

Key Native Ecosystem Operational Plan for Belmont-Korokoro

2020-2025



Contents

1. Purpose	1
2. Policy Context	1
3. The Key Native Ecosystem Programme	2
4. Belmont-Korokoro Key Native Ecosystem site	3
5. Parties involved	4
6. Ecological values	7
7. Threats to ecological values at the KNE site	10
8. Vision and objectives	14
9. Operational activities	14
10. Future opportunities	18
11. Operational delivery schedule	20
12. Funding contributions	24
Appendix 1: Site maps	25
Appendix 2: Nationally threatened species list	33
Appendix 3: Regionally threatened species list	34
Appendix 4: Ecological weed species	35
Appendix 5: Revegetation plant list	36
References	37

1. Purpose

The purpose of the five-year Key Native Ecosystem (KNE) Operational Plan for Belmont-Korokoro KNE site is to:

- Identify the parties involved
- Summarise the ecological values and identify the threats to those values
- Outline the objectives to improve ecological condition
- Describe operational activities (eg, ecological weed control) that will be undertaken, who will undertake the activities and the allocated budget

KNE Operational Plans are reviewed every five years to ensure the activities undertaken to protect and restore the KNE site are informed by experience and improved knowledge about the site.

This KNE Operational Plan is aligned to key policy documents that are outlined below (in Section 2).

2. Policy Context

Regional councils have responsibility for maintaining indigenous biodiversity, as well as protecting significant vegetation and habitats of threatened species, under the Resource Management Act 1991 (RMA)¹.

Plans and Strategies that guide the delivery of the KNE Programme are:

Greater Wellington Long Term Plan

The Long Term Plan (2018-2028)² outlines the long term direction of the Greater Wellington Regional Council (Greater Wellington) and includes information on all our major projects, activities and programmes for the next 10 years and how they will be paid for. This document outlines that Greater Wellington will actively manage selected high value biodiversity sites. Most of this work is undertaken as part of the KNE Programme.

Proposed Natural Resources Plan

The Proposed Natural Resources Plan³ (PNRP) provides the high level strategic framework which sets out how Greater Wellington, Mana whenua partners and the community work together and includes:

- Guiding Principles that underpin the overall management approach of the plan (eg, Kaitiakitanga)
- Sites with significant indigenous biodiversity values
- Sites of significance to mana whenua (refer Schedules B, C, Schedule D)

Parks Network Plan

Management of Belmont Regional Park as a whole is guided by the Greater Wellington Regional Council Parks Network Plan (PNP)⁴, Parks Asset Management Plan and the Belmont Regional Park Sustainable Land Use Plan⁵. These plans guide the recreational and amenity uses of Belmont Regional Park as well as identifying opportunities to protect biodiversity values.

Greater Wellington Biodiversity Strategy

The Greater Wellington Regional Council Biodiversity Strategy⁶ (the Strategy) is an internal document that sets a framework that guides how Greater Wellington protects and manages biodiversity in the Wellington region to work towards the Vision.

Vision

Healthy ecosystems thrive in the Wellington region and provide habitat for native biodiversity

The Strategy provides a common focus across Greater Wellington's departments and guides activities relating to biodiversity. The Vision is underpinned by four operating principles and three strategic goals. Goal One drives the delivery of the KNE Programme.

Goal One

Areas of high biodiversity value are protected or restored

3. The Key Native Ecosystem Programme

The KNE Programme is a voluntary programme of work. There is no statutory obligation for Greater Wellington to do this work. Greater Wellington invites selected landowners to discuss whether they would like to be involved in the programme. When work is done on private land, it is at the discretion of landowners, and their involvement in the programme is entirely voluntary. Involvement may just mean allowing work to be undertaken on that land.

The programme seeks to protect some of the best examples of original (pre-human) ecosystem types in the Wellington region by managing, reducing, or removing threats to their ecological values. Sites with the highest biodiversity values have been identified and prioritised for management. Sites are identified as of high biodiversity value for the purposes of the KNE Programme by applying the four ecological significance criteria described below.

Representativeness	Rarity/ distinctiveness	Diversity	Ecological context
The extent to which ecosystems and habitats represent those that were once typical in the region but are no longer common place	Whether ecosystems contain Threatened/At Risk species, or species at their geographic limit, or whether rare or uncommon ecosystems are present	The levels of natural ecosystem diversity present, ie, two or more original ecosystem types present	Whether the site provides important core habitat, has high species diversity, or includes an ecosystem identified as a national priority for protection

A site must be identified as ecologically significant using the above criteria and be considered “sustainable” for management in order to be considered for inclusion in the KNE Programme. “Sustainable” for the purposes of the KNE Programme is defined as: a site where the key ecological processes remain intact or continue to influence the site and resilience of the ecosystem is likely under some realistic level of management.

KNE sites can be located on private or publicly owned land. However, land managed by the Department of Conservation (DOC) is generally excluded from this programme.

KNE sites are managed in accordance with five-year KNE plans prepared by Greater Wellington’s Biodiversity department. Greater Wellington works with the landowners, mana whenua and other operational delivery providers to achieve mutually beneficial goals.

4. Belmont-Korokoro Key Native Ecosystem site

The Belmont-Korokoro KNE site (1,039ha) is located at the southern end of the western Hutt hills between the suburbs of Horokiwi to the west and Korokoro and Maungaraki to the east. Most of the KNE site is managed by Greater Wellington as part of Belmont Regional Park (see Appendix 1, Map 1).

Belmont-Korokoro KNE site contains the largest remaining stand of rimu-rātā/tawa-kohekohe forest in the south-west of the Wellington region⁷ and a large surrounding area of regenerating native forest. The KNE site contains most of the catchment of Te Korokoro o Te Mana/Korokoro Stream, which flows into Wellington Harbour, and a portion of the adjacent Belmont Stream catchment, which flows into the Hutt River. It is one of five forested KNE sites located in the western Hutt hills which together provide habitat connectivity and support the dispersal of native species through the Hutt Valley.

5. Parties involved

There are several organisations, groups and individuals that play important roles in the care of the KNE site.

5.1. Land Owners and Managers

The majority of the site (1,002ha) is managed by Greater Wellington as part of Belmont Regional Park (see Appendix 1, Map 1). This area includes land owned by Greater Wellington (448ha), Hutt City Council (HCC) (411ha), Wellington City Council (104ha) and DOC (39ha) (see Appendix 1, Map 2). Management of Belmont Regional Park as a whole is guided by the Greater Wellington Parks Network Plan⁸, and the Belmont Regional Park Sustainable Land Use Plan⁹. These plans guide the recreational and amenity uses of the park as well as identify opportunities to protect biodiversity values. This KNE plan is consistent with the wider objectives and policies of these plans. The Biodiversity and Parks departments work collaboratively to efficiently deliver the activities in these plans.

A small area of land (5ha) within the KNE site outside of Belmont Regional Park is owned and managed by HCC, and a further 15ha are privately owned by fourteen separate landowners, which include the Office of Treaty Settlements (see Appendix 1, Map 2). These landowners grant access to their properties for the purpose of carrying out activities described within this plan.

Various levels of legal protection are in place on land within the KNE site: 201ha are legally protected as scenic reserve, 587ha as recreation reserve and 3ha as other local purpose reserve (Esplanade or Maori Significance). A further 200ha are held by HCC for waterworks purposes. The remaining 48ha are not legally protected.

5.2. Operational delivery

Within Greater Wellington, four departments are responsible for delivering the KNE operational plan.

- The Biodiversity department is the overarching lead department on the longer term planning and coordination of biodiversity management activities and the provision of biodiversity management advice within the KNE site
- The Biosecurity department coordinates and implements pest controls measures at the KNE site with funding provided by the Biodiversity department
- The Environmental Science department coordinates monitoring of mammalian pests at the KNE site with funding provided by the Biodiversity department
- The Parks department manages/funds revegetation work within the KNE site. The department also manages recreational access and maintains assets such as roads, tracks and amenity areas within the KNE site

5.3. Mana whenua partners

Taranaki Whānui ke te Upoko o te Ika (Taranaki Whānui) and Ngāti Toa Rangatira (Ngāti Toa) are Greater Wellington's mana whenua partners in Belmont - Korokoro KNE site. Greater Wellington is committed to identifying ways in which kaitiakitanga can be strengthened by exploring opportunities of how mana whenua partners wish to be involved in the plan development or operational delivery of the KNE site. Te Korokoro o Te Mana/Korokoro Stream which lies within the KNE site holds significance to Taranaki Whānui. Table 1 below lists the values that it holds for Taranaki Whānui as listed in the PNRP¹⁰.

Table 1: Site of significance to Taranaki Whānui in Belmont-Korokoro KNE site¹¹

Site of significance	Mana whenua values
Te Korokoro o Te Mana /Korokoro Stream (Schedule B - Te Taonga Nui a Kiwa)	Ngā Mahi a ngā Tūpuna Te Mahi Kai Wāhi Whakarite Te Mana o te Tangata Te Manawaroa o te Wai Te Mana o te Wai Wāhi Mahara

Greater Wellington recognises the value and importance of working with mana whenua in their roles as kaitiaki in areas within the KNE site. The KNE operational plan activities will:

- make a small but valuable contribution to the overall expected PNRP outcomes by protecting native vegetation in the Korokoro and Speedy's streams catchments
- ensure people working in KNE sites understand the requirements of the Accidental Discovery Protocol
- endeavour to ensure that Ngāti Toa and Taranaki Whānui values for the site are protected

In addition, Greater Wellington will work on initiatives to achieve mutual benefit including the Internship monitoring programme of the cultural health and wellbeing of KNE sites.

5.4. Stakeholders

Korokoro Environmental Group (KEG) is a local community group that advocates for the protection of natural areas in the Korokoro area, including the KNE site. It keeps the local community informed about local environmental issues and members undertake restoration activities in reserves in the area. The main activity that the group currently undertakes within the KNE site is the field work component of Greater Wellington's monitoring of rodent, hedgehog and mustelid populations. They have been undertaking this activity since June 2009. In the past they have also undertaken ecological weed control and native planting in the lower Korokoro Valley. The group has also advocated for better protection of Korokoro Valley, lobbied for greater

funding and scope of biodiversity management activities within the KNE site and promoted the installation of fish passage devices at the Woollen Mill Dam.

Friends of Belmont Regional Park has advocated for positive environmental outcomes in Belmont Regional Park, including for the protection of the KNE site and other areas of the park from development.

The Lower Hutt branch of the Royal Forest and Bird Protection Society (F&B) has a strong interest in the KNE site, and has identified it as a key site in the development of bush corridors for bird dispersal across the Wellington region. Their interest in the ecological health of Te Korokoro o Te Mana/Korokoro Stream initiated investigations into options to enhance fish passage at the Woollen Mill Dam.

The Pareraho Forest Trust has recently been established to support residents of Belmont and Kelson to care for nature, locally, including through predator trapping. Predator Free Pareraho, an affiliated project, has started getting traps into backyards and plan to move into trapping in the many reserves of the area. It is likely that this work will add value to management activities undertaken in the KNE site and in time his group might directly contribute to pest animal and ecological weed control activities within the KNE site.

Belmont Area Mountain Bike Association (BAMBA) is the most active recreational group operating in the KNE site.

The Greater Wellington Flood Protection department owns a debris arrester structure situated at the lower end of Te Korokoro o Te Mana/Korokoro Stream. The structure captures debris flowing down the stream that could cause a blockage further downstream during heavy rainfall events. The Flood Protection department is responsible for managing the structure and for maintaining full channel capacity downstream to reduce the likelihood of flooding of State Highway 2, local roads and industrial premises.

Toviewadream Farming Ltd (TFL) operates a grazing licence on about 30 ha of land at the top of Te Korokoro o Te Mana/Korokoro Stream catchment within the KNE site. It is likely that this land will continue to be grazed at least until the end of the current licence which expires in January 2026. However a light grazing regime is used in order to minimise impacts on soils and waterways. TFL and Greater Wellington Parks department maintain fence lines to ensure stock are excluded from the native bush within the KNE site.

6. Ecological values

This section describes the various ecological components and attributes that make the KNE site important. These factors determine the site's value at a regional scale and how managing it contributes to the maintenance of regional biodiversity.

6.1. Ecological designations

Table 2, below, lists ecological designations at all or part of the Belmont-Korokoro KNE site.

Table 2: Designations at the Belmont-Korokoro KNE site

Designation level	Type of designation
National	Parts of the Belmont-Korokoro KNE site are designated as Scenic Reserve Parts of the Belmont-Korokoro KNE site are designated as Recreation Reserve
Regional	Parts of the Belmont-Korokoro KNE site are designated under Greater Wellington's Proposed Natural Resources Plan (PNRP) ¹² as Ecosystems and Habitats with Significant Indigenous Biodiversity Values: <ul style="list-style-type: none"> • River with Significant Indigenous Ecosystems - habitat for indigenous threatened/at risk fish species (Schedule F1) - Te Korokoro o Te Mana/the Korokoro Stream and all of its tributaries • River with Significant Indigenous Ecosystems - habitat for six or more migratory indigenous fish species (Schedule F1) - Te Korokoro o Te Mana/the Korokoro Stream and all of its tributaries
District	Part of the Belmont-Korokoro KNE site is designated as Significant Natural Resource in HCC's District Plan: <ul style="list-style-type: none"> • Korokoro Stream Bush Part of the Belmont-Korokoro KNE site is designated as Conservation Covenant by the Department of Conservation: <ul style="list-style-type: none"> • Waitangirua Covenants
Other	Parts of the site are gazetted for Waterworks purposes

6.2. Ecological significance

The Belmont-Korokoro KNE site is considered to be of regional importance because:

- It contains highly **representative** ecosystems that were once typical or commonplace in the region
- It contains ecological features that are **rare or distinctive** in the region
- It contains high levels of ecosystem **diversity**, with several ecosystem types represented within the KNE site
- Its **ecological context** is valuable at the landscape scale as it has good connectivity to other important areas of indigenous ecosystems, and it is large enough to support large resident populations of most species of native forest birds

Representativeness

The Belmont-Korokoro KNE site contains an approximately 80ha area of forest which is highly representative of the forest types which would have once been common in this part of the Wellington region. The Singers and Rogers (2014)¹³ classification of pre-human vegetation indicates that the KNE site would have originally comprised predominantly a mix of kohekohe, tawa forest (MF6) and tawa, kāmahī, podocarp forest (MF7). Both these forest types are represented in the remaining forest. Only 16% and 22% of the pre-human extent of these forest types respectively remain in the Wellington region making them regionally at risk ecosystem types¹⁴. There may have also been a small component of kāmahī, broadleaved, podocarp forest (MF8) at higher altitude (see Appendix 1, Map 3).

The Threatened Environment Classification system¹⁵ indicates that parts of the KNE site, which include the area where the remnant of original forest stands, are on land environments that are classified as At Risk, having only 20-30% of their indigenous vegetation cover remaining nationally (see Appendix 1, Map 4).

Rarity/distinctiveness

New Zealand's national threat classification system¹⁶ lists three plant, two bird, three lizard and six freshwater fish species found in the KNE site as nationally Threatened or At Risk. Four plant and four lizard species have been listed as regionally Threatened or At Risk. Nationally and regionally Threatened and At Risk species are listed in Appendices 2 and 3 respectively.

Diversity

The KNE site contains a variety of habitat types incorporating areas of coastal, riverine and lowland forest habitats. Natural ecotones exist between these different types of habitat forming an uninterrupted ecological sequence from near sea level to 457m altitude at Belmont Trig. The variety of habitat types support a wide diversity of species.

Ecological context

The KNE site is well connected to other forested areas on the Wellington Harbour escarpment, in the western hills of the Hutt Valley, and in the Takapu Stream and Cannons Creek catchments to the north. Together these areas form ecological corridors, important for native bird dispersal and breeding in this part of the region. The KNE site is considered large enough to allow prolific breeding of indigenous forest bird species responsible for native seed dispersal and plant pollination¹⁷. This makes it an important area in the landscape-level ecology of the Wellington - Porirua - Hutt Valley area.

6.3. Ecological features

Vegetation communities and plants

The ecological makeup of the KNE site is underpinned by the remnant of original native forest which is situated roughly in the middle of the site. The dominant canopy trees in the remnant are tawa (*Beilschmedia tawa*), kohekohe (*Dysoxylum spectabile*), rewarewa (*Knightia excelsa*), hīnau (*Elaeocarpus dentatus*) and tītōki (*Alectryon*

excelsus)¹⁸. Emergent canopy trees are present although they are less abundant than they would have originally been. These comprise rimu (*Dacrydium cupressinum*), miro (*Prumnopitys ferruginea*), kahikatea (*Dacrycarpus dacrydioides*), northern rātā (*Metrosideros robusta*) and pukatea (*Laurelia novae-zelandiae*). Large areas of regenerating bush in varying degrees of regeneration, including advanced regeneration in gullies of the upper catchment, enlarge the area of native vegetation and act as a buffer for the remnant forest.

Species

Birds

Most of the native bird species that have survived naturally in the Wellington region are present in the KNE site. These include bellbird (*Anthornis melanura*), tomtit (*Petroica macrocephala*), whitehead (*Mohoua albicilla*) and red-crowned parakeets (kākāriki, *Cyanoramphus novaezelandiae*) along with more commonly occurring native species^{19,20}. New Zealand falcon (*Falco novaeseelandiae*) and kākā (*Nestor meridionalis*) have been recorded in the area and may use the KNE site for foraging or nesting²¹.

Reptiles

Six species of lizards have been observed either within the KNE site or within a few hundred metres of its boundary²². These are barking gecko (*Naultinus punctatus*), ngahere gecko (*Mokopirirakau* 'southern North Island'), raukawa gecko (*Woodworthia maculata*), northern grass skink (*Oligosoma polychroma*), ornate skink (*O. ornatum*) and brown skink (*O. zelandicum*). Three of these are nationally at risk species, one is regionally at risk (see Appendix 2).

Fish

The Korokoro Stream is recognised for its high native fish values. Nine species of native fish have been recorded in the Korokoro catchment: longfin eel (*Anguilla dieffenbachia*), shortfin eel (*A. australis*), giant kōkopu (*Galaxias argenteus*), banded kōkopu (*Galaxias fasciatus*), kōaro (*Galaxias brevipinnis*), īnanga (*Galaxias maculatus*), bluegill bully (*Gobiomorphus hubbsi*), redfin bully (*Gobiomorphus huttoni*) and common bully (*Gobiomorphus cotidianus*)²³. Six of these are nationally at risk species (see Appendix 2).

7. Threats to ecological values at the KNE site

Ecological values can be threatened by human activities, and by introduced animals and plants that change ecosystem dynamics. The key to protecting and restoring biodiversity as part of the KNE Programme is to manage threats to the ecological values at each KNE site.

7.1. Key threats

Ecological weeds, pest animals and human activities all have the potential to impact the Belmont-Korokoro KNE site. The most significant threats come from a suite of ecological weed and pest animal species, grazing stock, barriers to fish passage in the main stream course, and the adverse effects of surrounding land use.

Numerous climbing, ground covering and woody weed species are present in the KNE site. Some are widespread across the KNE site and entrenched in some areas. Species posing the most significant threat to the native integrity of the KNE site are tradescantia (*Tradescantia fluminensis*), African club moss (*Selaginella kraussiana*) and old man's beard (*Clematis vitalba*). These species are all displacing native flora and preventing natural forest regeneration in places. Other species present include Darwin's barberry (*Berberis darwinii*), barberry (*Berberis glaucocarpa*), cathedral bells (*Cobaea scandens*), ivy (*Hedra helix*) and Chilean rhubarb (*Gunnera tinctoria*). If left uncontrolled ecological weeds would grow in density and distribution and will alter the forest structure and character.

A number of pest animal species are present in the KNE site. The species that present the greatest threat if they weren't controlled are possums (*Trichosurus vulpecula*), rats (*Rattus* spp.), mustelids (stoats (*Mustela erminea*) and weasels (*M. nivalis*)), hedgehogs (*Erinaceus europaeus*) and goats (*Capra hircus*).

Grazing of stock beyond the boundary of the KNE site but still within the stream catchments could cause elevated levels of sediment run-off into the streams within the KNE site. This could lead to reduced water clarity and altered substrate composition, adversely impacting the stream ecology. Degraded fencing on some parts of the boundary of the KNE site could allow farmed stock to gain access into the KNE site which would lead to damage of the understory and would impact regeneration of the native forest.

Two historic dams within Te Korokoro o Te Mana/Korokoro Stream are likely to restrict or totally prevent the passage of some native fish species upstream of them. This reduces the amount of potential habitat available to these species and prevents the completion of the life-cycles of those that are diadromous species. Because the two dams are located in the lower reaches of the stream, a very large proportion of the catchment is rendered inaccessible to those species that can't negotiate the dams.

The KNE site is actively managed for recreation which presents threats as a result of both the creation of recreational opportunities, such as new track construction, and the actual recreational use itself. These activities could damage plant communities, cause sedimentation of streams, and introduce and/or spread ecological weeds if not managed carefully. All other operational activities undertaken at the site also have the potential to cause similar impacts.

While the key threats discussed in this section are recognised as the most significant, a number of other threats to the KNE site's values have also been identified. Table 3 presents a summary of all known threats to the Belmont-Korokoro KNE site (including those discussed above), detailing which operational areas they affect, how each threat impacts on ecological values, and whether they will be addressed by operational activities.

Table 3: Summary of all threats to ecological values present at the Belmont-Korokoro KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
Ecological weeds		
EW-1	Ground covering ecological weeds smother and displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. Key ground covering ecological weed species for control include tradescantia (<i>Tradescantia fluminensis</i>), African club moss (<i>Selaginella kraussiana</i>), Chilean rhubarb (<i>Gunnera tinctoria</i>) and periwinkle (<i>Vinca major</i>), (see full list in Appendix 4)	Entire KNE site
EW-2	Woody ecological weed species displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. Key woody ecological weed species for control include Darwin's barberry (<i>Berberis darwinii</i>), barberry (<i>Berberis glaucocarpa</i>) and wild cherry (<i>Prunus</i> spp.), (see full list in Appendix 4)	Entire KNE site
EW-3	Climbing ecological weeds smother and displace native vegetation often causing canopy collapse, inhibit indigenous regeneration, and alter vegetation structure and composition. Key climbing ecological weed species for control include old man's beard (<i>Clematis vitalba</i>), cathedral bells (<i>Cobaea scandens</i>), ivy (<i>Hedra helix</i>), and Japanese honeysuckle (<i>Lonicera japonica</i>), (see full list in Appendix 4)	Entire KNE site
EW-4*	Aquatic ecological weeds out-compete native aquatic species and choke watercourses. The key ecological weed species is <i>Lagarosiphon major</i>	Te Korokoro o Te Mana/Korokoro Stream - downstream from the Korokoro Dam lake
Pest animals		
PA-1	Possoms (<i>Trichosurus vulpecula</i>) browse palatable canopy vegetation until it can no longer recover ^{24,25} . This destroys the forest's structure, diversity and function. Possoms may also prey on native birds and invertebrates ²⁶	Entire KNE site
PA-2	Rats (<i>Rattus</i> spp.) browse native fruit, seeds and vegetation. They compete with native fauna for food and can reduce forest regeneration. They also prey on invertebrates, lizards and native birds ^{27,28}	Entire KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
PA-3	Mustelids (stoats ^{29,30} (<i>Mustela erminea</i>), ferrets ^{31,32} (<i>M. furo</i>) and weasels ^{33,34} (<i>M. nivalis</i>)) prey on native birds, lizards and invertebrates, reducing their breeding success and potentially causing local extinctions	Entire KNE site
PA-4	Hedgehogs (<i>Erinaceus europaeus</i>) prey on native invertebrates ³⁵ , lizards ³⁶ and the eggs ³⁷ and chicks of ground-nesting birds ³⁸	Entire KNE site
PA-5*	House mice (<i>Mus musculus</i>) browse native fruit, seeds and vegetation, and prey on invertebrates. They compete with native fauna for food and can reduce forest regeneration. They also prey on invertebrates, lizards and small eggs and nestlings ^{39,40}	Entire KNE site
PA-6*	Feral, stray and domestic cats (<i>Felis catus</i>) prey on native birds ⁴¹ , lizards ⁴² and invertebrates ⁴³ , reducing native fauna breeding success and potentially causing local extinctions ⁴⁴	Entire KNE site
PA-7*	Rabbits (<i>Oryctolagus cuniculus</i>) and hares (<i>Lepus europaeus</i>) graze on palatable native vegetation and prevent natural regeneration in some environments ⁴⁵ . Rabbits are particularly damaging in sand dune environments where they graze native binding plants and restoration plantings. In drier times hares especially, will penetrate into wetland forest areas browsing and reducing regenerating native seedlings	Forest margins
PA-8*	Wasps (<i>Vespula</i> spp.) adversely impact native invertebrates and birds through predation and competition for food resources. They also affect nutrient cycles in beech forests ⁴⁶	Entire KNE site
PA-9	Goats (<i>Capra hircus</i>) browsing affects the composition and biomass of native vegetation in the understory tiers of forest habitats, preventing regeneration of the most palatable understory species and reducing species diversity ⁴⁷	Entire KNE site
PA-10*	Red deer (<i>Cervus elaphus</i>) and fallow deer (<i>Dama dama</i>) browse the forest understory and can significantly change vegetation composition by preferential browsing and preventing regeneration ^{48,49,50}	
PA-11*	Brown trout (<i>Salmo trutta</i>) and rainbow trout (<i>Oncorhynchus mykiss</i>) prey on native fish and compete with them for food resources ⁵¹	Streams
PA-12*	Eastern rosella (<i>Platycercus eximius</i>) parakeets are known to out-compete native red-crowned parakeets for nest-sites and are a vector of avian diseases. The continued presence of eastern rosella in the KNE site could limit the ability of red crowned parakeets to establish functional populations ^{52,53}	Entire KNE site
Human activities		
HA-1	Garden waste dumping often leads to ecological weed invasions into natural areas. Common ecological weed species introduced at this KNE site include hydrangea (<i>Hydrangea macrophylla</i>) and plectranthus (<i>Plectranthus</i> spp.)	Residential boundaries of KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
HA-2	Agricultural practices, particularly grazing livestock can result in pugging soils, grazing native vegetation inhibiting regeneration, wildlife disturbance and increasing nutrient content of soils and watercourses ⁵⁴	Farm land in and adjacent to the KNE site
HA-3	Recreational use such as tramping, mountain biking and horse riding can cause damage and disturbance of the native ecosystem. It is also likely to disturb native fauna and introduce ecological weeds	Entire KNE site
HA-4	Management activities such as track development, pest control and ecological monitoring can damage indigenous vegetation, and cause the accidental introduction of weed species through the carriage of seeds and plant fragments on machinery, equipment and clothing	Entire KNE site
HA-5*	Plantation forestry on adjoining land parcels to the KNE site have the potential to cause habitat loss or degradation, disturb native wildlife, damage boundary fencing and increase sediment load in watercourses via surface run-off during harvesting operations	Adjacent plantations on the western and eastern boundaries
HA-6*	Barriers to native fish passage are present in streams within the KNE site reducing available habitat and preventing migrating fish from completing their life-cycle	Two dams located in Te Korokoro o Te Mana/Korokoro Stream
HA-7*	Poor water quality affects a range of species in the streams. Heightened nutrient levels and contaminants within watercourses are often caused by upstream land management practices and pollution events including development practices, forestry and agricultural practices, road run-off and storm water entering the watercourse, and septic tank leakages	All streams affected by adjacent land uses

*Threats marked with an asterisk are not addressed by actions in the operational delivery schedule

The codes alongside each threat correspond to activities listed in the operational delivery schedule (Table 4), and are used to ensure that actions taken are targeted to specific threats. A map of operational areas can be found in Appendix 1 (see Map 5).

8. Vision and objectives

8.1. Vision

The entire Belmont-Korokoro KNE site resembles the forest ecosystem originally present. It is regenerating and flourishing, and supporting increasingly diverse and successfully breeding populations of native birds, lizards, invertebrates and fish. It continues to provide core habitat and an anchor stone for the expansion of native species into the surrounding districts.

8.2. Objectives

Objectives help to ensure that operational activities carried out are actually contributing to improvements in the ecological condition of the site.

The following objectives will guide the operational activities at the Belmont-Korokoro KNE site.

- 1. Protect the core area of mature native forest**
- 2. Improve the regeneration of the rest of the KNE site**
- 3. Protect native fauna from predation**
- 4. Prevent the loss or degradation of native habitat**
- 5. Gather information to inform management decisions**
- 6. Raise community awareness of the ecological values of the KNE site and support the local community in protecting those values**

9. Operational activities

Operational activities are targeted to work towards the objectives above (Section 8) by responding to the threats outlined in Section 7. The broad approach to operational activities is described briefly below, and specific actions, with budget figures attached, are set out in the operational delivery schedule (Table 4).

It is important to note that not all threats identified in Section 7 can be adequately addressed. This can be for a number of reasons including financial, legal, or capacity restrictions.

9.1. Ecological weed control

The main aim of ecological weed control at the KNE site is to protect the core area of mature native forest and improve native regeneration in surrounding areas of advanced regenerating forest. This means preventing an increase in the abundance of exotic plants in the core area and keeping ecological weeds to low levels in surrounding areas. Some of the more invasive ecological weed species are controlled further afield within the KNE site to stop them spreading into these areas. However control is primarily confined to operational area A (see Appendix 1, Map 5). The ecological weed species targeted are listed in Appendix 4.

Controlling ecological weeds throughout operational area A is difficult due to its size and steep topography. Therefore spatial and quantitative data gathered from a number of past weed surveys at the site (see Appendix 1, Map 7) is used to focus control work to areas where infestations of the most invasive species are likely to be found. Operational staff utilise view-points and occasionally undertake helicopter searches during seasonal flowering periods to locate infestations of target species. Priority is made of controlling mature specimens producing large amounts of seed and checking the locations of previously controlled infestations to ensure those infestations don't regenerate.

Additionally, targeted control of tradescantia and African club moss is undertaken within operational areas A and B to minimise the spread of these species into the understory of native forest. Currently this involves controlling only patches of these species that are isolated from the large entrenched infestations that are line stream banks and walking tracks. Once the isolated infestations have been controlled, then progressive control of the large infestations, working from the top of the catchment down, may be undertaken.

Bridle trails within the KNE site are monitored for new ecological weed incursions in the course of carrying out other ecological weed control work. It is possible that horses being ridden through the KNE site could introduce new or spread existing ecological weeds through the carriage of seeds in their hooves and droppings.

9.2. Pest animal control

The aim of pest animal control at the KNE site is to protect the core area of mature native forest, improve native regeneration throughout the KNE site, and protect native fauna such as native birds, lizards and invertebrates. This means controlling mammalian browsers that impact native forest and its ability to regenerate, and controlling predators of native fauna. The pest animal species that are controlled in the KNE site are possums, rats, mustelids (stoats and weasels) and hedgehogs.

Possums and rats are kept at low levels in the middle and lower parts of the KNE site (operational area A; see Appendix 1, Map 6). Possums are targeted through a combination of poisoning and trapping while rats are targeted using poisoning alone. A small number of bait stations on private properties outside the KNE boundary are used to slow the migration of possums into the KNE site in the southern section where the KNE site is very narrow. Every second year, when the budget allocation for this work is slightly higher due to goat culling not being required that year, either maintenance of bait station lines will be undertaken, or new bait stations or traps will be installed into areas of bush where there is currently no control in place.

Hedgehogs and mustelids are controlled through trapping in the middle and lower parts of the KNE site (operational area A; see Appendix 1, Map 6). Traps were installed alongside walking tracks and on some bait station lines progressively from 2017 to 2019. Local volunteers started operating most of the traps from early 2019. Biosecurity department staff or their contractors operate traps in areas that volunteers find difficult to access. The results of small mammal monitoring undertaken in the KNE site will be monitored to see if this trapping can reduce the hedgehog population to low levels. Past monitoring has shown the hedgehog population present to be relatively

large for a forest ecosystem (over 33% tracking tunnel index (TTI) continually between November 2011 and May 2014⁵⁵).

Goat numbers are extremely low as a result of annual culling carried out by ground hunters since 2001, and very few goats have been found in the KNE site since 2011. Goats are kept to low numbers by carrying out culling operations every second year. Goat culling operations will be carried out in 2021/22 and 2023/24.

Apart from goat control, there is currently no pest animal control undertaken in the upper parts of the KNE site (operational areas B and C; see Appendix 1, Map 4). Available resources don't allow pest animal control to be carried out across the whole site so these activities are concentrated on the area of the KNE site that contains the greatest biodiversity values (operational area A). OSPRI undertook a possum control operation through most of Belmont Regional Park in 2015 as part of their TB-Free New Zealand programme and included the upper parts of the KNE site in the operation. The operation reduced the possum population to very low levels (below 2% residual trap catch (RTC)) at the time. However possum numbers will have increased since and are likely to continue to increase to a level that they are again impacting native biodiversity in the KNE site. Currently OSPRI don't plan to undertake another possum control operation in this area until 2026.

9.3. Monitoring

Monitoring of small mammal populations (rodents, mustelids and hedgehogs) is undertaken in the KNE site to gain information on the effectiveness of the pest animal control undertaken. This work is coordinated by Greater Wellington's Environmental Science department and field work is completed with voluntary assistance from members of KEG. Rodent monitoring is completed every spring and summer, and mustelid and hedgehog monitoring is completed annually.

9.4. Revegetation

Since 2015 Greater Wellington's Parks department has been managing an area of the KNE site to assist its natural regeneration back to native forest following the harvest of a pine plantation in the area (operational area C; see Appendix 1, Map 5). The Parks department carries out control of ecological weeds that may inhibit native regrowth in this area focusing mostly on gorse, pampas and wilding pines. A small amount of revegetation work is undertaken on the edges of cycling and walking tracks that have been developed in the area since the pine plantation was harvested. Planting is coordinated by the Parks department and undertaken by volunteers.

9.5. Community engagement

The purpose of Greater Wellington engaging with the community about the KNE site is to raise awareness of its ecological values and involve the community in the protection of those values. To raise awareness of the KNE site's values, interesting environmental stories regarding the KNE site are disseminated through social or print media when they arise. These may include observations such as of uncommon native bird species or exceptional flowering or fruiting of native plants.

Greater Wellington works with the Korokoro Environmental Group (KEG) and individual volunteers on undertaking operational activities at the KNE site. Pareraho Forest Trust also have ambitions to become involved in delivery of the work through volunteer efforts. Working with the community not only allows more activities to be accomplished but also builds support and advocacy for biodiversity protection work.

9.6. Environmental protocols

Greater Wellington undertakes biodiversity operational activities at the KNE site. This includes using best practice methods when undertaking ecological weed and pest animal control. Additionally, the following activities help to protect the natural resources of the site.

Environmental care

Greater Wellington's operational staff follow procedures to identify and avoid damage to biodiversity values such as plant and animal communities. Procedures may include undertaking assessments of environmental effects of planned works. This limits the risks to these values that could occur while carrying out the construction and maintenance of assets, and when permitting the use of the KNE site by other users.

Biosecurity guidelines for checking and removing seeds and plant fragments from vehicles, equipment and clothing⁵⁶ are followed by all operational staff when entering and working in the KNE. Following these guidelines reduces the risk of spreading ecological weeds and pathogens into and around the KNE site.

Research and the collection of natural materials

Research activities and the collection of native plants and animals in the KNE site is managed by a permit system run by the Environmental Science department. This system prevents adverse effects on native biodiversity occurring when these activities are undertaken.

10. Future opportunities

10.1. Grazing retirement

About 30 ha of land within the KNE site is grazed as part of the Belmont Regional Park grazing lease. It is likely that this land will continue to be grazed at least until the end of the current lease which is in 2026. At that time, or earlier if the opportunity presents itself, it would be beneficial to the health of the waterways and to the terrestrial biodiversity of the area to retire this area from grazing and allow it to passively regenerate to a native plant dominated habitat. Greater Wellington's Parks department has retired large sections of the catchment from the Belmont Regional Park farming operation in past years and this is now the largest area of land left still being farmed within the catchment. The land in this area is steep, incised and erosion prone. A grazing regime that is light on the land and waterways is used. Native vegetation is already regenerating in the bottom of the gullies under this regime.

10.2. Revegetation

There is opportunity for more major revegetation work to be undertaken in the KNE site. This can't be afforded within the funding currently available for biodiversity activities. However it is possible that funding for revegetation work at the KNE site may become available through the government's One Billion Trees funding. If funding for revegetation does eventuate through this or another initiative, the main aims of revegetation at the KNE site will be to rehabilitate degraded areas of the lower Te Korokoro o Te Mana/Korokoro Stream valley. Many sections of the stream valley are currently vegetated with exotic grasses and weeds only, and would benefit from the planting of native trees, shrubs and sedges.

Revegetation would involve planting of stream edges to provide shading for the stream and riparian habitat, and planting of open areas of the stream terrace to provide valley floor habitat and connect the regenerating bush on each side of the valley.

Greater Wellington's Biodiversity department has the capacity to arrange revegetation work, but obtaining funding and undertaking planting will be dependent on the local community providing the planting labour. Logistical support from Greater Wellington's Parks department may be required to facilitate planting events.

Appendix 1, Map 8 shows the area where planting could take place and Appendix 5 provides a list of appropriate plants for revegetation in the proposed area. All plants would be eco-sourced from the Wellington Ecological District.

10.3. Fish passage

It is likely that the two dams located in Te Korokoro o Te Mana/Korokoro Stream present barriers to the passage of some native fish species. Although surveys undertaken in the past indicate this, there have been no surveys done in recent years and not since a fish ladder aimed at improving fish passage was installed adjacent to the spillway of the Mill Workers Dam in 2016. It would be of interest and value in any future decision making regarding remediation of fish passage, to gain up to date

information about the species composition above and below each dam. And it would be beneficial to those species found to be still confined by one or other dam, to create some form of passage for them over the dams. Coordinating and sourcing funding for either of these activities are projects that a volunteer group or organisation may be interested in undertaking. Any proposed alteration or attachment to either dam would need to take into account the heritage values of the dams.

10.4. Lizard translocation

To address the future need for mitigation-driven lizard translocation sites, Greater Wellington has identified twelve sites within its parks network that are potentially suitable for the release of lizards. Two of these identified sites are located within the Belmont-Korokoro KNE site. Sites were selected based on the suitability of the habitat for Northern Grass Skink (*Oligosoma polychroma*) particularly, as this species is considered to be the most likely species to be an initial target of translocation efforts. Further details of the selection criteria and a map showing the locations of sites can be found in the project report⁵⁷.

11. Operational delivery schedule

The operational delivery schedule shows the actions planned to achieve the stated objectives for the Belmont-Korokoro KNE site, and their timing and cost over the five-year period from 1 July 2020 to 30 June 2025. The budget for years 2021/22 to 2024/25 are indicative only and subject to change. A map of operational areas can be found in Appendix 1 (see Map 5).

Table 4: Five-year operational plan for the Belmont-Korokoro KNE site

Objective	Activity	Operational area	Actions	Intended outcome	Implementing party	Timetable and resourcing				
						2020/21	2021/22	2022/23	2023/24	2024/25
1, 2, 4	Ecological weed control	A	Search for and control ecological weed species listed in Appendix 4: <ul style="list-style-type: none"> • Search from tracks, routes and view-points, • Use helicopters or drones when deemed efficient, • Utilise seasonal flowering periods to recognise plants 	The abundance of exotic species in the remnant forest is prevented from increasing	GW Biosecurity department	\$17,500	\$17,500	\$17,500	\$17,500	\$17,500
						(combined allocation for this and following two activities)	(combined allocation for this and following two activities)	(combined allocation for this and following two activities)	(combined allocation for this and following two activities)	(combined allocation for this and following two activities)
1, 2, 4	Ecological weed control	A	Check locations of previously controlled ecological weed infestations and control all target ecological weeds present	Previously controlled infestations don't regenerate	GW Biosecurity department					

Objective	Activity	Operational area	Actions	Intended outcome	Implementing party	Timetable and resourcing				
						2020/21	2021/22	2022/23	2023/24	2024/25
1, 2, 4	Ecological weed control	A, B	Control isolated infestations of tradescantia and African club moss. Then as resources allow control main infestations working from the top of the catchment down	The impact of the target species on forest under-story regeneration is reduced	GW Biosecurity department					
2	Ecological weed control / Revegetation	C	Assist natural regeneration of the area of harvested pine plantation: <ul style="list-style-type: none"> Control ecological weeds, Plant edges of the tracks with native species 	Native forest is regenerating with minimal colonisation by ecological weed species	GW Parks department	Funded by Parks department – costs not known at this time	Funded by Parks department – costs not known at this time	Funded by Parks department – costs not known at this time	Funded by Parks department – costs not known at this time	Funded by Parks department – costs not known at this time
1, 2, 3, 4	Pest animal control	A	Control possums and rats through three monthly bait station and trap servicing	Populations are maintained to: Possums <5% RTC* Rats <5% TTI**	GW Biosecurity department	\$36,750	\$36,750	\$38,250	\$36,750	\$38,250
3	Pest animal control	A	Control hedgehogs and mustelids through regular trap servicing	Mustelid populations are maintained to <2% TTI** Reduction in hedgehog populations	Volunteers coordinated by GW Parks, Biosecurity departments	\$750	\$750	\$750	\$750	\$750

Objective	Activity	Operational area	Actions	Intended outcome	Implementing party	Timetable and resourcing				
						2020/21	2021/22	2022/23	2023/24	2024/25
1, 2, 4	Pest animal control	A, B, C	Control goats by ground hunting	The KNE site is kept free of goats (apart from Judas goats)	GW Biosecurity department	\$0	\$1,500	\$0	\$1,500	\$0
5	Pest animal monitoring	A	Carry out monitoring of small mammal populations (rats, hedgehogs and mustelids) to gauge the effectiveness of control Rat monitoring completed every six months, and hedgehog/ mustelid monitoring completed annually	Results inform pest animal control decision making	GW Environmental Science department	\$6,824	\$6,824	\$6,824	\$6,824	\$6,824
4	Environmental protocols	Whole KNE site	Ensure pest plant biosecurity guidelines are adhered to while carrying out all management activities	Ecological weeds are not introduced or spread as a result of operational activities	GW Parks, Biodiversity, Biosecurity & Environmental Science departments	Nil (staff time only)	Nil (staff time only)	Nil (staff time only)	Nil (staff time only)	Nil (staff time only)

Objective	Activity	Operational area	Actions	Intended outcome	Implementing party	Timetable and resourcing				
						2020/21	2021/22	2022/23	2023/24	2024/25
4	Environmental protocols	Whole KNE site	Undertake environmental impact assessments and adhere to procedures that protect the natural environment when carrying out construction and maintenance of assets, and when managing recreational, research and commercial activities in the KNE site	Minimal impacts are imposed on biodiversity values by operational, recreational, research and commercial activities	GW Parks, Biodiversity & Environmental Science departments	Nil (staff time only)				
6	Community engagement	Whole KNE site	Disseminate interesting biodiversity stories regarding the KNE site through social and print media when they arise	Increased community awareness of KNE site values	GW Biodiversity and Parks departments	Nil (staff time only)				
6	Community engagement	Whole KNE site	Effectively support volunteers participating in KNE operational activities	Volunteers are well supported, feel valued and continue to participate	GW Parks, Environmental Science and Biodiversity departments	Nil (staff time only)				
Totals						\$61,824†	\$63,324	\$63,324	\$63,324	\$63,324

*RTC = Residual Trap Catch. The control regime has been designed to control possums to this level but monitoring will not be undertaken. Experience in the use of this control method indicates this target will be met

**TTI = Tracking Tunnel Index. The control regime has been designed to control rats/mustelids to this level but monitoring will not be undertaken. Experience in the use of this control method indicates this target will be met

†Pest animal control budget reduced by \$1,500 for one year and this amount re-allocated to Belmont-Speedys KNE site for deer control.

12. Funding contributions

12.1. Budget allocated by Greater Wellington

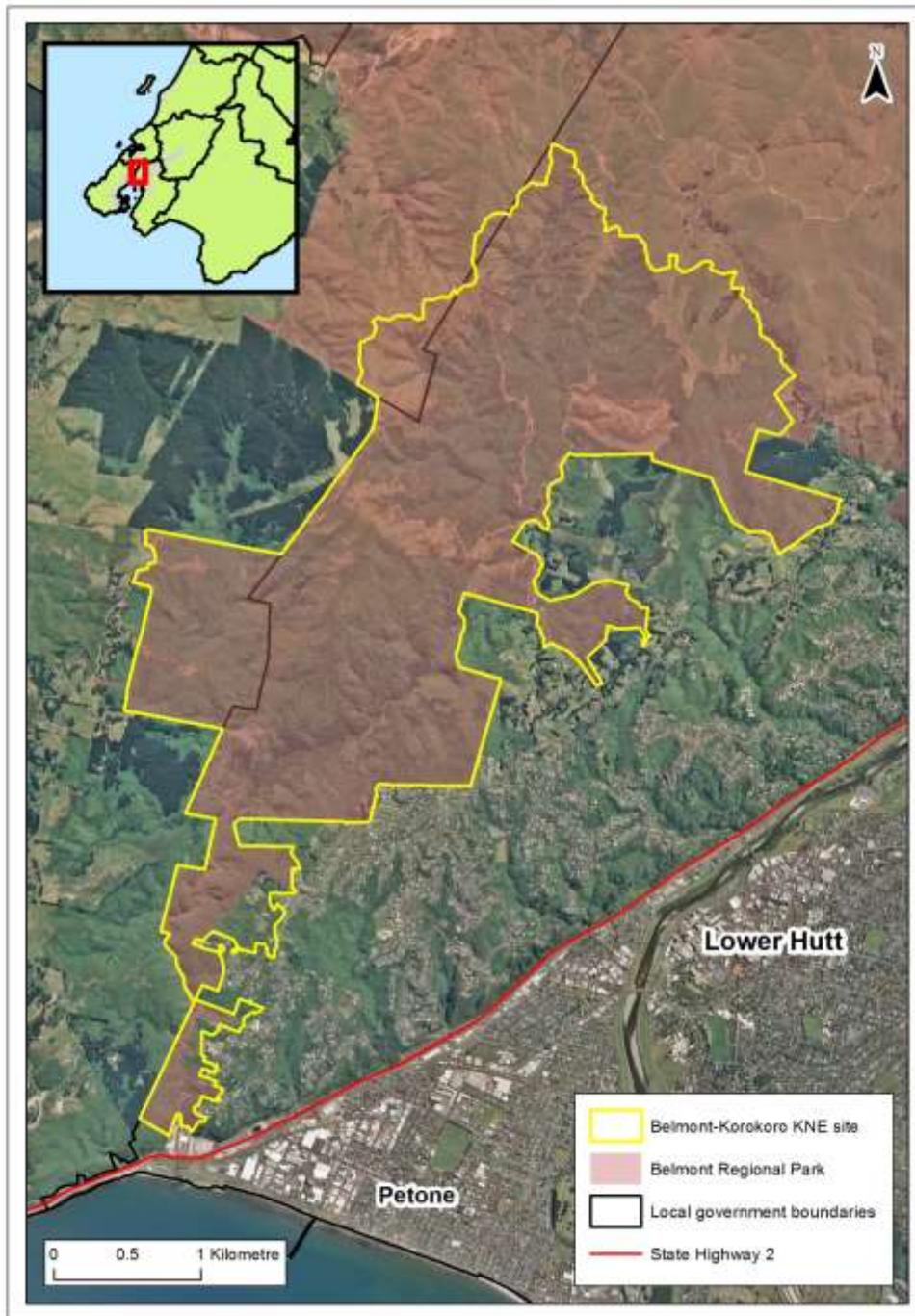
The budget for the years 2021/22 to 2024/25 are indicative only and subject to change.

Table 5: Greater Wellington allocated budget for the Belmont-Korokoro KNE site

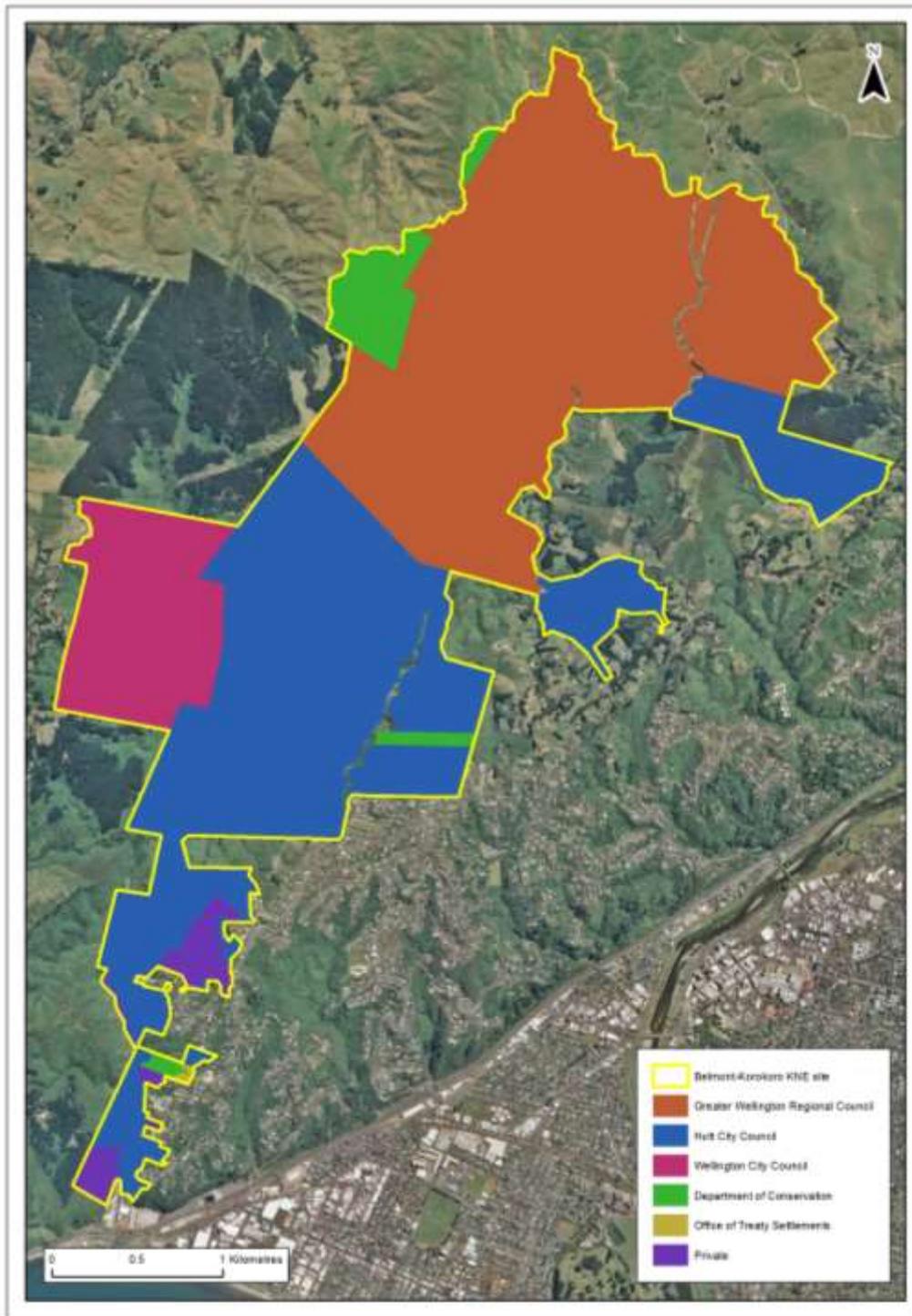
Management activity	Timetable and resourcing				
	2020/21	2021/2022	2022/23	2023/24	2024/25
Ecological weed control	\$17,500	\$17,500	\$17,500	\$17,500	\$17,500
Pest animal control	37,500†	39,000	39,000	39,000	39,000
Monitoring	\$6,824	\$6,824	\$6,824	\$6,824	\$6,824
Total	\$61,824	\$63,324	\$63,324	\$63,324	\$63,324

†Pest animal control budget reduced by \$1,500 for one year and this amount re-allocated to Belmont-Speedys KNE site for deer control.

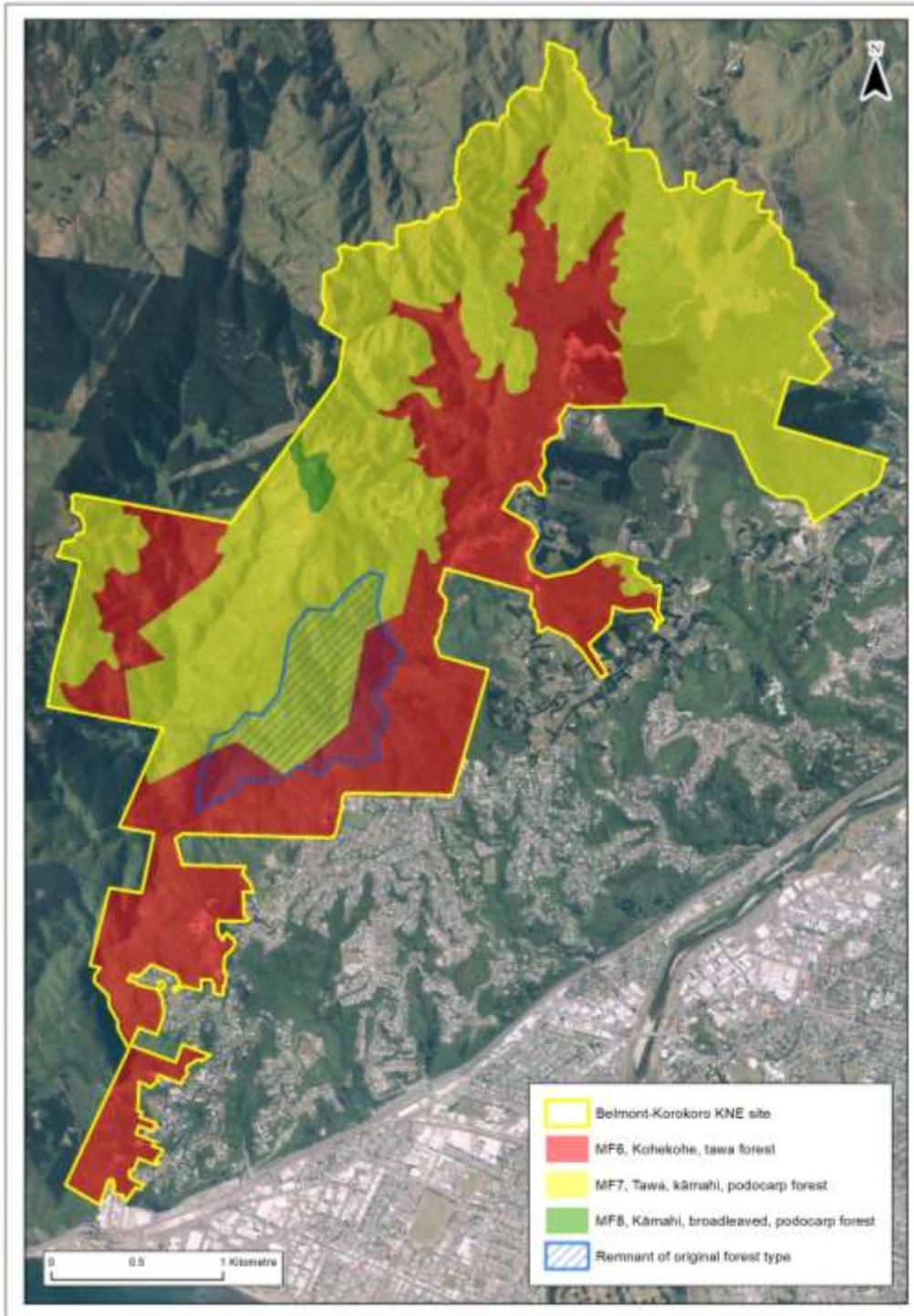
Appendix 1: Site maps



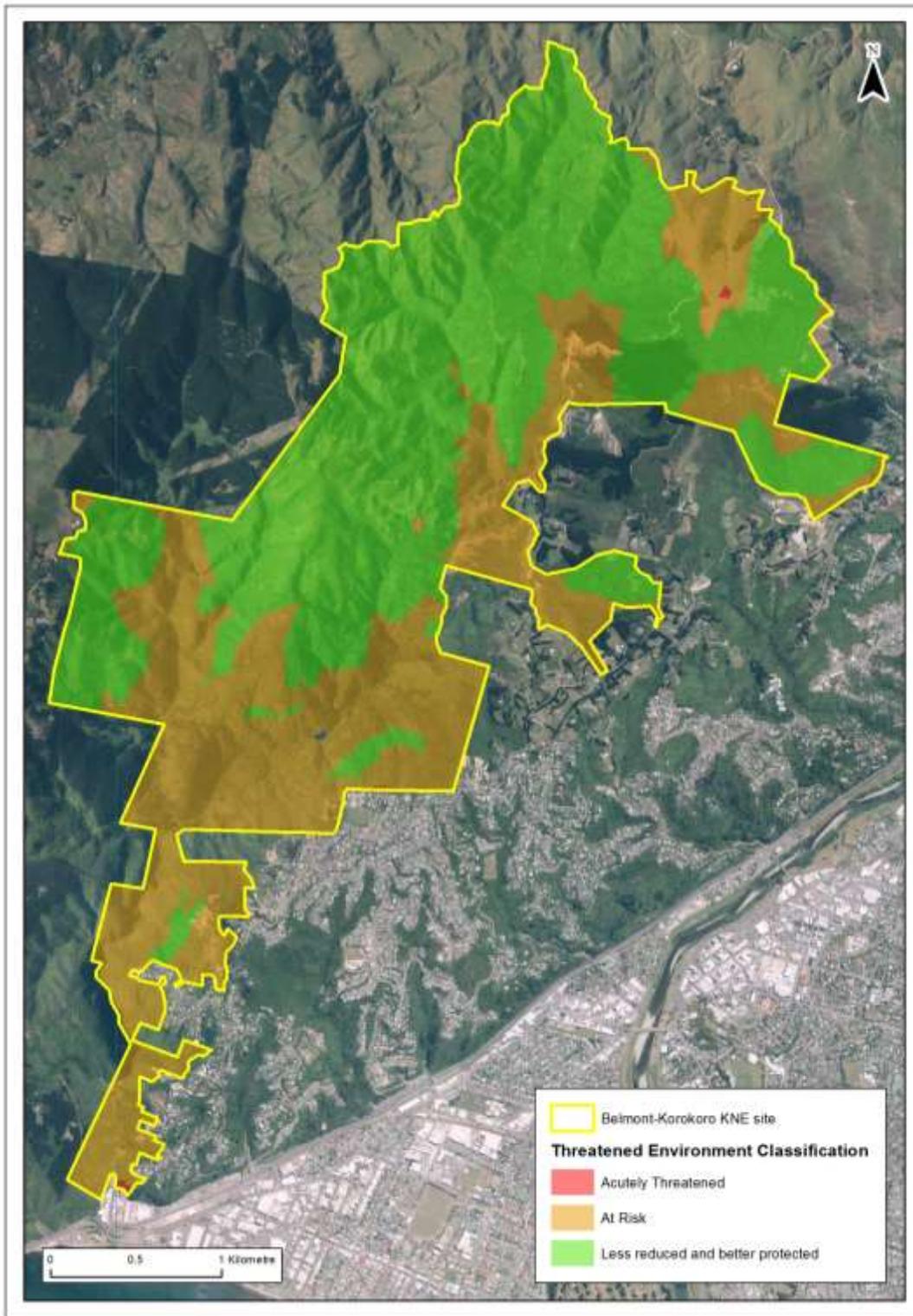
Map 1: The Belmont-Korokoro KNE site and Belmont Regional Park boundaries



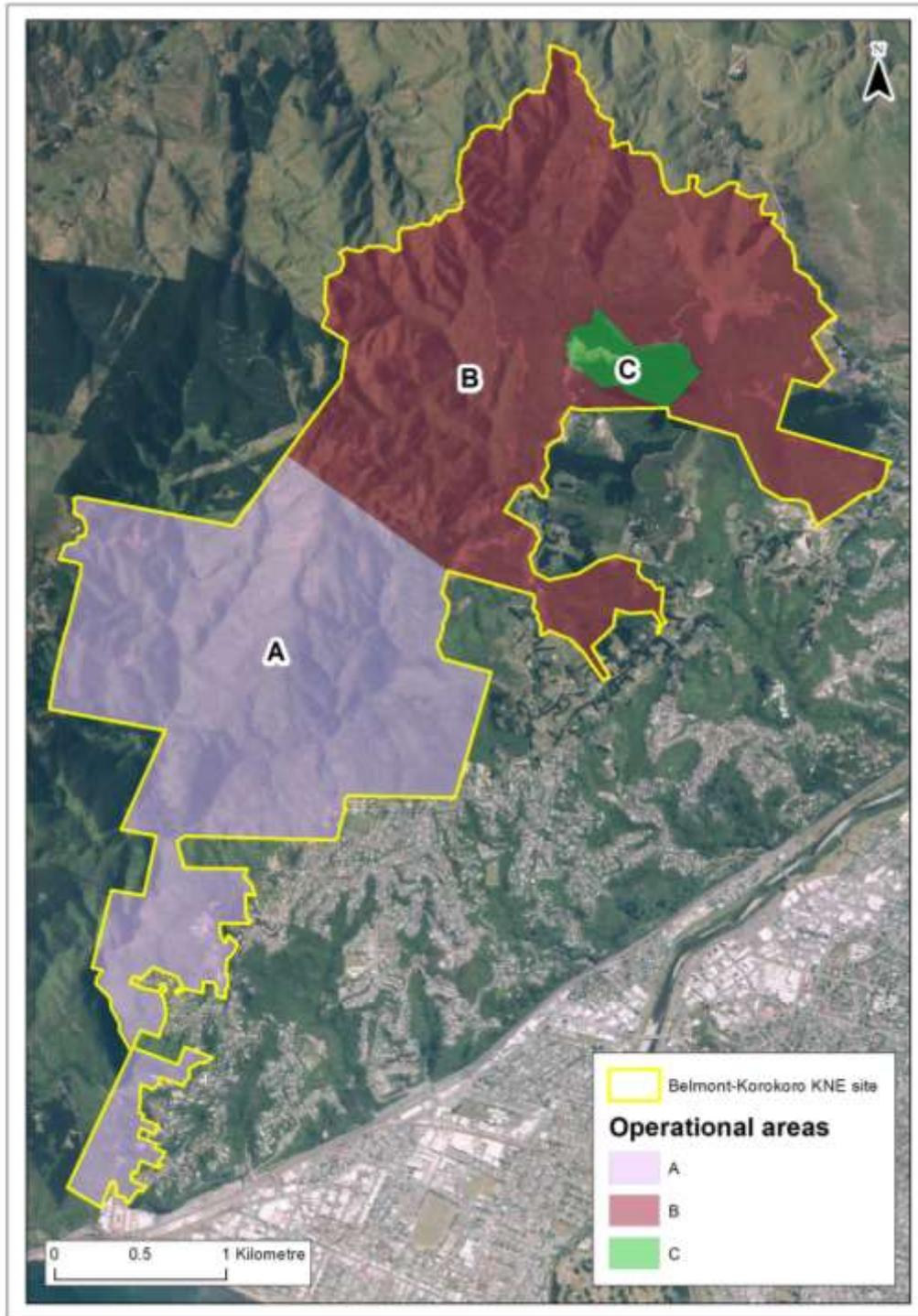
Map 2: Landowners at the Belmont-Korokoro KNE site



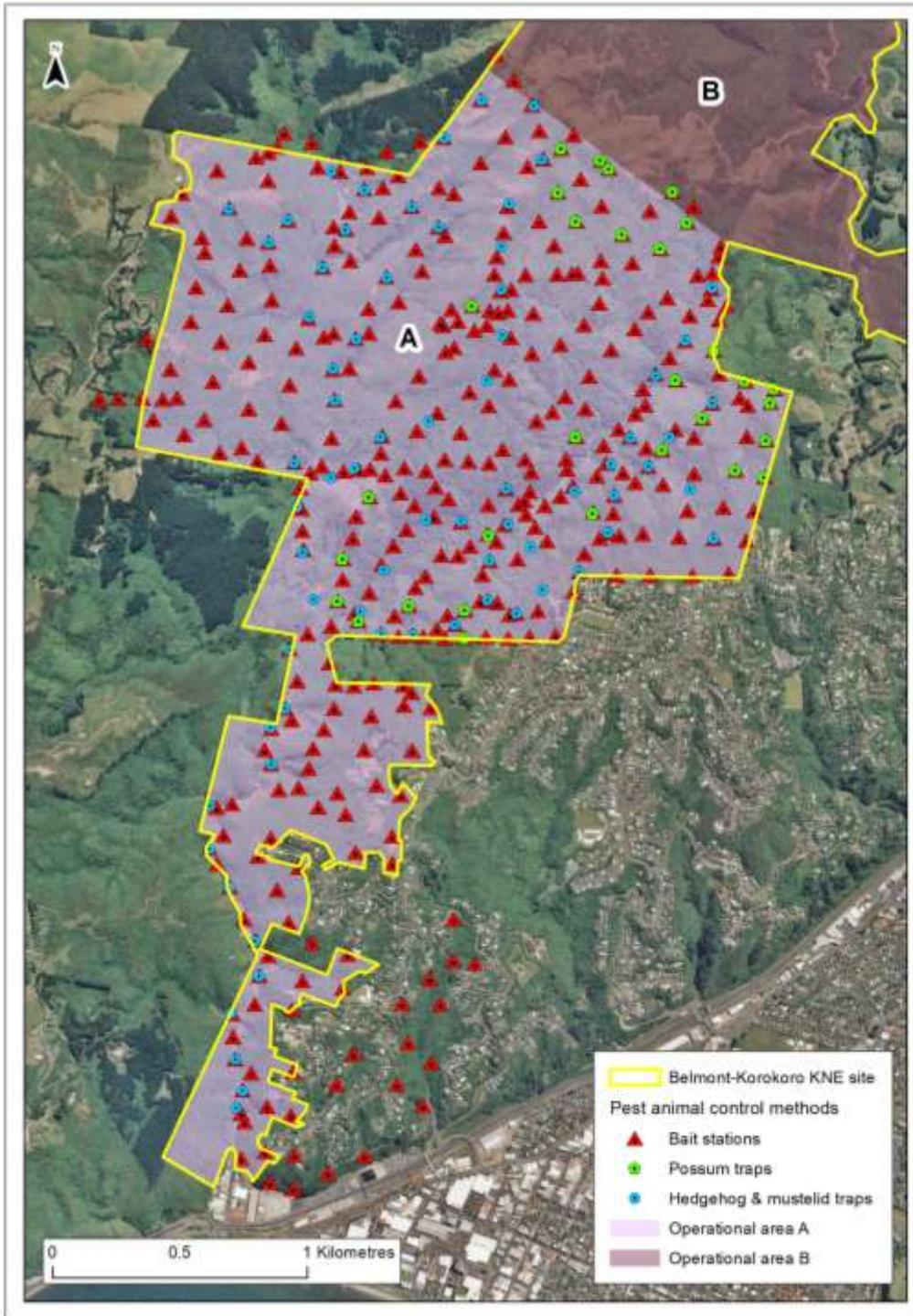
Map 3: Singers and Rogers classification of pre-human forest types and area of remnant original forest in Belmont-Korokoro KNE site



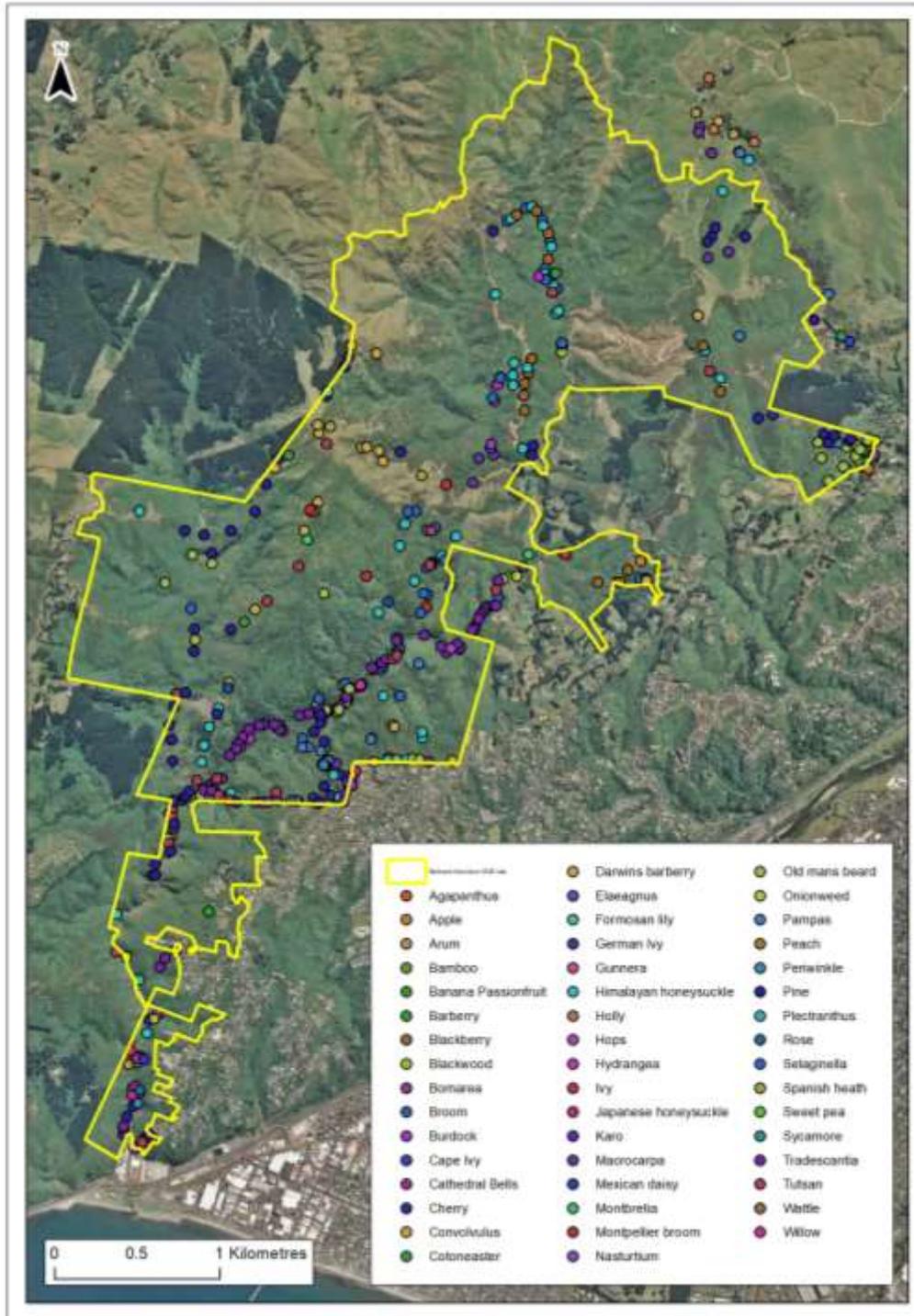
Map 4: Land Environment New Zealand threat classifications for the Belmont-Korokoro KNE site



Map 5: Operational areas in the Belmont-Korokoro KNE site

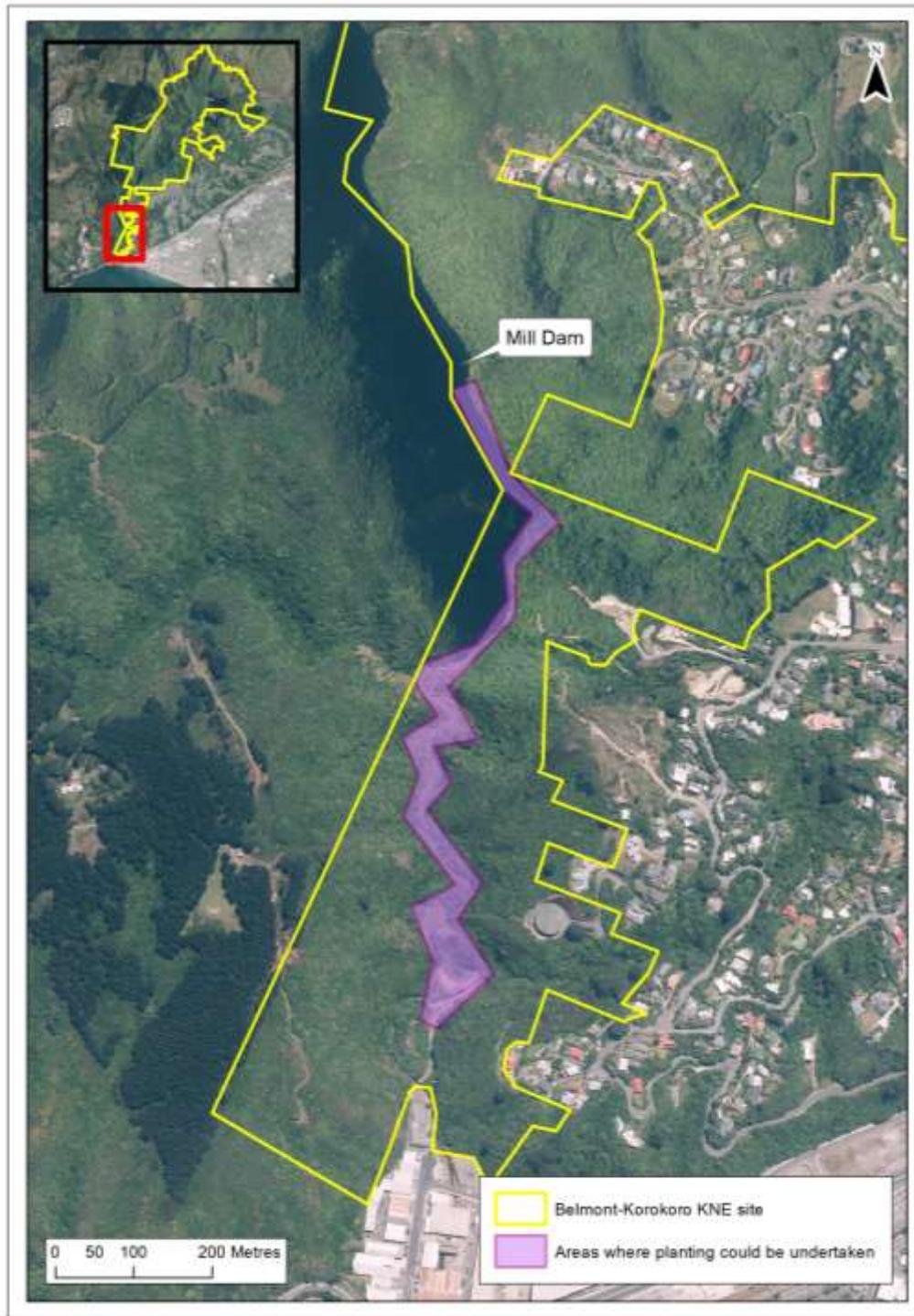


Map 6: Pest animal control in the Belmont-Korokoro KNE site



Map 7: Ecological weeds in the Belmont-Korokoro KNE site

This map was created using data collected during an ecological weed survey undertaken in 2013, and provides an indication of the diversity and distribution of ecological weeds at the KNE site. Appendix 4 lists those species that will be controlled during the term of this plan.



Map 8: Area where revegetation could be undertaken in the Belmont-Korokoro KNE site if funding for this becomes available

Appendix 2: Nationally threatened species list

The New Zealand Threat Classification System lists species according to their threat of extinction. The status of each species group (plants, reptiles, etc) is assessed over a five-year cycle⁵⁸. Species are regarded as Threatened if they are classified as Nationally Critical, Nationally Endangered or Nationally Vulnerable. They are regarded as At Risk if they are classified as Declining, Recovering, Relict or Naturally Uncommon. The following table lists Threatened and At Risk species that are resident in, or regular visitors to, the Belmont-Korokoro KNE site.

Table 6: Threatened and At Risk species at the Belmont-Korokoro KNE site

Scientific name	Common name	Threat status	Observation
Plants(vascular)⁵⁹			
<i>Brachyglottis kirkii</i> var. <i>kirkii</i>	Kirk's tree daisy	At Risk - Declining	Pat Enright, pers comm 2014
<i>Trichomanes colensoi</i>	Bristle fern	At Risk - Naturally Uncommon	Pat Enright, pers comm 2014
<i>Pterostylis foliata</i>	Grassland greenhood	At Risk - Naturally Uncommon	Pat Enright, pers comm 2014
Birds⁶⁰			
<i>Cyanoramphus novaeseelandiae</i>	Red-crowned parakeet /kākāriki	At Risk - Relict	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Falco novaeseelandiae</i>	New Zealand falcon	Threatened - Nationally Vulnerable	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
Reptiles⁶¹			
<i>Naultinus punctatus</i>	Barking gecko	At Risk - Declining	GWRC 2010 ⁶²
<i>Oligosoma ornatum</i>	Ornate skink	At Risk - Declining	GWRC 2010
<i>Oligosoma zelandicum</i>	Brown skink	At Risk - Declining	GWRC 2010
Freshwater fish⁶³			
<i>Anguilla dieffenbachii</i>	Longfin eel	At Risk - Declining	GWRC 2007 ⁶⁴
<i>Galaxias argenteus</i>	Giant kōkopu	At Risk - Declining	GWRC 2007
<i>Galaxias brevipinnis</i>	Kōaro	At Risk - Declining	GWRC 2007
<i>Galaxias maculatus</i>	Īnanga	At Risk - Declining	GWRC 2007
<i>Gobiomorphus hubbsi</i>	Bluegill bully	At Risk - Declining	GWRC 2007
<i>Gobiomorphus huttoni</i>	Redfin bully	At Risk - Declining	GWRC 2007

Appendix 3: Regionally threatened species list

The following table lists regionally Threatened and At Risk species that have been recorded in the Belmont-Korokoro KNE site.

Table 7: Regionally Threatened and At Risk species recorded in the Belmont-Korokoro KNE site

Scientific name	Common name	Threat status	Observation
Plants⁶⁵			
<i>Acaena juvenca</i>	Bidibid	At Risk – Naturally Uncommon	Enright P. pers comm 2014
<i>Brachyglottis kirkii</i> var <i>kirkii</i>	Kirk's tree daisy	Threatened - Endangered	Enright P. pers comm 2014
<i>Trichomanes colensoi</i>	Bristle fern	Threatened - Critical	Enright P. pers comm 2014
<i>Pterostylis foliata</i>	Grassland greenhood	At Risk - Naturally Uncommon	Enright P. pers comm 2014
Reptiles⁶⁶			
<i>Mokopirirakau</i> 'southern North Island'	Ngahere gecko	At Risk - Declining	GWRC Reptile distribution database (accessed 2020)
<i>Naultinus punctatus</i>	Barking gecko	Threatened - Vulnerable	GWRC 2010 ⁶⁷
<i>Oligosoma ornatum</i>	Ornate skink	At Risk - Declining	GWRC 2010
<i>Oligosoma zelandicum</i>	Brown skink	At Risk - Declining	GWRC 2010

Appendix 4: Ecological weed species

The following table lists key ecological weed species that have been recorded in the Belmont-Korokoro KNE site.

Table 8: Ecological weed species recorded in the Belmont-Korokoro KNE site

Scientific name	Common name	Weed type
<i>Acer pseudoplatanus</i>	Sycamore	Woody
<i>Arundinaria</i> spp.	Bamboo	Woody
<i>Buddleja davidii</i>	Buddleia	Woody
<i>Clematis vitalba</i>	Old man's beard	Climber
<i>Cobaea scandens</i>	Cathedral bells	Climber
<i>Cortaderia selloana</i>	Pampas	Ground cover
<i>Cotoneaster glaucocarpa</i>	Cotoneaster	Woody
<i>Crataegus monogyna</i>	Hawthorn	Woody
<i>Eleagnus x reflexa</i>	Elaeagnus	Climber
<i>Erica lusitanica</i>	Spanish heath	Woody
<i>Gunnera tinctoria</i>	Chilean rhubarb	Ground cover
<i>Hedera helix</i>	Ivy	Climber
<i>Humulus lupulus</i>	Hops	Climber
<i>Hydrangea macrophylla</i>	Hydrangea	Woody
<i>Lonicera japonica</i>	Japanese honeysuckle	Climber
<i>Paraserianthes lophantha</i>	Brush wattle	Woody
<i>Passiflora</i> spp.	Banana passionfruit	Climber
<i>Pinus radiata</i>	Pine	Woody
<i>Pittosporum crassifolium</i> *	Karo	Woody
<i>Prunus</i> spp.	Plum and cherry	Woody
<i>Sambucus nigra</i>	Elder	Woody
<i>Selaginella kraussiana</i>	African club moss	Ground cover
<i>Tradescantia fluminensis</i>	Tradescantia	Ground cover
<i>Vinca major</i>	Periwinkle	Ground cover

* Denotes a New Zealand native plant that is not local to the KNE site

Appendix 5: Revegetation plant list

Plants from the following table will be used in any revegetation planting as per Section 9.4.

Table 9: Revegetation plant list for use within the Belmont-Korokoro KNE site

Scientific name	Common name
<i>Aristotelia serrata</i>	Wineberry
<i>Austroderia fulvida</i>	Toetoe
<i>Coprosma propinqua</i>	Mingimingi
<i>Coprosma robusta</i>	Karamū
<i>Griselinia littoralis</i>	Broadleaf
<i>Kunzea robusta</i>	Kānuka
<i>Leptospermum scoparium</i>	Mānuka
<i>Melicope ternata</i>	Whārangi
<i>Melicytus lanceolatus</i>	Narrow-leaved māhoe
<i>Melicytus ramiflorus</i>	Māhoe
<i>Myrsine australis</i>	Red māpou
<i>Olearia paniculata</i>	Akiraho
<i>Phormium cookianum</i>	Mountain flax
<i>Pittosporum eugenioides</i>	Lemonwood
<i>Pittosporum tenuifolium</i>	Kōhūhū
<i>Veronica stricta</i>	Koromiko

References

- ¹ New Zealand legislation. 1991. Resource Management Act 1991.
- ² Greater Wellington Regional Council. Greater Wellington Regional Council Long Term Plan: 2018 – 2028.
- ³ Greater Wellington Regional Council. 2019. Proposed Natural Resources Plan for the Wellington Region. Te Tikanga Taiao o Te Upoko o te Ika a Maui.
- ⁴ Greater Wellington Regional Council. 2011. Parks Network Plan. GW/CP-G-11/101.
- ⁵ P A Handford & Associates Ltd. 2011. Belmont Regional Park Sustainable Land Use Plan.
- ⁶ Greater Wellington Regional Council. 2016. Greater Wellington Regional Council Biodiversity Strategy. <http://www.gw.govt.nz/assets/council-publications/Biodiversity-Strategy-2016.pdf>
- ⁷ Greater Wellington Regional Council. 2007. Belmont Regional Park Resource Statement.
- ⁸ Greater Wellington Regional Council. 2010. Parks Network Plan.
- ⁹ P A Handford & Associates Ltd. 2011. Belmont Regional Park Sustainable Land Use Plan.
- ¹⁰ Greater Wellington Regional Council. 2019. Proposed Natural Resources Plan for the Wellington Region. Te Tikanga Taiao o Te Upoko o te Ika a Maui. P. 354.
- ¹¹ Greater Wellington Regional Council. 2019. Proposed Natural Resources Plan for the Wellington Region. Te Tikanga Taiao o Te Upoko o te Ika a Maui. P. 354.
- ¹² Greater Wellington Regional Council. 2019. Proposed Natural Resources Plan for the Wellington Region. Te Tikanga Taiao o Te Upoko o te Ika a Maui. P. 431.
- ¹³ Singers NJD, Rogers GM. 2014. A classification of New Zealand's terrestrial ecosystems. Science for Conservation No. 325. Department of Conservation, Wellington. 87p.
- ¹⁴ Singers N, Crisp P, Spearpoint O. 2018. Forest ecosystems of the Wellington region.
- ¹⁵ Walker S, Cieraad E, Grove P, Lloyd K, Myers S, Park T, Porteous T. 2007. Guide for users of the threatened environment classification, Version 11, August 2007. Landcare Research New Zealand. 34p plus appendix.
- ¹⁶ New Zealand Threat Classification System (NZTCS) <http://www.doc.govt.nz/about-us/science-publications/conservation-publications/nz-threat-classification-system/>
- ¹⁷ Nikki McArthur, pers comm, 2015.
- ¹⁸ Greater Wellington Regional Council. 2007. Belmont Regional Park Resource Statement.
- ¹⁹ Kim Broad, Greater Wellington, per obs 2015.
- ²⁰ Paul Thomas, pers comm 2015.
- ²¹ Jeremy Paterson, Greater Wellington. pers comm 2015.
- ²² Romijn R. 2010. Lizard Fauna of Wellington's Regional Parks. Greater Wellington Regional Council.
- ²³ New Zealand Freshwater Fish Database, accessed 2016.
- ²⁴ Pekelharing CJ, Parkes JP, Barker RJ. 1998. Possum (*Trichosurus vulpecula*) densities and impacts on fuchsia (*Fuchsia excorticata*) in South Westland, New Zealand. *New Zealand Journal of Ecology* 22(2): 197–203.
- ²⁵ Nugent G, Sweetapple P, Coleman J, Suisted P. 2000. Possum feeding patterns. Dietary tactics of a reluctant folivore. In: Montague TL ed. *The brushtail possum: Biology, impact and management of an introduced marsupial*. Lincoln, Manaaki Whenua Press. Pp. 10–19.
- ²⁶ Sweetapple PJ, Fraser KW, Knightbridge PI. 2004. Diet and impacts of brushtail possum populations across the invasion front in South Westland, New Zealand. *New Zealand Journal of Ecology* 28(1): 19–33.
- ²⁷ Daniel MJ. 1973. Seasonal diet of the ship rat (*Rattus r. rattus*) in lowland forest in New Zealand. *Proceedings of the New Zealand Ecological Society* 20: 21–30.
- ²⁸ Innes JG. 2005. Ship rat. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. Pp. 187–203.
- ²⁹ Murphy E, Maddigan F, Edwards B, Clapperton K. 2008. Diet of stoats at Okarito Kiwi Sanctuary, South Westland, New Zealand. *New Zealand Journal of Ecology* 32(1): 41–45.
- ³⁰ King CM and Murphy EC. 2005. Stoat. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. Pp. 261–287.

-
- ³¹ Ragg JR. 1998. Intraspecific and seasonal differences in the diet of feral ferrets (*Mustela furo*) in a pastoral habitat, east Otago, New Zealand. *New Zealand Journal of Ecology* 22(2): 113–119.
- ³² Clapperton BK, Byron A. 2005. Feral ferret. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. Pp. 294–307.
- ³³ King CM. 2005. Weasel. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. Pp. 287–294.
- ³⁴ King CM, Flux M, Innes JG, Fitzgerald BM. 1996. Population biology of small mammals in Pureora Forest Park: 1. Carnivores (*Mustela erminea*, *M.furo*, *M.nivalis* and *Felis catus*). *New Zealand Journal of Ecology* 20(2): 241–251.
- ³⁵ Jones C, Sanders MD. 2005. European hedgehog. In: King CM ed. *The handbook of New Zealand mammals*. 2nd edition. Melbourne, Oxford University Press. Pp. 81–94.
- ³⁶ Spitzen-van der Sluijs AM, Spitzen J, Houston D, Stumpel AHP. 2009. Skink predation by hedgehogs at Macraes Flat, Otago, New Zealand. *New Zealand Journal of Ecology* 33(2): 205–207.
- ³⁷ Jones C, Moss K, Sanders M. 2005. Diet of hedgehogs (*Erinaceus europaeus*) in the upper Waitaki Basin, New Zealand. Implications for conservation. *New Zealand Journal of Ecology* 29(1): 29–35.
- ³⁸ Jones C, Sanders MD. 2005. European hedgehog. In: King CM ed. *The handbook of New Zealand mammals*. 2nd edition. Melbourne, Oxford University Press. Pp. 81–94.
- ³⁹ Ruscoe WA, Murphy EC. 2005. House mouse. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. Pp. 204–221.
- ⁴⁰ Newman DG. 1994. Effect of a mouse *Mus musculus* eradication programme and habitat change on lizard populations on Mana Island, New Zealand, with special reference to McGregor's skink, *Cyclodina macgregori*. *New Zealand Journal of Ecology* 21: 443–456.
- ⁴¹ King CM, Flux M, Innes JG, Fitzgerald BM. 1996. Population biology of small mammals in Pureora Forest Park: 1. Carnivores (*Mustela erminea*, *M.furo*, *M.nivalis* and *Felis catus*). *New Zealand Journal of Ecology* 20(2): 241–251.
- ⁴² Reardon JT, Whitmore N, Holmes KM, Judd LM, Hutcheon AD, Norbury G, Mackenzie DI. 2012. Predator control allows critically endangered lizards to recover on mainland New Zealand. *New Zealand Journal of Ecology* 36(2): 141–150.
- ⁴³ King CM, Flux M, Innes JG, Fitzgerald BM. 1996. Population biology of small mammals in Pureora Forest Park: 1. Carnivores (*Mustela erminea*, *M.furo*, *M.nivalis* and *Felis catus*). *New Zealand Journal of Ecology* 20(2): 241–251.
- ⁴⁴ Gillies C, Fitzgerald BM. 2005. Feral cat. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. Pp. 308–326.
- ⁴⁵ Norbury G, Flux JEC. 2005. Brown hare. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. Pp. 151–158.
- ⁴⁶ Beggs JR. 2001. The ecological consequences of social wasps (*Vespula* spp.) invading an ecosystem that has an abundant carbohydrate resource. *Biological Conservation* 99: 17–28.
- ⁴⁷ Parkes. JP. 2005. Feral goat. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. Pp. 374–391.
- ⁴⁸ Stewart GH, Wardle JA and Burrows LE. 1987. Forest understory changes after reduction in deer numbers, Northern Fiordland, New Zealand. *New Zealand Journal of Ecology* 10: 35–42.
- ⁴⁹ Nugent G, Fraser W. 2005. Red deer. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. Pp. 401–419.
- ⁵⁰ Nugent G, Asher G. 2005. Fallow deer. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. Pp. 447–459.
- ⁵¹ McIntosh AR, McHugh PA, Dunn NR, Goodman JM, Howard SW, Jellyman PG, O'Brien LK, Nystrom P, Woodford DJ. 2010. The impact of trout on galaxiid fishes in New Zealand. *New Zealand Journal of Ecology* 34(1): 195–206.
- ⁵² Wright D, Clout M 2001. The eastern rosella (*Platycercus eximius*) in New Zealand. DOC Science Internal Series 18.
- ⁵³ Galbraith JA. 2013. Eastern rosella. In Miskelly, C.M. (ed.) *New Zealand Birds Online*. www.nzbirdsonline.org.nz
- ⁵⁴ Smale MC, Dodd MB, Burns BR, Power IL. 2008. Long-term impacts of grazing on indigenous forest remnants on North Island hill country, New Zealand. *New Zealand Journal of Ecology* 32(1): 57–66.

-
- ⁵⁵ GWRC, Small mammal monitoring report for Key Native Ecosystem sites, February 2016.
- ⁵⁶ National Pest Control Agencies. 2013. Keep it Clean. Machinery hygiene guidelines & logbook to prevent the spread of pests and weeds.
- ⁵⁷ Greater Wellington Regional Council, 2020. Preferred Lizard Release Site Options in Greater Wellington's Parks: Belmont Park, Queen Elizabeth Park and Whareroa Farm Park (Department of Conservation). Unpublished report.
- ⁵⁸ Department of Conservation. 2008. New Zealand Threat Classification System manual.
- ⁵⁹ de Lange PJ, Rolfe JR, Champion PD, Courtney SP, Heenan PB, Barkla JW, Cameron EK, Norton DA, Hitchmough RA. 2013. Conservation status of New Zealand indigenous vascular plants, 2012. New Zealand Threat Classification Series 3. 70 p.
- ⁶⁰ Robertson HA, Baird, K, Dowding JE, Elliot GP, Hitchmough RA, Miskelly CM, McArthur N, O'Donnell CFJ, Sagar PM, Scofield P, Taylor GA. 2017. Conservation status of New Zealand birds, 2016. New Zealand Threat Classification Series 19. 27p.
- ⁶¹ Hitchmough R, Barr B, Lettink M, Monks J, Reardon J, Tocher M, Van Winkel D, Rolfe J. 2016. Conservation status of New Zealand reptiles, 2015. New Zealand Threat Classification Series 17. 14 p.
- ⁶² Romijn R. 2010. Lizard Fauna of Wellington's Regional Parks. Greater Wellington Regional Council.
- ⁶³ Goodman JM, Dunn NR, Ravenscroft PJ, Allibone RM, Boubée JAT, David BO, Griffiths M, Ling N, Hitchmough RA, Rolfe JR. 2014. Conservation status of New Zealand freshwater fish, 2013. New Zealand Threat Classification Series 7. 12 p.
- ⁶⁴ Greater Wellington Regional Council. 2007. Belmont Regional Park Resource Statement.
- ⁶⁵ Crisp P. Conservation status of indigenous vascular plant species in the Wellington region. 2020.
- ⁶⁶ Crisp P. Conservation status of indigenous lizard species in the Wellington region. 2020.
- ⁶⁷ Romijn R. 2010. Lizard Fauna of Wellington's Regional Parks. Greater Wellington Regional Council.

Greater Wellington Regional Council:

Wellington office
PO Box 11646
Manners Street
Wellington 6142

T 04 384 5708
F 04 385 6960

Upper Hutt office
PO Box 40847
Upper Hutt 5018

T 04 526 4133
F 04 526 4171

Masterton office
PO Box 41
Masterton 5840

T 06 378 2484
F 06 378 2146

Follow the Wellington
Regional Council



info@gw.govt.nz
www.gw.govt.nz

November 2020
GW/BD-G-20/44



Please recycle
Produced sustainably