru on the margin of the regenerating pasture.

Figure 8. Pine (*Pinus radiata*) saplings on the southern margin of polygon B.

Figure 9. Weedy margin of Waimata River with pampas.

Figure 10. Thicket of riparian black alder (*Alnus glutinosa*) riparian.

Figure 11. Large plant of pink ragwort (*Senecio glastifolius*) on dry slope.

Figure 12. Large patch of blackberry (*Rubus fruiticosus* agg.) on dry ridge.

Figure 13. Patch of blackberry on shaded forest margin.

Figure 14. Tussock of grey sedge (*Carex divulsa*) in shaded forest.

Figure 15. Seed head of grey sedge.

Figure 16. A frond of the weedy Cretan brake (*Pteris cretica*).

Figure 17. Thick patch of field horsetail (*Equisetum arvense*) on Waimata River margin.

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References

Ford, M., Smale, M., & Gilbride, K. (2022). *A biodiversity survey of Waikereru Ecosanctuary, Waimatā, Gisborne. Auckland Botanical Society Journal 77* (2): 100–117.