

Key Native Ecosystem Operational Plan for Western Wellington Forest

2024-2029



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1. Purpose

The purpose of this five-year Key Native Ecosystem (KNE) Operational Plan for Western Wellington Forest KNE site is to:

- Identify the parties involved in preparing and delivering the operational plan
- Summarise the ecological values of the site and identify the threats to those values
- Outline the vision and objectives that guide management decision-making
- Describe the operational activities undertaken to improve ecological conditions (e.g., ecological weed control), who will undertake the activities and the allocated budgets.

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 outlined in Section 2.

2. Policy context

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

Funding for the KNE programme is allocated under the Greater Wellington Long Term Plan (2021-2031)² and is managed in accordance with the Greater Wellington Biodiversity Strategy³. This sets a framework for how Greater Wellington protects and manages biodiversity in the Wellington region. Goal One of the Biodiversity Strategy - *Areas of high biodiversity value are protected or restored* - drives the delivery of the KNE programme.

Other important drivers for the KNE programme include the Natural Resources Plan for the Wellington Region⁴ and the Regional Pest Management Plan 2019-2039⁵.

Most of the Western Wellington Forest KNE site is owned by Wellington City Council (WCC), and the reserves within the site are managed under the Reserves Act 1977. WCC manages these reserves in line with the objectives set out within Our Natural Capital – Wellington’s Biodiversity Strategy and Action Plan⁶, the Outer Green Belt Management Plan⁷, the Botanic Gardens of Wellington Management Plan⁸, and the Open Space Access Plan⁹.

3. The Key Native Ecosystem programme

The KNE programme is a non-regulatory programme. The programme seeks to protect some of the best examples of original (pre-human) ecosystem types in the Wellington region. Greater Wellington has identified sites with the highest biodiversity values and prioritized them for management¹⁰.

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

KNE sites can be located on private or publicly owned land. Any work undertaken on private land as part of this programme 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. Land managed by the Department of Conservation (DOC) is generally excluded from this programme.

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 commonplace	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, i.e., 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 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.

4. Western Wellington Forest Key Native Ecosystem site

The Western Wellington Forests KNE site is located on the eastern slopes of the skyline walkway, immediately north-west of Wellington City (see Appendix 1, Map 1). The KNE site comprises several large regenerating native forest reserves and parks. These are in the city's outer greenbelt owned or managed by Wellington City Council. The highest ecological values within the KNE site are found in Johnston Hill Scenic Reserve, Ōtari-Wilton's Bush, Huntleigh Park, Khandallah Park, and Johnsonville Park. The KNE site is an important wildlife corridor in the broader Wellington peninsula landscape, connecting Wellington's south coast with bush reserves near Porirua City. In addition, this corridor provides important dispersal opportunities for species reintroduced to Zealandia Te Māra a Tāne ecosanctuary. The site is within the Kaiwharawhara catchment and te Whaitua te Whanganui-a-Tara¹¹.

5. Parties involved

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

5.1. Landowners

Wellington City Council owns or administers most land (as public land) within the KNE site, in accordance with the District Plan (see Appendix 1, Map 2). These include the forested reserves that have the highest ecological values. A full list of the WCC reserves contained within the KNE site boundary is provided in Appendix 7, Table 11.

The Department of Conservation (DOC) owns the Ōtari Conservation Area. However, this area is controlled and managed by WCC through the Outer Green Belt Management Plan and Botanic Gardens of Wellington Management Plan.

Other landowners include the Girl Guides Association NZ (which owns part of Huntleigh Park), Kordia, formally Broadcast Communications Limited (which owns lands associated with the summit of Mount Kaukau), and John Hume (who owns and farms a parcel of land adjacent to the summit of Mount Kaukau).

5.2. Mana whenua

Te Manga o Kaiwharawhara (including Te Mahanga Korimako Streams) which flows through the KNE is a site of significance for Taranaki Whānui ki te Upoko o te Ika (Taranaki Whānui) and they are aware that this area of interest is located on WCC land.

This area has been identified in the Natural Resources Plan for the Wellington Region¹² as culturally important with reference to freshwater (wai Māori) recognising that these are areas where mana whenua lived and practiced māhinga kai, tauranga waka, kainga, and wāhi tapu (see Table 1 below).

Greater Wellington and WCC recognize that the interconnection between cultural values and natural ecosystems can enhance conservation efforts while recognizing mana whenua, whakapapa, tikanga Māori, and Mātauranga Māori. The partnership between WCC and mana whenua has grown stronger since the last KNE operational plan. In turn, this has led for instance, to the reintroduction of pua o te rēinga (*Dactylanthus taylorii*) to Ōtari within the KNE site.

Greater Wellington is committed to identifying ways in which kaitiakitanga can be strengthened by exploring opportunities for mana whenua partners to participate in the development or delivery of KNE operational plans.

Table 1: Mana whenua sites of significance at Western Wellington Forest KNE site.

Site of significance	Mana whenua values
Ngā Taonga Nui a Kiwa Te Manga o Kaiwharawhara (including Te Mahanga Korimako Streams)	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 (NRP - Schedule B)

5.3. Operational delivery

Wellington City Council Parks Sports and Recreation Business Unit is responsible for planning, coordinating, and delivering most of the biodiversity management activities within the KNE site. WCC is also the primary contact for community groups operating in the KNE site.

Several community groups are active within the KNE site. They undertake a range of biodiversity management activities including ecological weed control, pest animal control, pest animal monitoring, and restoration planting.

Within Greater Wellington, several teams are responsible for delivering the Western Wellington Forest KNE operational plan.

- The Environment Restoration team leads the strategic planning, funding and coordination of the pest animal management activities, and advice within the KNE site
- The Pest Animals team coordinates and implements pest animal control measures at the KNE site with funding from the Environment Restoration team's KNE programme budget
- The Monitoring - Land, Ecosystems and Air team coordinates small mammal monitoring with funding from the Environment Restoration team's KNE programme budget.

5.4. Stakeholders

Transpower New Zealand has the right of access through the KNE site to service electricity pylons located along the skyline walkway. This may require vegetation management within the KNE site that will be managed in accordance with the electricity act. Transpower New Zealand has supported community groups within the KNE site through the provision of grant money that has funded restoration activities.

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 Western Wellington Forest KNE site.

Table 2: Designations at the Western Wellington Forest KNE site.

Designation level	Type of designation
Regional	Parts of the KNE site are designated under Greater Wellington's Natural Resources Plan as Ecosystems and Habitats with Significant Indigenous Biodiversity Values: <ul style="list-style-type: none"> • Kaiwharawhara stream and tributaries; habitat for threatened and at-risk species and habitat for six or more migratory fish species (Schedule F1)
District	Parts of the KNE site are designated as Reserves under the Reserves Act: <ul style="list-style-type: none"> • Ōtari Conservation Area scenic and recreation reserves • Johnston Hill - scenic reserve • Khandallah Park and Johnsonville Park – recreation reserves • Awarua Street - recreation reserve • Kilminster block - recreation reserve The KNE site includes sections of various Significant Natural Areas under Wellington City Council's Draft District Plan
Other	Parts of the KNE site is designated as: <ul style="list-style-type: none"> • Karori cemetery • Ōtari Farm Reserve

6.2. Ecological significance

The Western Wellington Forest KNE site is 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
- Its **ecological context** is valuable at the landscape scale as it contains a variety of inter-connected habitats and, provides core/seasonal habitat for threatened indigenous species within the KNE site.

Representativeness

The Singers and Rogers classification¹³ of pre-human vegetation indicates the KNE site would have comprised three forest types (see Appendix 1, Map 3). These were kohekohe – tawa forest (MF6); tawa - kāmahī - podocarp forest (MF7); and kāmahī – broadleaf – podocarp forest (MF8). There is 15%, 22% and 85% remaining respectively of the pre-human extent of these forest types in the Wellington region¹⁴. This makes MF6 and MF7, regionally Threatened and At-Risk ecosystem types respectively.

The Threatened Environment Classification system defines ecosystem and habitat threat categories nationally, based on percentage of indigenous cover remaining¹⁵. This system indicates that a small area of the KNE site is classified as Acutely Threatened. However, this is not considered representative of the KNE site which predominately consists of habitats that are either At Risk or Well Protected (see Appendix 1, Map 4).

Rarity/distinctiveness

New Zealand's national threat classification system lists several threatened species that are present within the KNE site. These include thirteen Threatened or At-Risk plant species, eight Threatened or At-Risk bird species, four Threatened or At-Risk fish one Threatened land-snail species, and four At-Risk lizard species. Nationally threatened species are listed in Appendix 2, and regionally threatened species in Appendix 3.

Ecological context

The KNE site is the largest continuous area of indigenous vegetation in Wellington City and provides an important connectivity corridor between the Wellington south coast and Porirua Harbour. In addition, this corridor provides important dispersal opportunities for species reintroduced to Zealandia Te Māra a Tāne ecosanctuary. The site is part of the Kaiwharawhara catchment and the Whaitua te Whanganui-a-Tara.

6.3. Ecological features

The Western Wellington Forest KNE site is in the Wellington Ecological District¹⁶. The climate is warm and very windy with frequent gales. The annual rainfall ranges between 900-1,400mm¹⁷. The KNE site is the largest continuous area of indigenous vegetation in Wellington City.

Flora

The lower slopes of the KNE site are largely regenerating indigenous broadleaved and podocarp forest, with remnants of primary forest remaining in the gullies¹⁸. The upper slopes consist of grey scrub developing through the dominant exotic scrub mix. The top of the skyline walkway is maintained as an open landscape and is grazed.

The primary forest remnants contain podocarp-tawa-kohekohe forest, regenerating mataī forest, ngaio forest, and mamaku tree fern-land. The regenerating broadleaved forest is dominated by māhoe (*Melicytus ramiflorus*) and rewarewa (*Knightia excelsa*). These forest areas are buffered by exotic scrub, indigenous grey scrub, and secondary grey scrub¹⁹. Grey scrub is an ecosystem type consisting of small-leaved divaricating indigenous shrubs with climbing plants²⁰ which is now considered to be reduced nationally from its previous extent²¹.

More than 70 species of indigenous trees and shrubs, nearly 60 species of ferns, and 14 species of orchids have been recorded at the site²². Notable tree species present within the KNE site include ewekuri / large-leaved milk tree (*Streblus banksii*), northern rātā (*Metrosideros robusta*), hīnau (*Elaeocarpus dentatus*), rimu (*Dacrydium cupressinum*), tōtara (*Podocarpus totara*), kahikatea / white pine (*Dacrycarpus dacrydioides*), miro (*Prumnopitys ferruginea*), mataī / black pine (*Prumnopitys taxifolia*), pukatea (*Laurelia novae-zelandiae*), and kōtukutuku / tree fuchsia (*Fuchsia excorticata*).

Fauna

Birds

The KNE site provides significant habitat for a large range of native forest bird species. It has benefited from the dispersal of species reintroduced to Zealandia Te Māra a Tāne over the last two decades and now supports a greater diversity of native forest birds than any other KNE site.

However, a recent report on the state and trends in the diversity, abundance, and distribution of forest birds in Wellington City states that several species present in the KNE site are considered of concern²³.

Of 'high concern' is tītīpounamu / rifleman (*Acanthisitta chloris*); nationally and regionally "At Risk, Declining". This species exists in the Wellington city area with only small populations that are threatened by a high risk of predation²².

Of 'moderate concern', because of their small, localized, and sparse populations, and risk of predation are kārearea / NZ falcon (*Falco novaeseelandiae*), kākārīki / red-crowned parakeet (*Cyanoramphus novaezelandiae*), korimako / whitehead (*Mohoua albicilla*), pīpīwharau / shining cuckoo (*Chrysococcyx lucidus*), tīeke / North Island saddleback (*Philesturnus rufusater*), toutouwai / North Island robin (*Petroica longipes*), and hihi / stitchbird (*Notiomystis cincta*)²².

Species considered of 'low concern' include pīwakawaka / fantail (*Rhipidura fuliginosa*), tūi (*Prosthemadera novaeseelandiae*), tauhou / silvereve (*Zosterops lateralis*), kākā (*Nestor meridionalis*), kōtare / kingfisher (*Todiramphus sanctus*), kererū / New Zealand pigeon (*Hemiphaga novaeseelandiae*), and riroriro / grey warbler (*Gerygone igata*). These species tend to have larger, more stable or increasing populations and are of lower risk to predation²².

As a result of the efforts of the Capital Kiwi project, kiwi-nui / North Island brown kiwi (*Apteryx mantelli*) have been reintroduced to Wellington City. Kiwi presence has been confirmed within Johnston Hill and is likely through other parts of the KNE site. Over the coming months more than 100 kiwi will be released into the surrounding landscape.

Reptiles

Between 2016 and 2018, WCC conducted lizard surveys in four sites within or adjacent to the KNE site: Ōtari-Wilton's Bush, Khandallah Park, Johnsonville Park, Huntleigh Park, and Awarua Street Recreation Reserve.

Ngahere gecko (*Mokopirirakau* "southern North Island") were found in Ōtari. Copper skink (*Oligosoma aeneum*), ornate skink (*Oligosoma ornatum*), and Northern grass skink (*Oligosoma polychroma*) were found in Huntleigh Park. Several Northern grass skink were found in Awarua Street Reserve²⁴. Barking gecko (*Naultinus punctatus*) and glossy brown skink (*Oligosoma zelandicum*) have been recoded previously in Khandallah Park and Ōtari-Wilton's Bush respectively²⁵.

Wellington City Council is working with Victoria University to establish city wide lizard monitoring.

Fish and koura

The KNE site contains the headwaters of several streams, including Kaiwharawhara Stream, Koromako Stream, and Tyers Stream. These streams support a variety of native fish²⁶. Recent surveys undertaken as part of WCC's city-wide urban streams monitoring programme found ōrea / longfin eel (*Anguilla dieffenbachii*), shortfin eel (*Anguilla australis*), giant kōkopu (*Galaxias argenteus*), banded kōkopu (*Galaxias fasciatus*), kōaro / climbing galaxias (*Galaxias brevipinnis*), redfin bully (*Gobiomorphus huttoni*), and kōura / southern crawfish (*Paranephrops planifrons*) present in the catchment²⁷.

Invertebrates

The KNE site has a high diversity of invertebrates with over 600 species recorded within Ōtari-Wilton's Bush reserve alone during the Bioblitz in 2007²⁸.

Khandallah Park was the location for a translocation of a population of native land-snail, the *Powelliphanta traversi latizona* in 1944. This population is still known to be present, and experts have confirmed sightings²⁹.

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 key threats to the ecological values at each KNE site. Key threats to the Western Wellington Forest KNE site are discussed below and all known threats to the KNE site are summarized in Appendix 4.

7.1. Key threats

The primary threats to the biodiversity values of the KNE site are from the impacts of ecological weeds and pest animals.

Ecological weeds are widespread throughout the KNE site ranging from mature pine trees to ground-covering plant species. The largest infestations are known to be present on the urban edges of the KNE site, and along tracks where the canopy is open. The presence of ecological weeds can affect the biodiversity values of a habitat by out-competing native plants to such an extent that the weeds become infestations. This hinders the natural regeneration of forest understory and reduces species diversity and the availability of food resources for native animals. Ecological weed control is undertaken to allow native plants to regenerate without the competition provided by ecological weed species. This enables native species to become more dominant, functioning as a natural suppressor of weeds.

Pest animals affect the forest habitat by over-browsing native foliage, out-competing native species for food and resources, and through direct predation. Possums (*Trichosurus vulpecula*), rats (*Rattus* spp.), and mustelids (*Mustela* spp.) are the biggest threat to the identified ecological values. These species are known to compete for food resources, consume large quantities of canopy foliage, and eat birds, bird's eggs, and invertebrates.

Dogs roaming off lead pose a serious threat to kiwi, recently re-introduced in the KNE site.

8. Vision and objectives

8.1. Vision

A resilient and self-sustaining forest ecosystem, supporting many native species and playing a full part in connecting species and their habitats along the wildlife corridor from the Wellington South Coast to Porirua Harbour.

8.2. Objectives

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

The following objectives will guide the operational activities at the Western Wellington Forest KNE site.

- 1. To maintain and enhance the resilience of the core forest blocks.***
- 2. To improve the KNE site for vulnerable native birds.***
- 3. To maintain the KNE site's freshwater habitat.***
- 4. To support the community in management of the KNE site.***

9. Operational activities

Operational activities are targeted to work towards the objectives listed in Section 8.2. 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 in Section 11 (Table 3).

Wellington City Council undertakes many activities for the retention and restoration of ecological values in this KNE site and some are listed in this plan. Their activities are guided by the Outer Green Belt Management Plan and Our Natural Capital: Wellington's Biodiversity Strategy and Action Plan 2015.

9.1. Ecological weed control

The aim of ecological weed control at the KNE site is to maintain the integrity and resilience of the high value core forested areas. This is achieved through annual targeted weed control through the core forested blocks in Johnston Hill, Ōtari, Huntleigh Park, Khandallah Park, Chartwell Drive, and Johnsonville Reserve areas (see Appendix 1, Map 5).

WCC sets out weed control operational areas and identifies target species for control annually. Climbing species such as climbing asparagus are the highest priority. Woody species and subsequently ground cover species are the lowest priority. Appendix 5 contains a list of ecological weeds recorded at the KNE site and the current management aim for each.

Between 2018 and 2023 WCC invested an average of 1,069 hours per year in ecological weed control in the KNE site, with an average expenditure of \$74,600 per year. Over this period, WCC controlled (or recorded if control was not possible at that time) ecological weeds such as climbing asparagus, African club moss, banana passion fruit, bomarea, cherry, ivy species, licorice plant, gunnnera, Japanese honeysuckle, and old man's beard.

While some delimiting surveys are required, WCC is starting to expand its ecological weed control to areas where ecological weeds are known to be present but not yet controlled. These include old man's beard infestations on the Ohariu side of Johnsonville Park, gunnnera at the top of Kaukau, and licorice plant encroaching from Ohariu.

WCC's Urban Ecology Team, Greater Wellington, and the National Biocontrol Collective work collectively to trial biocontrol organisms that are approved for release in the wild. It is hoped that biocontrol of Darwin's barberry (*Berberis darwinii*) and buddleia (*Buddleja davidii*) can be trialled within the life cycle of this KNE operational plan.

9.2. Pest animal control

The aim of pest animal control at the KNE site is to prevent over-browsing of the native forest cover and protect native fauna. This activity also encourages natural regeneration of the native forest and improves food supply and nesting opportunities available for vulnerable bird species.

The primary focus of the pest animal control network is on protecting native ecosystems from the effects of possums, rats, and mustelids. A combination of Pelifeed poison bait-

stations, DOC200 traps, Flipping Timmy traps, AT220 traps, and Timms traps is in place across most of the KNE site (see Appendix 1, Map 6).

The work of servicing the bait stations and traps is jointly funded and delivered by Greater Wellington, WCC, and community groups. A brief outline of each control method is provided below:

- A large network of poison bait-stations using anticoagulant bait is in place across most of the KNE site and some buffer zones. These control possums to low levels and reduce the risk of re-invasion into the KNE site of this species. The bait stations are serviced every three months by Greater Wellington
- DOC200 traps are used in a network sufficient to control small mammals such as mustelids, rats, and hedgehogs. These traps are in place in all operational areas except for Johnsonville water supply, where there are no mustelids traps. Traps are serviced monthly by the community group Katch 22, with Greater Wellington servicing the traps when filling bait stations (only if they observe an animal in the trap). Results are then reported to WCC

Note: not all DOC200 traps are shown on Map 6 in Appendix 1, due to the ongoing expansion of community group networks in the KNE site (see Section 9.5).

- Timms and Flipping Timmy traps are in place along the full length of the skyline walkway. These traps reduce the risk of possum re-invasion into the KNE site from the Ohariu Valley. The traps are currently being serviced by the volunteers of the Skyline Project and are showing good results in terms of catches.

Johnsonville Park has, up until recently, been maintained as a trial site for testing the effectiveness of Goodnature A24 gas-traps. However, this approach has not proven effective as it does not maintain low rat numbers. Therefore, this area has been reverted to an anticoagulant baiting regime. The Good Nature A24 traps are still in place but baited for mustelids and serviced by volunteers. The Johnsonville Park area will remain an area where new pest control tools are tested for effectiveness against current methods. This area is monitored as part of the small mammal monitoring programme (see section 9.4).

Many community groups have self-funded the expansion of the DOC200 trap network across the KNE site (see Appendix 1, Map 6). WCC is the key support for community groups trapping in the area, providing additional traps, training, and materials. The traps primarily target mustelids and rats across a greater area of the KNE site, providing benefits to native birds and lizards. WCC, Greater Wellington, and DOC are working collaboratively to share best practice and training advice with community groups trapping in the area. Expansion of the pest animal trap network will be assessed in collaboration with community as opportunities arise in the KNE site.

Greater Wellington has installed a large bait-station network throughout the Ohariu Valley, which is immediately adjacent to the KNE site to the west. This work was funded by Greater Wellington's Regional Predator Control Programme (RPCP) which aims to control possums to low levels across the greater Wellington landscape³⁰. This activity will benefit the KNE site by controlling possums in the wider landscape and reducing the risk of re-invasion into the KNE site. However, the absence of control in the WCC block immediately east of the skyline walkway allows for possum invasion, making this benefit minimal.

Feral goats, pigs, and deer are present in the Wellington peninsula and are occasional visitors to the KNE site via the skyline walkway. WCC undertakes regular control using contracted hunters, aiming to keep feral goats, pigs, and deer suppressed to low numbers within the KNE site. However, goat numbers seem to be increasing to the west of the skyline walkway. Therefore, goats will need to be targeted in future to keep numbers at low levels.

WCC has funded some control of pest cats in the KNE site. The colony previously located in Chartwell/Crofton Downs, appears to no longer be a significant threat. However further work and understanding of stray cats in the area is important and WCC encourages responsible pet ownership. Under the animal bylaw, owned cats must be microchipped, and the cat's microchip registered with New Zealand Companion Animal Register^{31,32}.

Rabbits are an increasing problem in the KNE site. WCC funds the control of rabbits through night shooting. WCC is working with Greater Wellington to undertake a pindone poison operation along the skyline walkway during the period of this plan. As rabbits are a favoured prey of stoats, rabbit populations might increase because of the increased stoat control being undertaken by the Capital Kiwi project on the surrounding rural land.

WCC has been undertaking wasp control in the KNE site since 2020 and undertakes reactive wasp control when wasp nests are reported on reserve land. WCC has collaborated with Conservation Volunteers New Zealand (CVNZ) and other community groups to undertake proactive wasp control with VESPEX over the last few years, and will continue to consider cost-effective best practice wasp control.

9.3. Restoration planting

The aim of the restoration planting work at the KNE site is to support the regeneration and resilience of the forest providing additional food resources for native animals.

WCC coordinates all restoration planting activities within the KNE site with assistance from community groups. These activities are undertaken in line with the objectives set out in this KNE operational plan, the Our Natural Capital – Biodiversity Strategy and Action Plan, and the Outer Green Belt Management Plan.

Only locally sourced (eco-sourced) native plant species, grown at WCC's nursery and community nurseries are used in restoration planting.

The principles guiding restoration planting in the KNE are to:

- Increase species diversity
- Plant key 'missing' species (e.g., podocarp species and epiphytes)
- In-fill canopy gaps with native species
- Restore areas following ecological weed control work.

WCC and/or the responsible community groups monitor and record the condition of the restoration plantings.

9.4. Monitoring

Small mammal monitoring

Greater Wellington funds small mammal monitoring undertaken bi-annually in Ōtari-Wilton's Bush and Johnsonville Park. Tracking tunnels are used to monitor the presence of small mammal species, primarily mustelids, mice, rats, and hedgehogs to provide an indication of the effectiveness of the pest animal control network. Monitoring in Johnsonville Park has also been used to assess the effectiveness of the non-toxin approaches to forest pest control.

Small mammal monitoring reports can be found on this web page: [Key Native Ecosystem Programme - Small Mammal Monitoring | Greater Wellington \(gw.govt.nz\)](#).

Bird monitoring

WCC funds bird monitoring within the KNE site as part of their city-wide bird monitoring programme. Five-minute bird counts are undertaken annually to assess trends in abundance, diversity, and distribution of native birds across Wellington City forested reserves. Citizen science data is also analysed as part of the data set. This data is utilised to assess the effectiveness and inform the future management undertaken within the KNE site. Bird monitoring reports can be found on this web page: [Data, monitoring and reporting](#).

Fresh water monitoring

Data is currently being collected from the surveys of fish and fish passage barriers in the catchment to establish a baseline for an Urban Stream Monitoring programme in a collaboration between WCC and Greater Wellington. Reports for this programme should be available during the life of this plan.

Te Tini o Hākuturi have undertaken cultural freshwater monitoring across the Kaiwharawhara catchment, in part to assess the effects of increased sedimentation in the catchment resulting from the severe storms of 2022, and intensification and new subdivisions across upper catchments. WCC and Zealandia aim to collaborate with Taranaki Whanui to support further cultural monitoring throughout the life of this plan³³.

Rabbit monitoring

The skyline walkway is now one of Greater Wellington's regional annual rabbit population monitoring locations. Rabbit numbers will be counted with a spotlight at night on one night a year and recorded on a per kilometre count basis.

9.5. Supporting community

The purpose of community engagement is to support and build the capacity of existing and new community groups engaging in biodiversity projects. Community conservation efforts enable people to connect with nature and provide a powerful conservation tool. WCC supports and builds the capacity of existing and new community groups by engaging in biodiversity projects and providing guidance on their work programmes. Greater Wellington provides further support and advice as required. This work has become increasingly important with the emergence of community-led projects such as the development of Predator-free communities and Capital Kiwi.

There are several environmental community groups operating in the Western Wellington Forest KNE site and their efforts made a significant contribution to biodiversity management. The current community groups supported by WCC within the KNE site are:

- Rodent and Mustelid Blitzing at Otari (RAMBO)
- Katch 22 (Makara Peak Supporters)
- The Friends of Khandallah Park
- Khandallah Predator Free community
- Otari-Wilton's Bush Trust
- Bells Track Working Group
- Royal Forest & Bird Protection Society – Wellington Branch Chartwell Group
- Crofton Downs Predator Free Community
- Silversky Track
- Ngaio and Crofton Downs Residents Association
- The Green Belters
- Makererua Reserve Group*

*This group works outside the KNE area but within the pest animal buffer zone

9.6. Other management activities

Responsible dog ownership

With the increasing native bird numbers and the introduction of kiwi within the KNE site, there will be an increased focus on ensuring that dog-on-lead regulations are implemented. WCC has installed additional signage and will be looking to monitor areas within the KNE site and support community efforts for responsible dog ownership.

Fencing and grazing

WCC has prioritised fencing along the grazed margins adjacent to Otari-Wilton's Bush and Khandallah Park⁷. Fencing is an effective tool for excluding some feral animals and livestock from sites with high biodiversity values or where natural regeneration of native vegetation is the management objective.

WCC is proposing to gradually phase out grazing within reserve areas of the KNE site. This will be managed through WCC's leases and licenses over a period likely to exceed the life of this plan. Grazing in general as a management tool is being reviewed as per the Outer Green Belt Management Plan – Policy 4.3.2.2. Until now grazing has been used to maintain pasture cover on the ridgetops and hilltops. WCC has reviewed the effectiveness, suitability, and sustainability of grazing regimes in the light of recreational use, environmental impact, and farm consultant advice about the land's grazing capacity and value. It is proposed to gradually phase out grazing. This will be managed through WCC's leases and licenses over a period likely to exceed the life of this plan.

Private land encroachments

Encroachment of private properties into public reserves is prohibited and WCC is reviewing its programme to identify and resolve existing encroachments and protect the WCC reserve network. The cumulative effect of encroachments into open space is a significant issue for the management of reserve land, in particular in an urban landscape. Currently there are 20 encroachments into reserve land in the KNE site, totalling 2,352 m². The cumulative effect of encroachments into open space is a significant issue for the management of reserve land, in particular in an urban landscape.

10. Future opportunities

WCC and Greater Wellington endeavour to implement the management activities that they believe best protect the biodiversity values of the KNE site. However, WCC and Greater Wellington recognise that to protect and restore the biodiversity values of the KNE site, it will take more than what two agencies can do alone. Initiatives and participation from other partners are essential for the development of future opportunities.

WCC recognizes the importance of this land to mana whenua and welcome kōrero to consider management initiatives across the KNE site.

WCC supports community groups undertaking biodiversity management activities. Below is a list of some management activities that have been identified as having the potential to improve biodiversity values in the KNE site, and improve our understanding of the present values and how to better protect them:

- Extend weed management.

- Extend predator trapping (e.g., possum control in the Ohariu Valley adjoining the skyline walkway to reduce re-invasion into the KNE site and the entire Wellington town belt).
- Increase frequency of trap checks.
- Increase species monitoring (e.g., lizards, snails).
- Report wildlife sightings through citizen science platforms such as eBird and Inaturalist.

Community groups and researchers should approach WCC in the first instance to pursue any of the above or other opportunities within the KNE site.

11. Operational delivery schedule

The operational delivery schedule shows the actions planned to achieve the stated objectives for the Western Wellington Forest KNE site, and their timing and cost over the five-year period from 1 July 2024 to 30 June 2029. The budgets for the financial years 2025/26 to 2028/29 are indicative only and subject to change. Operational areas (see Appendix 1, Maps 5 and 6) are also subject to change according to operational needs over the course of the operational plan.

Table 3: Five-year operational plan for the Western Wellington Forest KNE site.

Objective	Activity	Operational area	Intended 5-year outcome	Implementing party	Annual budget
2	Pest plant control Undertake annual programme of surveillance and control of priority weeds in core forest areas	A, B, C, D, E; specific areas determined annually by WCC.	Priority weeds are identified and controlled Integrity of core forested areas is maintained	WCC	\$55,000*
1,2	Pest animal control Sustained control of possums and rats by servicing all bait-stations Control predators in the Johnston Hill area by servicing DOC200 traps every three months.	Most of the KNE site Johnston's Hill	Maintain suppression of target species to low numbers Integrity of core forested areas is maintained, native birds are protected and more resources are available to them	GW Pest Animals team	\$56,460

Objective	Activity	Operational area	Intended 5-year outcome	Implementing party	Annual budget
1,2,4	<p>Pest animal control</p> <p>Sustained control of mustelids rats and hedgehogs by servicing all DOC 200 traps on a monthly basis (exc. Johnston Hill where traps are serviced by GW)</p>	Throughout KNE site	<p>Maintain target species at low densities</p> <p>Native birds, reptiles, and invertebrates are protected and more resources are available to them</p>	WCC supported volunteer groups	\$ **
1,2,4	<p>Pest animal control</p> <p>Service Timms and Flipping Timmy traps on skyline walkway on a monthly basis</p>	Skyline walkway	<p>Possum reinvasion of the KNE site is reduced</p> <p>Integrity of core forested areas is maintained</p>	WCC supported volunteer groups	\$ **
1,2	<p>Pest animal control</p> <p>Coordinate the sustained control of pest species including rabbits, goats, deer, pigs, and stray cats throughout and immediately adjacent to the KNE site</p>	Throughout KNE site	<p>Maintain target species at low densities</p> <p>Integrity of core forested areas is maintained and native fauna is protected</p>	WCC	\$ **
1,2,4	<p>Restoration planting</p> <p>Coordination of annual restoration planting programme. Restoration planting priorities to be determined annually by WCC</p>		Increased diversity and connectivity of forest blocks	WCC	\$ *
1,2,4	Small mammal monitoring		Monitoring completed and reported to inform future management	GW	\$8,820

Objective	Activity	Operational area	Intended 5-year outcome	Implementing party	Annual budget
1	Monitoring		Monitoring completed and reported to inform future management	WCC	\$ *
3	Monitoring		Baseline established and reported to inform future management	WCC	\$ *
1,2	Fencing		No damage to high value areas recorded because of stock damage	WCC / Private landowners	\$ **
2	Private land encroachment		No further loss of reserve land. Restoration planting of current encroachments	WCC	\$ **
1,2	Grazing review		Gradual phasing out of grazing implemented (when leases and licences are reviewed)	WCC	\$ **

* Variable costs determined annually by WCC, but within identified figures.

** Costs cannot be detailed at this time.

12. Funding contributions

12.1. Budget allocated by Greater Wellington

The budgets for the years 2025/26 to 2028/29 are indicative only and subject to change.

Table 4: Greater Wellington allocated budget for the Western Wellington Forest KNE site.

Management activity	Timetable and resourcing				
	2024/25	2025/26	2026/27	2027/28	2028/29
Ecological weed control	\$0	\$0	\$0	\$0	\$0
Pest animal control	\$28,230	\$30,350	\$32,625	\$32,625	\$32,625
Monitoring	\$8,820	\$9,480	\$10,190	\$10,190	\$10,190
Revegetation	\$0	\$0	\$0	\$0	\$0
Fencing	\$0	\$0	\$0	\$0	\$0
Total	\$37,050	\$39,830	\$42,815	\$42,815	\$42,815

** \$= Costs cannot be detailed at this time.

12.2. Budget allocated by Wellington City Council

The budget is subject to confirmation through Wellington City Council ten-year planning process.

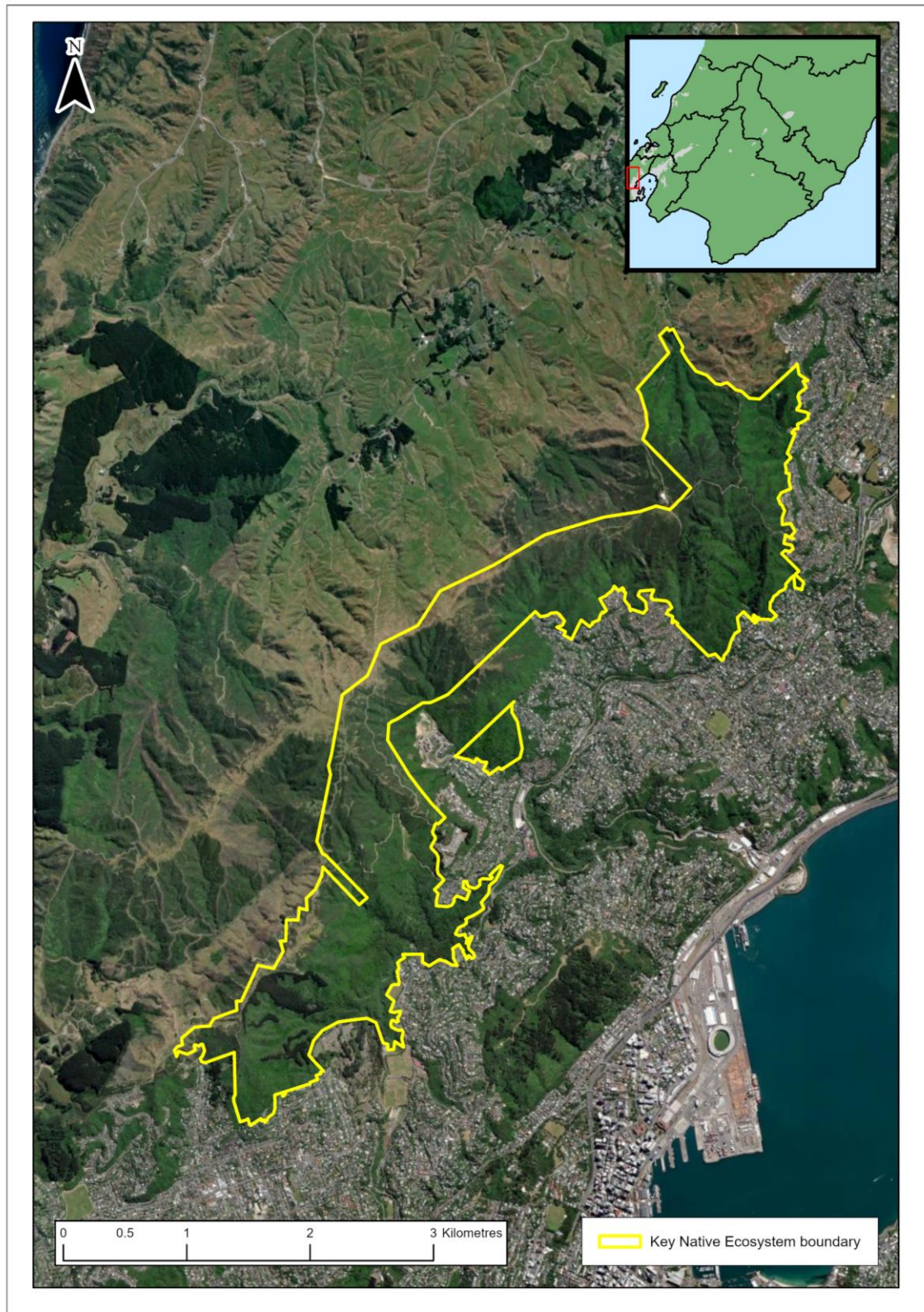
Table 5: Wellington City Council allocated budget for the Western Wellington Forest KNE site.

Management activity	Timetable and resourcing				
	2024/25	2025/26	2026/27	2027/28	2028/29
Ecological weed control	\$55,000*	\$55,000*	\$55,000*	\$55,000*	\$55,000*
Pest animal control	\$28,230	\$30,350	\$32,625	\$32,625	\$32,625
Revegetation	\$ **	\$ **	\$ **	\$ **	\$ **
Fencing	\$ **	\$ **	\$ **	\$ **	\$ **
Total	\$ 83,230	\$85,350	\$87,625	\$87,625	\$87,625

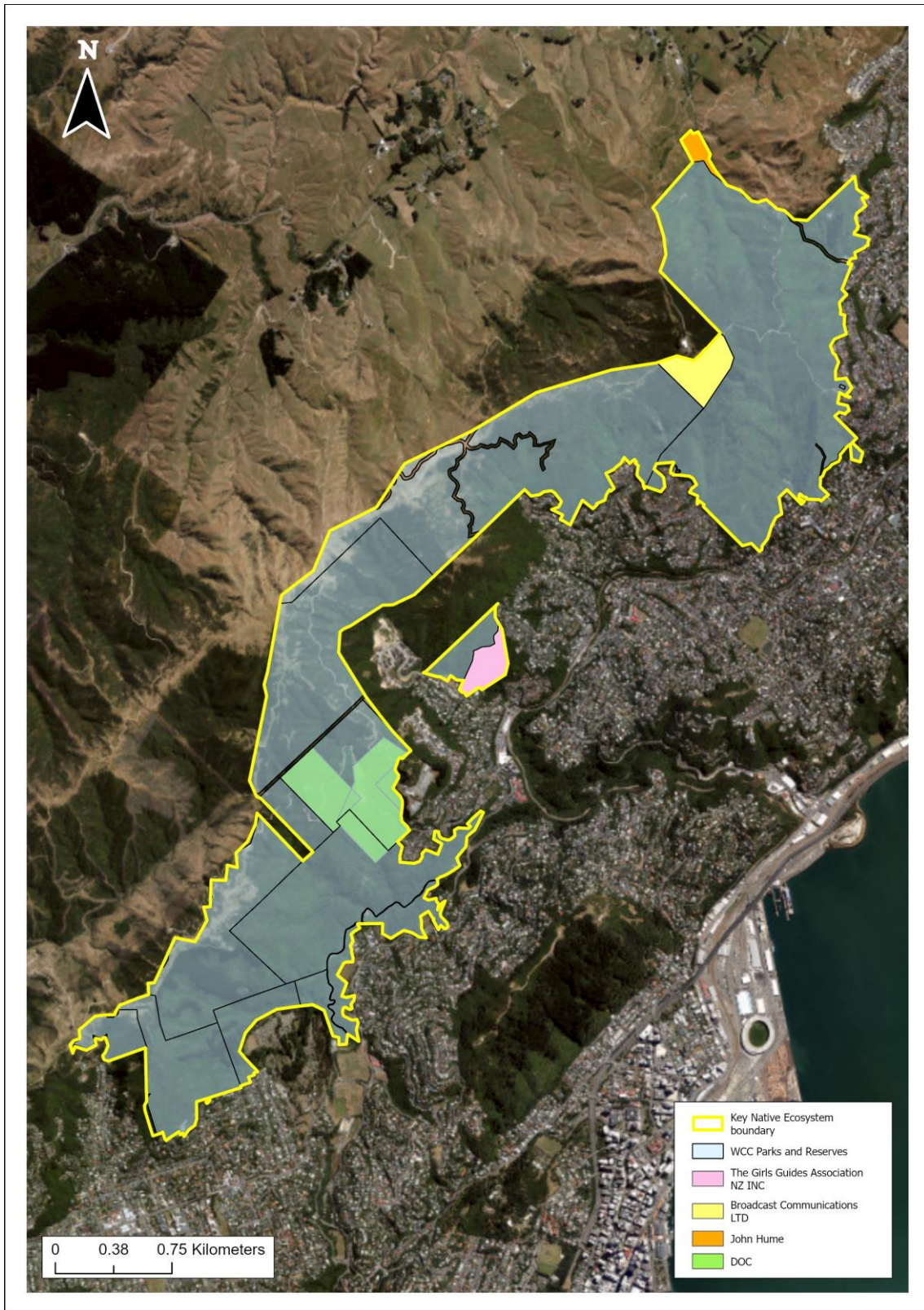
*Variable costs determined annually by WCC, but within identified figures.

** \$= Costs cannot be detailed at this time.

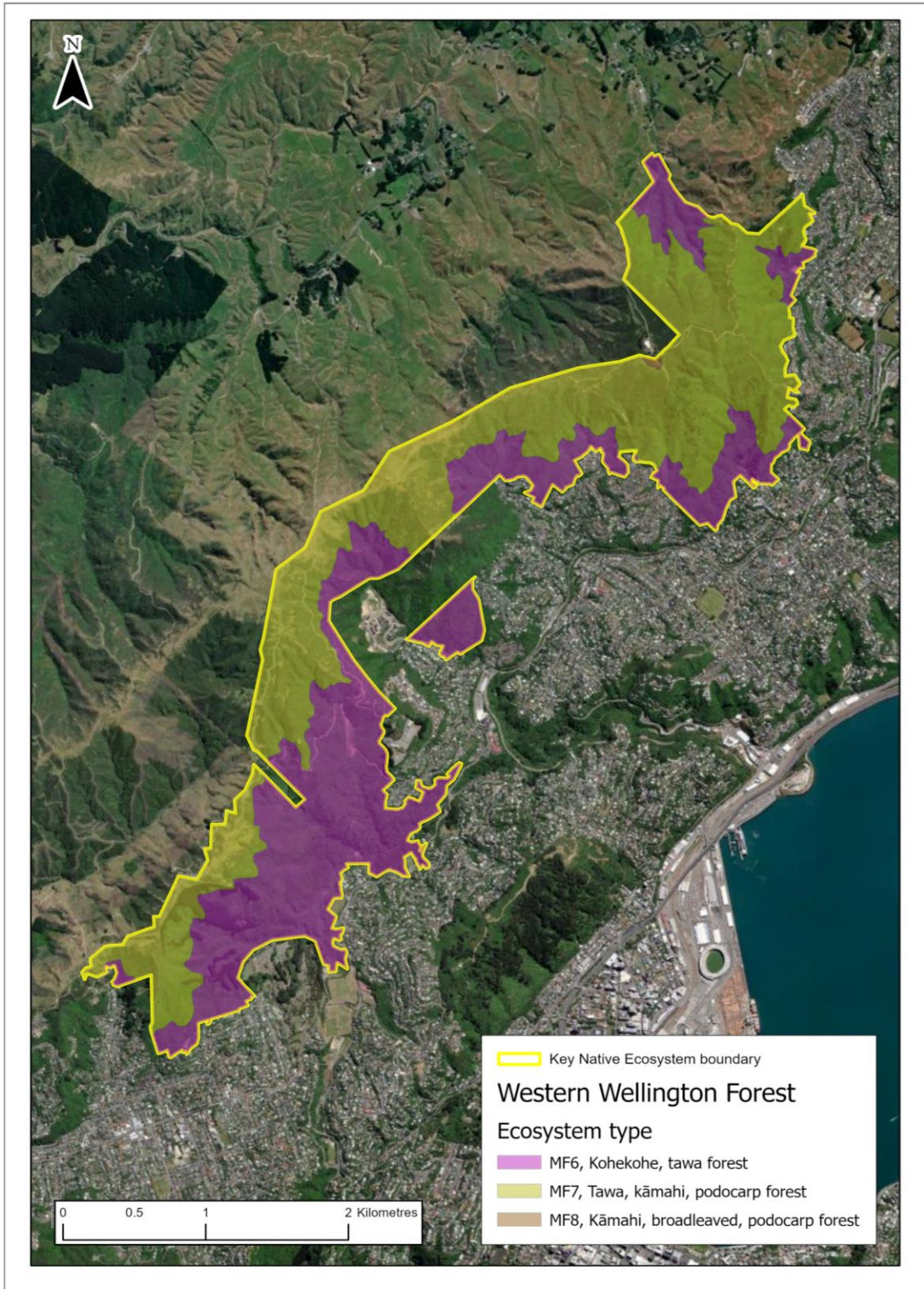
Appendix 1: Western Wellington Forest KNE site maps



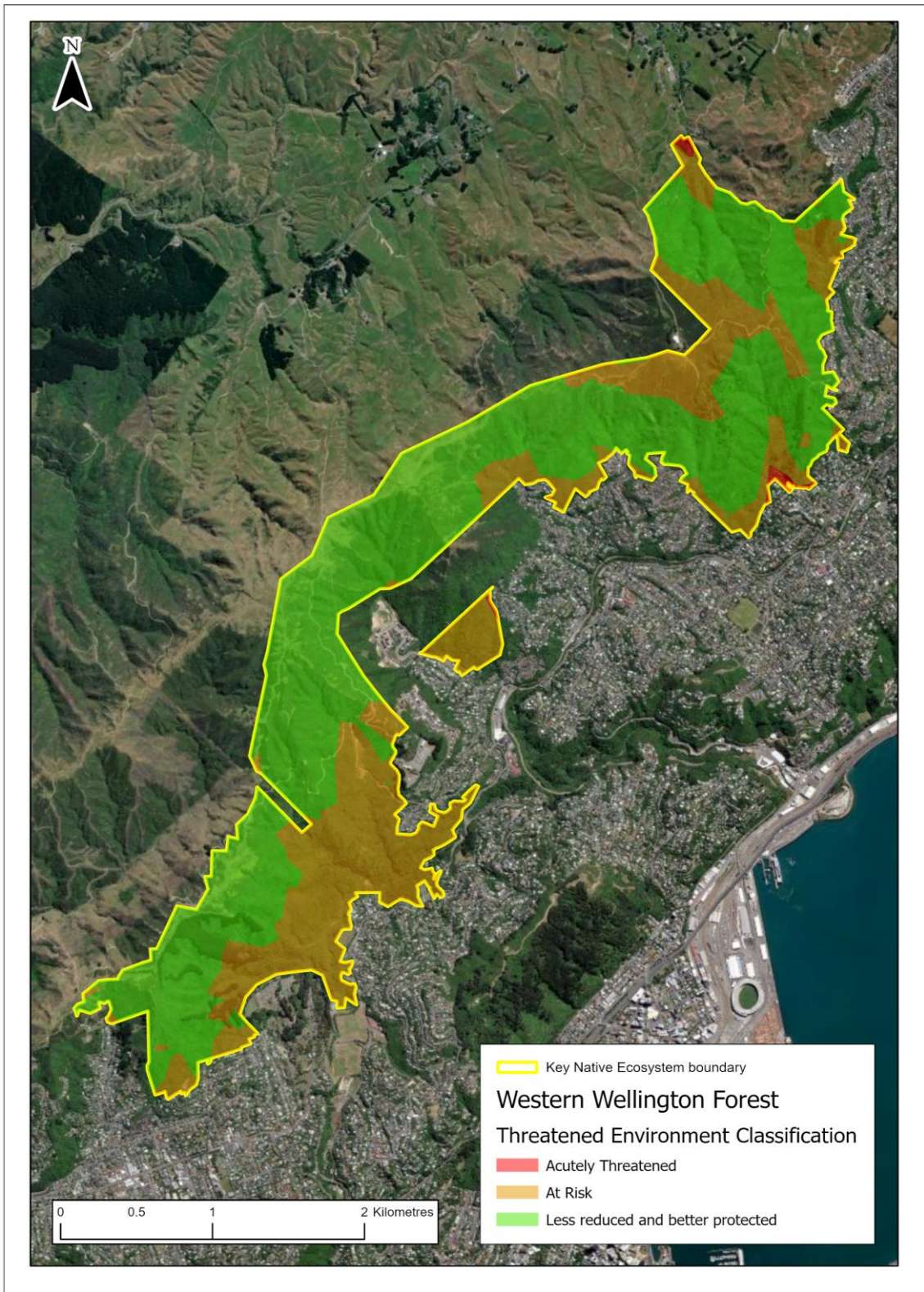
Map 1: The Western Wellington Forest KNE site boundary.



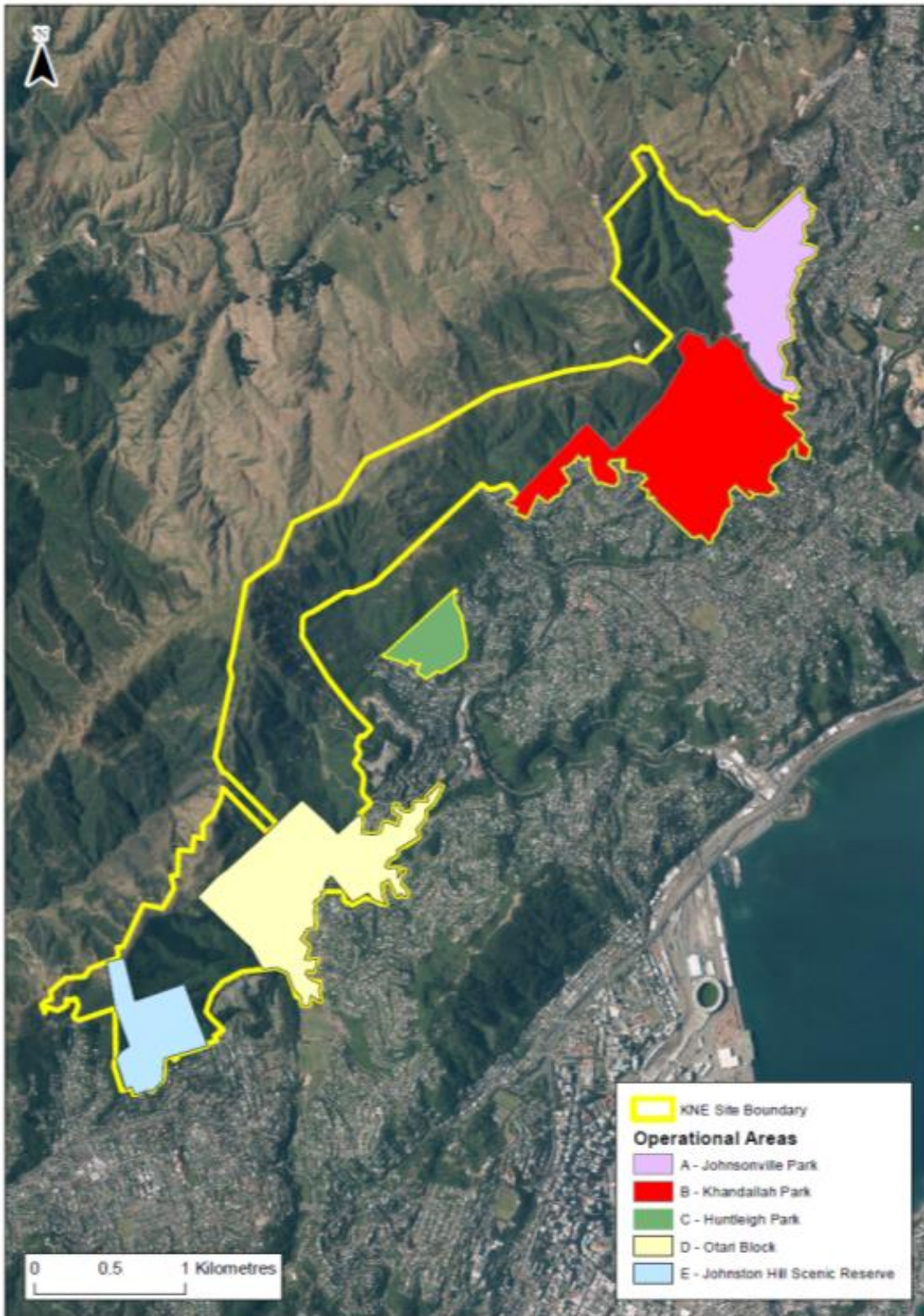
Map 2: Land ownership for the Western Wellington Forest KNE site.



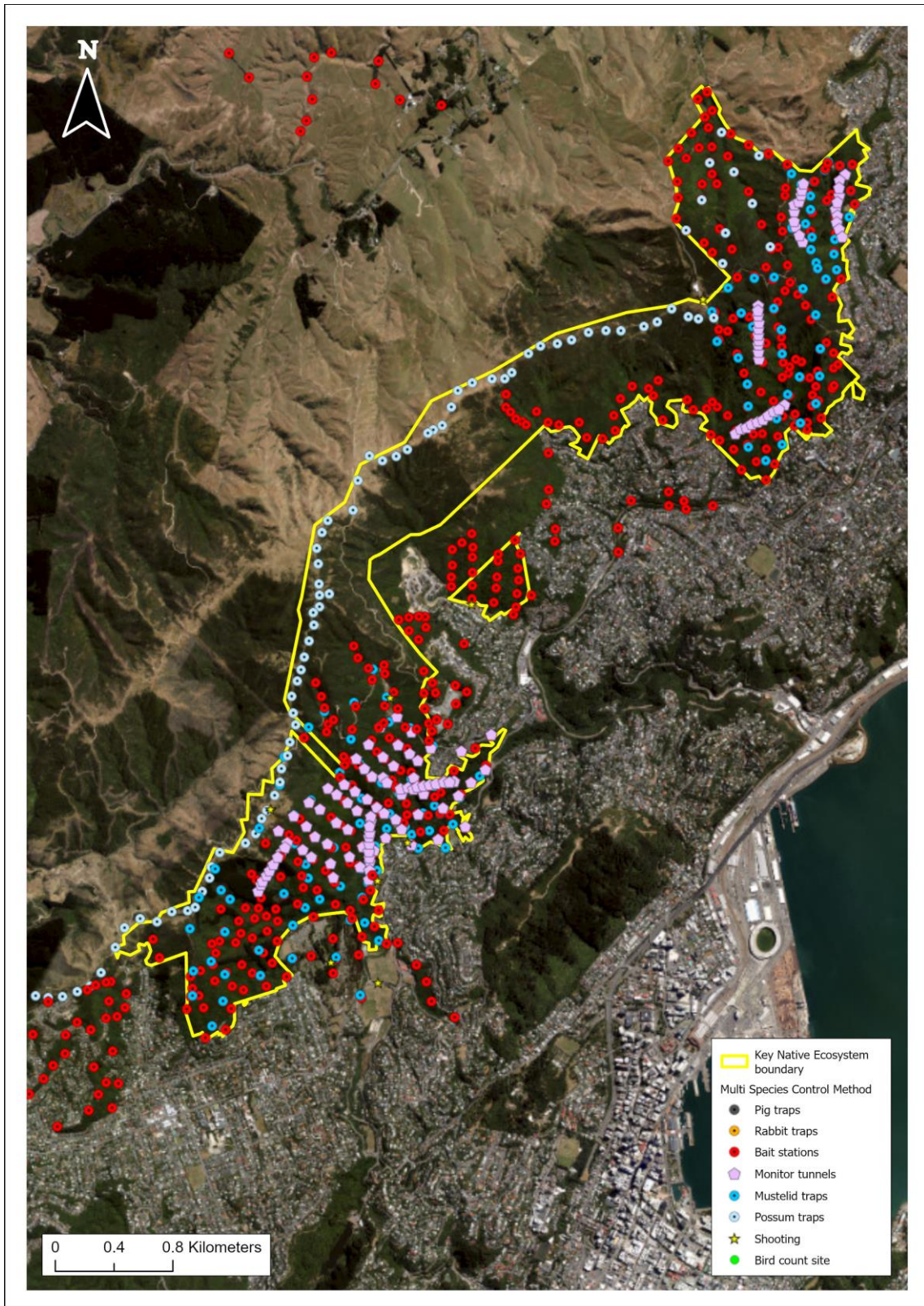
Map 3: Singers and Rogers classification of pre-human forest vegetation types for the Western Wellington Forest KNE site.



Map 4: Land Environment New Zealand threat classifications for the Western Wellington Forests KNE site.



Map 5: Ecological weed control operational areas in the Western Wellington Forest KNE site.



Map 6: Pest animal control in the Western Wellington Forest KNE site.

Appendix 2: Nationally threatened species list

The following table lists nationally Threatened and At-Risk species that are resident in, or regular visitors to, the Western Wellington Forest KNE site.

The New Zealand Threat Classification System (NZTCS) lists species according to their threat of extinction. The status of each species group (plants, reptiles, etc.) is assessed over a five-year cycle³⁴. Species are regarded as Threatened if they are classified as Nationally Critical, Nationally Endangered or Nationally Vulnerable³⁵. They are regarded as At Risk if they are classified as Declining, Recovering, Relict or Naturally Uncommon.

Table 6: Nationally Threatened and At Risk species at the Western Wellington Forest KNE site.

Scientific name	Common name	National threat status	Observation
Plants(vascular) ³⁶			
<i>Anemanthele lessoniana</i>	Hunangāmoho	Threatened – Nationally Vulnerable	Garden escapee Wellington Botanical Society 2007 ³⁷
<i>Kunzea robusta</i>	Kānuka	Threatened – Nationally Vulnerable	A. Benbrook <i>pers comm</i>
<i>Lophomyrtus bullata</i>	Ramarama	Threatened – Nationally Critical	A. Benbrook <i>pers comm</i>
<i>Lophomyrtus obcordata</i>	Rohutu	Threatened – Nationally Critical	A. Benbrook <i>pers comm</i>
<i>Meliccytus crassifolius</i>	Thick-leaved mahoe	At Risk – Declining	A. Benbrook <i>pers comm</i>
<i>Metrosideros colensoi</i>	Rātā	Threatened – Nationally Vulnerable	A. Benbrook <i>pers comm</i>
<i>Metrosideros diffusa</i>	White rātā	Threatened – Nationally Vulnerable	A. Benbrook <i>pers comm</i>
<i>Metrosideros fulgens</i>	Climbing rātā	Threatened – Nationally Vulnerable	A. Benbrook <i>pers comm</i>
<i>Metrosideros perforata</i>	Akatea	Threatened – Nationally Vulnerable	A. Benbrook <i>pers comm</i>
<i>Metrosideros robusta</i>	Northern rātā	Threatened – Nationally Vulnerable	A. Benbrook <i>pers comm</i>
<i>Streblus banksii</i>	Large-leaved milk tree	At Risk – Relict	Greater Wellington site inventory Wilton House
<i>Syzygium maire</i>	Swamp maire	Threatened – Nationally Critical	A. Benbrook <i>pers comm</i>
<i>Teucrium parvifolium</i>	Teucrium	At Risk – Declining	Garden escapee Wellington Botanical Society 2007
Birds ³⁸			
<i>Cyanoramphus novaezelandiae</i>	Red-crowned parakeet; kākāriki	At Risk – Relict	Department of Conservation 2021 ³⁷

<i>Philesturnus rufusater</i>	Tieke / North Island saddleback	At Risk - Relict	Department of Conservation 2021
<i>Falco novaeseelandiae</i>	New Zealand falcon; kārearea	At Risk – Nationally Vulnerable	Department of Conservation 2021
<i>Nestor meridionalis septentrionalis</i>	North Island kākā	At Risk – Recovering	Department of Conservation 2021
<i>Phalacrocorax varius</i>	Pied shag	At Risk - Recovering	Department of Conservation 2021
<i>Notiomystis cincta</i>	Stitchbird; hihi	At Risk - Declining	Department of Conservation 2021
<i>Petroica longipes</i>	North Island robin	At Risk – Declining	Department of Conservation 2021
<i>Anthus novaeseelandiae</i>	New Zealand pipit	At Risk - Naturally Uncommon	Department of Conservation 2021
Reptiles ³⁹			
<i>Mokopirirakau</i> 'southern North Island'	Ngahere gecko	At Risk – Declining	Department of Conservation 2021 ³⁸
<i>Naultinus punctatus</i>	Barking gecko	At Risk – Declining	Department of Conservation 2021
<i>Oligosoma ornatum</i>	Ornate skink	At Risk – Declining	Department of Conservation 2021
<i>Oligosoma zelandicum</i>	Glossy brown skink	At Risk – Declining	Department of Conservation 2021
<i>Oligosoma aeneum</i>	Copper skink	At Risk – Declining	Department of Conservation 2021
Freshwater fish ⁴⁰			
<i>Anguilla dieffenbachii</i>	Longfin eel	At Risk – Declining	Nicholas et al. 2017 ³⁹
<i>Galaxias argenteus</i>	Giant kōkopu	At Risk – Declining	Nicholas et al. 2017
<i>Galaxias brevipinnis</i>	Kōaro	At Risk – Declining	Nicholas et al. 2017
<i>Galaxias postvectis</i>	Shortjaw kōkopu	Threatened - Vulnerable	Nicholas et al. 2017

Appendix 3: Regionally threatened species list

The following table lists regionally threatened species that have been recorded in the Western Wellington Forest KNE site.

A methodology to create regional threat lists was developed by a collaborative group comprising representatives from DOC, regional councils, and a local authority. The resulting regional threat listing methodology leverages off the NZTCS, but applies a species population threshold adjusted to the regional land area under consideration (relative to the national land area) for species that are not nationally threatened. The assigned regional threat status cannot be lower than that of the national threat status, but can be higher, (e.g., a Nationally Vulnerable species could be assessed as being Regionally Critical). Other assessments made in the regional threat listing process include identifying populations that are national strongholds and the use of regional qualifiers, such as natural or historic range limits.

Table 7: Regionally threatened species recorded in the Western Wellington Forest KNE site.

Scientific name	Common name	Regional threat status	Observation
Birds ⁴¹			
<i>Anthus novaeseelandiae</i>	New Zealand pipit	Threatened – Vulnerable	Crisp et al. 2020 ⁴¹
<i>Cyanoramphus novaeseelandiae</i>	Red Crowned parakeet	At Risk - Recovering	Crisp et al. 2020
<i>Falco novaeseelandiae</i>	New Zealand falcon	Threatened - Critical	Crisp et al. 2020
<i>Hemiphaga novaeseelandiae</i>	New Zealand pigeon	At Risk - Recovering	Crisp et al. 2020
<i>Nestor meridionalis</i>	Kākā	At Risk - Recovering	Crisp et al. 2020
<i>Notiomystis cincta</i>	Stitchbird	Threatened - Critical	Crisp et al. 2020
<i>Philesturnus rufusater</i>	North Island saddleback	Threatened – Vulnerable	Crisp et al. 2020
<i>Phalacrocorax varius</i>	Pied shag	Threatened – Vulnerable	Crisp et al. 2020
Lizards ⁴²			
<i>Mokopirakau 'southern North Island'</i>	Ngahere gecko	At Risk - Declining	Crisp et al. 2023 ⁴²
<i>Naultinus punctatus</i>	Barking gecko	Threatened - Vulnerable	Crisp et al. 2023
<i>Oligosoma aeneum</i>	Copper skink	Threatened - Vulnerable	Crisp et al. 2023
<i>Oligosoma ornatum</i>	Ornate skink	At Risk - Declining	Crisp et al. 2023
<i>Oligosoma zelandicum</i>	Glossy brown skink	At Risk - Declining	Crisp et al. 2023

Appendix 4: Threat table

Appendix 4 presents a summary of all known threats to the Western Wellington Forest KNE site including those discussed in section 7.

Table 8: Threats to the Western Wellington Forest KNE site.

Threat code	Threat and impact on biodiversity in the KNE site
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>) and African club moss (<i>Selaginella kraussiana</i>) (see full list in Appendix 5).
EW-2	Woody weed species displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. Key woody ecological weed species include holly (<i>Ilex aquifolium</i>), Darwin's barberry (<i>Barberis darwinii</i>), and buddleia (<i>Buddleja davidii</i>) (see full list in Appendix 5).
EW-3	Climbing weeds smother and displace native vegetation often causing canopy collapse, inhibit indigenous regeneration, and alter vegetation structure and composition. Key climbing ecological weed species include climbing asparagus (<i>Asparagus scandens</i>) and old man's beard (<i>Clematis vitalba</i>) (see full list in Appendix 5).
EW-4	Aquatic weeds out-compete native aquatic species and choke watercourses (see full list in Appendix 5).
Pest animals	
PA-1	Possums (<i>Trichosurus vulpecula</i>) browse palatable canopy vegetation until it can no longer recover ^{43,44} . This destroys the forest's structure, diversity and function. Possums may also prey on native birds and invertebrates ⁴⁵ .
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 ^{46,47} .
PA-3	Mustelids (stoats ^{48,49} (<i>Mustela erminea</i>), ferrets ^{50,51} (<i>M. furo</i>) and weasels ^{52,53} (<i>M. nivalis</i>)) prey on native birds, lizards, and invertebrates, reducing their breeding success and potentially causing local extinctions.
PA-4	Hedgehogs (<i>Erinaceus europaeus</i>) prey on native invertebrates ⁵⁴ , lizards ⁵⁵ and the eggs ⁵⁶ and chicks of ground-nesting birds ⁵⁷ .
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 ^{58,59} .
PA-6*	Pest and domestic cats (<i>Felis catus</i>) prey on native birds ⁶⁰ , lizards ⁶¹ and invertebrates ⁶² , reducing native fauna breeding success and potentially causing local extinctions ⁶³ .

Threat code	Threat and impact on biodiversity in the 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 ⁶⁴ .
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 ⁶⁵ .
PA-9	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 ^{66,67,68} .
PA-10	Feral pigs (<i>Sus scrofa</i>) root up the soil and eat roots, invertebrates, seeds, and native plants preventing forest regeneration ⁶⁹ .
PA-11	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 ⁷⁰ .
PA-12*	Brown trout (<i>Salmo trutta</i>) and rainbow trout (<i>Oncorhynchus mykiss</i>) prey on native fish and compete with them for food resources ⁷¹ .
PA-13*	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 ^{72,73} .
PA-14*	Australasian magpie (<i>Gymnorhina tibicen</i>) are a known nest predator of native bird species and are known to modify the behaviour of native birds which could inhibit the ability of native birds to feed and breed ^{74,75} .
Human activities	
HA-1	Garden waste dumping often leads to ecological weed invasions into natural areas. Common weed species introduced at this KNE site include tradescantia, montbretia, and ivy species.
HA-2	Agricultural practices, particularly grazing livestock, can result in pugged soils, grazed native vegetation inhibiting regeneration, wildlife disturbance and increased nutrient content of soils and watercourses ⁷⁶ .
HA-3	Recreational use such as tramping, mountain biking and horse riding can damage and disturb the native ecosystem. It is also likely to disturb native fauna and introduce ecological weeds.
HA-4	Plantation forestry on adjoining land parcels to the KNE site has 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.
HA-5	Encroachment of residential gardens into the KNE site from urban areas causes habitat loss and introduces ecological weeds.
HA-6	Barriers to native fish passage are present in streams within the KNE site preventing migrating fish from completing their life-cycle.
HA-7	Land use activities that alter the local hydrology, such as development schemes and sub-divisions can affect the water levels that sustain wetland ecosystems.

Threat code	Threat and impact on biodiversity in the KNE site
HA-9	Poor water quality affects a range of species in the stream. High 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.
HA-10	Dogs (<i>Canis lupus familiaris</i>), if uncontrolled or unleashed can disturb or kill nesting birds and chicks, and lizards within the KNE site, particularly in close proximity to walking tracks ⁷⁷ .

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

Appendix 5: Ecological weed species

The following table lists key ecological weed species that have been recorded in the Western Wellington Forest KNE site and the management aims for the most relevant weed species.

Table 9: Ecological weed species recorded in the Western Wellington Forest KNE site.

Scientific name	Common name	Management aim
<i>Acanthus mollis</i>	Bear's breeches	Surveillance
<i>Acer pseudoplatanus</i>	Sycamore	Suppression
<i>Agapanthus praecox</i>	Agapanthus	Surveillance
<i>Allium triquetrum</i>	Onion weed	Surveillance
<i>Alocasia brisbanensis</i>	Giant taro	Surveillance
<i>Asparagus scandens</i>	Climbing asparagus	Suppression
<i>Berberis darwinii</i>	Darwin's barberry	No management - given the widespread distribution of this species, there are insufficient resources to control it.
<i>Buddleja davidii</i>	Buddleia	Surveillance - biocontrol agent has been used to reduce the species' dominance.
<i>Cedronella canariensis</i>	Balm of Gilead	Surveillance
<i>Chrysanthemoides monilifera</i> <i>subsp. monilifera</i>	Boneseed	Sustained control
<i>Clematis vitalba</i>	Old man's beard	Eradication
<i>Cobaea scandens</i>	Cathedral bells	Suppression
<i>Cotoneaster spp.</i>	Cotoneaster	Surveillance
<i>Crateagus monogyna</i>	Hawthorn	Suppression
<i>Crococsmi x crocosmiiflora</i>	Montbretia	Surveillance
<i>Cytisus scoparius</i>	Broom	Surveillance
<i>Elaeagnus x reflexa</i>	Elaeagnus	Surveillance
<i>Erigeron karvinskianus</i>	Mexican daisy	Surveillance
<i>Foeniculum vulgare</i>	Fennel	Surveillance
<i>Gunnera tinctoria</i>	Chilean rhubarb	Surveillance
<i>Galeobdolon luteum</i>	Aluminium weed	Surveillance
<i>Hedera helix</i>	English ivy	No management - given the widespread distribution of this species, there are insufficient resources to control it.
<i>Hedychium gardnerianum</i>	Kahili ginger	Surveillance
<i>Hydrangea macrophylla</i>	Hydrangea	Surveillance
<i>Hypericum androsaemum</i>	Tutsan	Surveillance
<i>Ilex aquifolium</i>	Holly	Surveillance
<i>Impatiens glandulifera</i>	Himalayan balsam	Surveillance
<i>Jasmine polyanthum</i>	Jasmine	Suppression
<i>Corynocarpus laevigatus*</i>	Karaka	Surveillance

<i>Laurus nobilis</i>	Bay laurel	Surveillance
<i>Lonicera japonica</i>	Japanese honeysuckle	Suppression
<i>Lupinus arboreus</i>	Tree lupin	Surveillance
<i>Melanoselinum decipiens</i>	Parsnip palm	Surveillance
<i>Passiflora 'Tacsonia' subgroup</i>	Banana passionfruit	Suppression
<i>Pinus spp.</i>	Wilding pines and conifers	Progressive containment
<i>Pittosporum crassifolium*</i>	Karo	Surveillance
<i>Pittosporum ralphii*</i>	Ralph's kohuhu	Surveillance
<i>Prunus laurocerasus</i>	Cherry laurel	Surveillance
<i>Prunus spp.</i>	Cherry	No management - given the widespread distribution of this species, there are insufficient resources to control it.
<i>Pseudosasa japonica</i>	Bamboo	Surveillance
<i>Rhaphiolepis indica</i>	Indian hawthorn	Surveillance
<i>Rubus fruticosus agg.</i>	Blackberry	Surveillance
<i>Sambucus nigra</i>	Elderberry	Surveillance
<i>Selaginella kraussiana</i>	African club moss	There are insufficient resources to control African club moss at present. Possible future management could aim to control African club moss along tracks and bait lines to avoid further spreading in the bush
<i>Senecio angulatus</i>	Cape ivy	Suppression
<i>Senecio mikanioides</i>	German ivy	Suppression
<i>Stachys sylvatica</i>	Hedge woundwort	Surveillance
<i>Syzygium smithi</i>	Monkey apple	Surveillance
<i>Taxus baccata</i>	Yew	Surveillance
<i>Tradescantia fluminensis</i>	Tradescantia	Controlled in selective areas only.
<i>Tropaeolum majus</i>	Nasturtium	Surveillance
<i>Vinca major</i>	Periwinkle	Surveillance
<i>Zantedeschia aethiopica</i>	Arum lily	Surveillance

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

Appendix 7: Wellington City Council reserves and parks

Table 11: Wellington City Council reserves and parks included in the Western Wellington Forest KNE site.

Wellington City Council reserves and parks
Johnston Hill Scenic Reserve
Ōtari Wiltons Bush
Ōtari Farm Reserve
Wilton Park
Kilmister Block
Awarua Street Recreation Reserve
Huntleigh Park
Khandallah Park
Johnsonville Park
Karori Cemetery
Kanpur Road / Nalanda Crescent Reserve
Kim Street Reserve
Orleans Recreational Reserve*
Cummings Park*
Heke Street Park*

* Outside of the KNE site boundary but within the pest animal control buffer zone.

References

- ¹ New Zealand legislation. 1991. Resource Management Act 1991.
- ² Greater Wellington Regional Council. Greater Wellington Regional Council Long Term Plan Ko Te Pae Tawhiti: 2021 – 2031.
- ³ Greater Wellington Regional Council. 2016. Greater Wellington Regional Council Biodiversity Strategy. <http://www.gw.govt.nz/assets/council-publications/Biodiversity-Strategy-2016.pdf>
- ⁴ Greater Wellington Regional Council. 2023. Natural Resources Plan for the Wellington Region, Te Tikanga Taiao o Te Upoko o te Ika a Maui. Operative Version – 28 July 2023.
- ⁵ Greater Wellington Regional Council. 2019. Greater Wellington Regional Pest Management Plan 2019–2039. GW/BIO-G-2019/74
- ⁶ Wellington City Council 2015. Our Natural Capital – Wellington’s Biodiversity Strategy and Action Plan. Wellington City Council, Wellington.
- ⁷ Wellington City Council 2013. Wellington Town Belt Management Plan. Wellington City Council, Wellington.
- ⁸ Wellington City Council 2014. Botanic Gardens of Wellington Management Plan. Wellington City Council, Wellington.
- ⁹ Wellington City Council. 2016. Open Space Access Plan. Plan for the Management of the Open Space Access Network.
- ¹⁰ Crisp P, Govella S, Crouch L. 2016. Identification and prioritisation of high value terrestrial biodiversity sites for selection within the Key Native Ecosystems Programme in the Wellington region. Greater Wellington Regional Council, GW/ESCI-T-16/93.
- ¹¹ Whaitua Te Whanganui-a-Tara Committee. (2021). Te Whaitu ate Whanganui-a-Tara. Implementation programme.
- ¹² Greater Wellington Regional Council. 2023. Natural Resources Plan for the Wellington Region, Te Tikanga Taiao o Te Upoko o te Ika a Maui. Operative Version – 28 July 2023.
- ¹³ Singers NJD, Rogers GM. 2014. A classification of New Zealand's terrestrial ecosystems. Science for Conservation No. 325. Department of Conservation, Wellington.
- ¹⁴ Singers N, Crisp P, Spearpoint O. 2018. Forest ecosystems of the Wellington Region.

- ¹⁶ McEwen M ed. 1987. Ecological regions and districts of New Zealand. 3rd ed in four 1:500 000 maps. New Zealand Biological Resources Centre Publication No. 5. Wellington, Department of Conservation.
- ¹⁷ McEwen WM. (Ed.) 1987. Booklet to accompany SHEET 3. Descriptions of Districts in central New Zealand, from Eastern Wairarapa to Akaroa; also Chathams, not shown on map. Ecological Regions and Districts of New Zealand. Wellington, Department of Conservation.
- ¹⁸ Park G. 1999. An inventory of the surviving traces of the primary forest of Wellington city. Wellington City Council, Wellington. 11 plus appendices pp.
- ¹⁹ Wardle P. 1991. Vegetation of New Zealand. Cambridge, Cambridge University Press.
- ²⁰ Brabyn L. New Zealand Landscape Classification version 2 – A Classification of visual Landscape Character.
- ²¹ Walker S, Price R, Rutledge D. 2005. New Zealand's indigenous cover. Recent changes and biodiversity protection needs. Landcare Research Contract Report No. LC0405/038. Landcare Research, Dunedin.
- ²² Wellington Botanical Society 2007. Results of the BioBlitz up to 16 May 2007 for the forested areas of Otari Wilton’s bush.
- ²³ McArthur N, Flux I, and Harvey A. 2021. State and trends in the diversity, abundance and distribution of birds in Wellington City. Client report prepared for Greater Wellington Regional Council. Wildlife Management International Ltd, Blenheim.
- ²⁴ Bell T. 2019. Wellington City Council lizard surveys: 2016-2018. Technical report prepared for Wellington City Council by EcoGecko Consultants Limited, February 2019.
- ²⁵ Department of Conservation. Bioweb Herpatofauna database. Accessed 2018.
- ²⁶ Joy M, Hewitt A. 2002. Freshwater fish survey of selected sites for Wellington Regional Council. Institute of Natural Resources-Ecology, Massey University.

- ²⁷ Harrison, E. 2019. Ecosystem health in Wellington City urban streams. Greater Wellington Regional Council, Publication No. GW/ESCI-T-19/123, Wellington.
- ²⁸ <http://wellington.govt.nz/~media/recreation/gardens/files/2007bioblitz-organisms.pdf>.
- ²⁹ Walker K. 2003. Recovery plans for *Powelliphanta* land snails 2003–2013 Department of Conservation, Wellington.
- ³⁰ Greater Wellington Regional Council. 2009. Greater Wellington – Regional Pest Management Strategy. 2002 – 2022 Five Year Review 2007. *Regional Pest Management Strategy No. GW/BIO-G-08/188*. Greater Wellington Regional Council, Wellington.
- ³¹ Greater Wellington Regional Council. 2019. Greater Wellington Regional Pest Management Plan 2019-2039.
- ³² Wellington City Council. 2008. Wellington City Council Consolidated Bylaw 2008.
- ³³ Wellington City Council. 2024.
- ³⁴ Townsend AJ, de Lange PJ, Duffy CAJ, Miskelly CM, Molloy J, Norton DA. 2008. New Zealand Threat Classification System manual. Department of Conservation, Wellington.
- ³⁵ Rolfe J, Makan T, Tait A. 2021. Supplement to the New Zealand Threat Classification System manual 2008: new qualifiers and amendments to qualifier definitions, 2021. Department of Conservation, Wellington.
- ³⁶ De Lange PJ, Rolfe JR, Barkla JW, Courtney SP, Champion PD, Perrie LR, Beadel SM, Ford KA, Breitwieser I, Schonberger, I, Hindmarsh-Walls R, Heenan PB, Ladley K. 2018. Conservation status of New Zealand indigenous vascular plants, 2017. New Zealand Threat Classification Series 22. Department of Conservation, Wellington.
- ³⁷ Wellington Botanical Society 2007. Results of the BioBlitz up to 16 May 2007 for the forested areas of Otari Wilton’s bush.
- ³⁸ Robertson HA, Baird KA, Elliot GP, Hitchmough RA, McArthur NJ, Makan TD, Miskelly CM, O’Donnell CFJ, Sagar PM, Scofield RP, Taylor GA, Michel P. 2021. Conservation status of birds in Aotearoa New Zealand, 2021. New Zealand Threat Classification Series 36. Department of Conservation, Wellington.
- ³⁹ Hitchmough R, Barr B, Knox C, Lettink M, Monks JM, Patterson GB, Reardon JT, Tocher M, Van Winkel D, Rolfe J, Michel P. 2021. Conservation status of New Zealand reptiles, 2021. New Zealand Threat Classification Series 35. Department of Conservation, Wellington.
- ⁴⁰ Dunn NR, Allibone RM, Closs GP, Crow SK, David BO, Goodman JM, Griffiths M, Jack CD, Ling N, Waters JM, Rolfe JR. 2018. Conservation status of New Zealand freshwater fishes, 2017. New Zealand Threat Classification Series 24. Department of Conservation, Wellington.
- ⁴¹ Crisp, P 2020. Conservation status of native bird species in the Wellington region. Greater Wellington Regional Council. GW/ESCI-G-20/75.
- ⁴² Crisp P, Hitchmough R, Newman D, Adams L, Lennon O, Woolley C, Hulme-Moir A, Bell T, Herbert S, Spearpoint O, Nelson N. 2023. Conservation status of indigenous reptile species in the Wellington region. Greater Wellington Region Council. GW/ESCI-G-23/03.
- ⁴³ 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.
- ⁴⁴ 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. 10–19.
- ⁴⁵ 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.
- ⁴⁶ 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.
- ⁴⁷ Innes JG. 2005. Ship rat. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. 187–203.
- ⁴⁸ 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.
- ⁴⁹ King CM and Murphy EC. 2005. Stoat. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. 261–287.

-
- ⁵⁰ 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.
- ⁵¹ Clapperton BK, Byron A. 2005. Feral ferret. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. 294–307.
- ⁵² King CM. 2005. Weasel. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. 287–294.
- ⁵³ 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.
- ⁵⁴ Jones C, Sanders MD. 2005. European hedgehog. In: King CM ed. *The handbook of New Zealand mammals*. 2nd edition. Melbourne, Oxford University Press. 81–94.
- ⁵⁵ 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.
- ⁵⁶ 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.
- ⁵⁷ Jones C, Sanders MD. 2005. European hedgehog. In: King CM ed. *The handbook of New Zealand mammals*. 2nd edition. Melbourne, Oxford University Press. 81–94.
- ⁵⁸ Ruscoe WA, Murphy EC. 2005. House mouse. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. 204–221.
- ⁵⁹ 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.
- ⁶⁰ 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.
- ⁶¹ 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.
- ⁶² 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.
- ⁶³ Gillies C, Fitzgerald BM. 2005. Feral cat. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. 308–326.
- ⁶⁴ Norbury G, Flux JEC. 2005. Brown hare. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. 151–158.
- ⁶⁵ 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.
- ⁶⁶ 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.
- ⁶⁷ Nugent G, Fraser W. 2005. Red deer. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. 401–419.
- ⁶⁸ Nugent G, Asher G. 2005. Fallow deer. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. 447–459.
- ⁶⁹ McIlroy JC. 2005. Feral pigs. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. 334–345.
- ⁷⁰ Parkes. JP. 2005. Feral goat. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. 374–391.
- ⁷¹ 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.
- ⁷² Wright D, Clout M 2001. The eastern rosella (*Platycercus eximius*) in New Zealand. DOC Science Internal Series 18.
- ⁷³ Galbraith JA. 2013. Eastern rosella. In Miskelly, C.M. (ed.) *New Zealand Birds Online*. www.nzbirdsonline.org.nz

-
- ⁷⁴ Morgan JD, Waas R, Innes J. 2006. The relative importance of Australian magpies (*Gymnorhina tibicen*) as nest predators of rural birds in New Zealand, *New Zealand Journal of Zoology*, 33:1, 17-29.
- ⁷⁵ Morgan D, Waas J, Innes J. 2006. Do territorial and non-breeding Australasian Magpies (*Gymnorhina tibicen*) influence the local movements of rural birds in New Zealand? *IBIS International Journal of Avian Science*, Volume 148, Issue 2.
- ⁷⁶ 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.
- ⁷⁷ Holderness-Roddam B. 2011. The effects of domestic dogs (*Canis familiaris*) as a disturbance agent on the natural environment. Thesis submitted at University of Tasmania, Hobart.

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