

# Key Native Ecosystem Operational Plan for Pākuratahi

2017-2020





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## 1. Purpose

The purpose of the three-year Key Native Ecosystem (KNE) Operational Plan for Pākuratahi 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 three 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)<sup>1</sup>.

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

### **Greater Wellington 10 Year Plan**

The 10 Year Plan (2015-2025)<sup>2</sup> 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 Plan (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 Pākuratahi as a whole is guided by the Greater Wellington Parks Network Plan (PNP)<sup>3</sup>. This plan guides the recreational and amenity uses of Pākuratahi as well as identifying opportunities to protect biodiversity values.

## **Greater Wellington Biodiversity Strategy**

The Greater Wellington Biodiversity Strategy<sup>4</sup> (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/<br>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 three-year KNE plans prepared by the Greater Wellington’s Biodiversity department. Greater Wellington works with the landowners, mana whenua and other operational delivery providers to achieve mutually beneficial goals.

#### 4. Pākuratahi Key Native Ecosystem site

The Pākuratahi KNE site (7,180 ha) is a large expanse of mature native forest and regenerating native scrub located within Pākuratahi Forest on the western side of the Rimutaka Range east of Upper Hutt. It comprises nearly all of the Pākuratahi River catchment, including land within the Kaitoke Basin (see Appendix 1, Map 1).

The KNE site is contiguous with the Rimutaka Forest Park to the east and the Tararua Forest Park and the Hutt Water Collection Area to the north, making it part of an almost continuous forested corridor from the Tararua ranges in the north to the Orongorongo ranges to the south. The KNE site comprises multiple ecosystem and habitat types including large tracts of original native forests, sub-alpine tussocklands and the regionally significant Ladle Bend Wetland.

Over half of the site is very remote in nature with no vehicle access or maintained walking tracks. However, the more accessible parts of the KNE site are popular areas for walking, cycling, horse riding and hunting. Recreational amenities, including picnic areas and walking, biking and horse riding trails are provided at Tunnel Gully and on the terraces of the Pākuratahi River.

## 5. Parties involved

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

### 5.1. Landowner

All land within the KNE site is owned by Greater Wellington. The whole site is managed by Greater Wellington's Parks department and its management is guided by the Greater Wellington Parks Network Plan<sup>5</sup> (PNP). The PNP guides the recreational and amenity uses of the forest park as well as identifying opportunities to protect biodiversity values.

The forest is retained as a future water collection area, with the primary focus of management to ensure the potential water supply is protected as a sustainable source of secure, fresh and clean water for future use.

Secondary management considerations are to protect the native forest for biodiversity purposes, preserve heritage values, manage the site for production forestry, provide a range of recreational opportunities, and undertake no significant development other than for water supply purposes<sup>6</sup>. This KNE plan is consistent with the wider objectives and policies of the PNP. The Biodiversity and Parks departments will work collaboratively to efficiently deliver the activities in these plans.

### 5.2. Operational delivery

Within Greater Wellington, the operational delivery partners are the Biodiversity, Biosecurity and Parks departments. The Biodiversity department is the overarching lead department for Greater Wellington on the coordination of biodiversity operational activities and advice within the KNE site. The Biosecurity department coordinates and carries out pest control activities. The Parks department manages recreational access and maintains assets such as roads, tracks and amenity areas within the KNE site.

### 5.3. Mana whenua partners

Ngāti Toa Rangatira (Ngāti Toa) and Taranaki Whānui ki Te Upoko o Te Ika a Maui (Taranaki Whānui) are Greater Wellington's mana whenua partners in Pākūratāhi. Greater Wellington is committed to exploring opportunities on how mana whenua partners wish to be involved in the plan development or operational delivery of the KNE site.

#### Ngāti Toa

Ngāti Toa considers it has a strong historical connection with the Te Awa Kairangi (Hutt River) and its tributaries. They consider that the river is included within their extended rohe and it is an important symbol of their interests in the Harataunga area<sup>7</sup>.

Ngāti Toa claims an association with the Te Awa Kairangi from the time of their participation in the invasion of the Hutt Valley during 1819 and 1820. While they did not remain in the area after this invasion, Te Awa Kairangi continued to be important to them following their permanent migration and settlement in the lower North Island



in the late 1820s and early 1830s. Ngāti Toa’s relationship to the Hutt Valley and river was not one defined by concentrated settlement and physical presence. Rather, the iwi felt their claim to the land was based on their powerful leadership and the relationship they had with iwi residing in the Hutt Valley who had been placed there by Ngāti Toa in the 1830s. For some years these iwi in the Hutt Valley paid tribute of goods such as canoes, eels and birds to Ngāti Toa<sup>8</sup>.

Te Awa Kairangi was an important transport route, and small waka were used along the length of the river. The river was traditionally an area for gathering piharau, or the freshwater blind eel, as well as tuna (eel) from its tributaries. Harataunga also supported flax plantations, which were used by early Maori for trading with settlers. The river was also of great importance as it was the largest source of freshwater in the area<sup>9</sup>.

**Table 1: Ngāti Toa sites of significance in Pākuratahi KNE site**

| Site of significance       | Mana whenua Values <sup>10</sup>  |
|----------------------------|---|
| Te Awa Kairangi/Hutt River | <p>Ngā mahi a ngā Tūpuna:</p> <p>Ngāti Toa’s relationship with Te Awa Kairangi and Wainuiomata Rivers extends back to the Amiowhenua expedition from 1819 and Te Rauparaha’s initial invasion of the Hutt Valley. During that campaign the tauā (war party) marched around the western side of Te Whanganui-a-Tara, defeating the local iwi as they went. When they reached Te Awa Kairangi they constructed rafts which were used to aid them in their invasion of the Hutt Valley. Ngāti Toa’s traditional relationship with each river as important mahinga kai, ara waka, and source of natural resources reflected the wider influence and mana of Ngāti Toa throughout the whole of the Hutt Valley</p> |
|                            | <p>Te Mahi Kai:</p> <p>Te Awa Kairangi was once the largest source of fresh water in the district, and supported a diverse and abundant native fishery resource which was important to Ngāti Toa’s physical and cultural sustenance. In addition to sustaining a large variety of native fish populations, the river also provided access to forest birds, watercress, and numerous other food plants. Today, the lower reaches of the river in particular are in a state of extreme degradation due to the adverse effects of development within the Hutt Valley catchment over many decades. This has severely impacted on the ability to continue customary practices</p>                                  |
|                            | <p>Te Mana o Te Tangata:</p> <p>Many iwi from around the region and from the top of the South Island are familiar with the life supporting capacity of this river and the wealth of freshwater foods and resources once harvested here</p>  |
|                            | <p>Te Manawaroa o te Wai:</p> <p>Despite excessive land reclamations, modification, and environmental damage Te Awa Kairangi continues to support a variety of endemic wildlife; including endangered species. There is vast potential for environmental restoration and this is a primary objective for Ngāti Toa. Environmental issues continue to have a direct and significant impact on successive generations</p>   |
|                            | <p>Te Mana o Te Wai:</p> <p>A defining feature of Ngāti Toa settlement in the Wellington area and integral to Ngāti Toa identity</p>  |

## Taranaki Whānui

Taranaki Whānui considers that Te Awa Kairangi is the oldest name for the Hutt River attributed to the Polynesian explorer Kupe. It was also known as Heretaunga in a later period. The origins of the streams flowing to Te Awa Kairangi are high in the Tararua Range. The stream and rivers lead down through Pakuratahi at the head of the Hutt Valley. Taranaki Whānui had interests at Pakuratahi as the trail linking Te Whanganui a Tara and the Wairarapa came through Pakuratahi and over the Rimutaka Range. Prior to the 1855 uplift Te Awa Kairangi was navigable by waka up to Pakuratahi and the river was navigable by European ships almost to Whirinaki (Silverstream)<sup>11</sup>.

Taranaki Whānui travelled in the Hutt Valley largely by waka. There were few trails through the heavy forest of the valley. Many Taranaki Whānui kainga and pā were close to the river including at Haukaretu (Māoribank), Whakataka Pā (which was across the bank from what is now Te Marua), Mawaihakona (Wallaceville), Whirinaki, Motutawa Pā (Avalon), Maraenuku Pā (Boulcott), Paetutu Pā and at the mouth of the river, Hikoikoi Pā to the west and Waiwhetu Pā (Owhiti) to the east<sup>12</sup>.

Te Awa Kairangi linked the settlements as well as being a food supply for the pā and kainga along the river. Mahinga kai were found along the river such as Te Momi (Petone) which was a wetland that held abundant resources of birds, tuna and other food sources. The river ranged across the valley floor and changed course several times leaving rich garden sites. Waka were carved from forest trees felled for that purpose close to the river<sup>13</sup>.

**Table 2: Taranaki Whānui sites of significance in Pākuratahi KNE site**

| Site of significance       | Mana whenua values <sup>14</sup>  |
|----------------------------|---|
| Te Awa Kairangi/Hutt River | Ngā Mahi a ngā Tūpuna:<br>Te Awa Kairangi is the major river system for the valley of the Hutt. Its sources from the Tararua connect with the extensive stream systems that support this, the largest river in the takiwā of Te Ātiawa/Taranaki Whānui  |
|                            | Te Mahi Kai:<br>This river is still navigable by waka and supported extensive wildlife of fish, birds, plants and resources that sustained many iwi over the centuries. The podocarp forest supported by this river was the home for teeming flocks of birds and evidence of this is written about extensively by early settlers especially Charles Heaphy, a surveyor with the New Zealand Company |
|                            | Wāhi Whakarite:<br>Along this river sites were maintained for rituals and ceremonies relating to the everyday activities of the iwi   |
|                            | Te Mana o te Tangata:<br>This river and its tributaries are significant as many pā were built on its banks and sustained a full way of life for whanau and provided extensively for manuhiri on the occasions required  |
|                            | Te Manawaroa o te Wai:<br>This river has been highly modified by settlers and this continues today. The use of the river to dump sewage and waste and the narrowing of its channel and the extensive changes to the delta at the mouth have caused iwi to lose their relationship with this most significant river  |

|  |  |
|--|--|
|  | <p>Te Mana o te Wai:</p> <p>Te Awa Kairangi has much lore and its name and connection for the iwi who lived and moved on from this area mean the cultural history is a large one</p>   |
|  | <p>Wāhi Mahara:</p> <p>Like all rivers in the Te Ātiawa/Taranaki Whānui takiwā, this river is the place for wānanga; of note are the pā sites, the swamps and their uses for weaving dyes and the fisheries. The battles are all linked to the Te Ātiawa/Taranaki Whānui story</p> |

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 including protecting native vegetation in the Hutt River catchment
- 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

#### 5.4. Stakeholders

The Upper Hutt branch of the Forest and Bird Protection Society (UHF&B) has a strong interest in the KNE site. Sixty-five hectares of land within the KNE site was formerly owned by the UHF&B who gifted it to the Upper Hutt City Council (UHCC) in 2003 after which it became part of Pākuratahi Forest. This land is now gazetted as Scenic Reserve.

Members of UHF&B carried out possum control in the Tunnel Gully area of the KNE site from 2007 until 2016. They ceased this work as very few possums were being caught and it was decided that their voluntary labour was better utilised elsewhere.

## 6. Ecological values

This section describes the various ecological components and attributes that make the KNE site ecologically 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 3, below, lists ecological designations at all or part of the Pākuratahi KNE site.

**Table 3: Designations at the Pākuratahi KNE site**

| Designation level | Type of designation   |
|-------------------|---|
| National          | Parts of the KNE site are designated as a Scientific Reserve: <ul style="list-style-type: none"> <li>Two land parcels totalling 56 ha gifted to UHCC by UHF&amp;B</li> </ul>  |
| Regional          | Parts of the KNE site are designated under Greater Wellington's proposed Natural Resources Plan as a: <ul style="list-style-type: none"> <li>River with Significant Indigenous Ecosystems – habitat for threatened and at risk fish species (Schedule F1): The Pākuratahi River and all tributaries</li> <li>River with Significant Indigenous Ecosystems – habitat with high macroinvertebrate community health (Schedule F1): The Pākuratahi River and all tributaries</li> <li>Significant Natural Wetlands (Schedule F3): Ladle Bend Wetland (actually Ladle Bend Wetland)</li> </ul> |
| District          | Part of the KNE site has been designated within UHCC's District Plan <sup>15</sup> for its high ecological, visual and/or landscape values: <ul style="list-style-type: none"> <li>Southern Hills Overlay Area (Development or the removal of vegetation has the potential to significantly impact on the identified values)</li> </ul>   |

### 6.2. Ecological significance

The Pākuratahi 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 boundary
- Its **ecological context** is valuable at the landscape scale as it contains a variety of large, intact and inter-connected habitats and, provides core habitat for threatened indigenous plant and animal species within the KNE site.

#### *Representativeness*

The Threatened Environment Classification system<sup>16</sup> indicates that some parts of the KNE site are classified as Acutely Threatened, Chronically Threatened or At Risk. There is less than 10%, 10-20% and 20-30% respectively of the original cover of these indigenous vegetation types remaining in New Zealand<sup>17</sup>. These areas of threatened environments within the KNE site are located on river and stream terraces (see Appendix 1, Map 2).

The Singers and Rogers (2014)<sup>18</sup> classification of pre-human vegetation indicates the Pākuratahi KNE site contains two forest ecosystem types that are now considered regionally threatened, having less than 30% of the pre-human extent remaining in the region. They are tawa, kamahi, podocarp forest (MF7) and hard beech forest (MF20). There is now only 22.5% and 26% respectively of the pre-human extent of these forest types remaining in the Wellington Region<sup>19</sup>.

The KNE site contains a mānuka (*Leptospermum scoparium*) dominated bog (Ladle Bend Wetland). Wetlands are now considered an uncommon habitat type in the Wellington Region with less than 3% of their original extent remaining<sup>20</sup>.

#### *Rarity/distinctiveness*

New Zealand's national threat classification system<sup>21</sup> lists six plant, four bird, one lizard and four freshwater fish species as nationally Threatened or At Risk within the KNE site. Seventeen plant species present have also been listed as regionally threatened. Nationally Threatened species are listed in Appendix 2 and regionally threatened species in Appendix 3.

#### *Diversity*

The Pākuratahi KNE site comprises six different forest ecosystem types as well as a sub-alpine scrub ecosystem at higher altitudes<sup>22</sup>. These ecosystem types are red beech, podocarp forest (CLF9); red beech, silver beech forest (CLF10); silver beech forest (CLF11-2); black beech forest (MF5); tawa, kamahi, podocarp forest (MF7); hard beech forest (MF20); and *olearia*, *pseudopanax*, *dracophyllum* scrub (sub-alpine scrub) (CDF6).

#### *Ecological context*

The present vegetation cover of the KNE site still comprises large areas of these forest types, largely unmodified in the Pākuratahi headwaters to the south, and a mosaic of original and regenerating podocarp remnants and scrub in the north. It is significant that four beech species are found together at this one site. The forest is contiguous with those of the Rimutaka Forest Park and the Hutt Water Collection Area. The site provides core breeding habitat for a large assemblage of forest bird species and is refuge for nationally and regionally threatened plant species.

### **6.3. Ecological features**

The Pākuratahi KNE site is located within the Tararua Ecological District<sup>23</sup>. The KNE site is characterised by steep to very steep, dissected hill country rising to 860m at Mt Climie. Rainfall is high with an annual mean of about 2,200mm falling in the main valleys. The site has a sheltered north-easterly aspect; however, strong north-westerly and south-easterly winds occur on exposed faces and ridgelines. A belt of sheared Torlesse greywacke underlies the Pākuratahi area. The greywacke has been folded and lifted by tectonic forces and volcanic and ocean floor material such as basalt, chert and limestone has been incorporated into the rock.

#### **Habitats**

Although the KNE site contains a multitude of forest types and vegetation associations, the site can be separated in to four broad habitats based on geographical,

environmental and human influences. These are described below and shown on Map 3 in Appendix 1. This information has been taken from the publication: Regional Forest Lands Resource Statement, Volume One – Physical Environment<sup>24</sup>.

#### *Pākuratahi north*

In this northern most area of the KNE site the vegetation is largely regenerating native forest and scrub, on a rolling to steep amphitheatre-shaped piece of land, on the eastern side of the Pākuratahi basin. Some areas that have suffered fire damage in the recent past here are good examples of successional sequences. A small area of original forest remains between Farm Creek and the northern boundary. Emergent tree species present include hard beech (*Fuscospora truncata*), rimu (*Dacrydium cupressinum*), kahikatea (*Dacrycarpus dacrydioides*) and rewarewa (*Knightia excelsa*), while silver beech (*Lophozonia menziesii*) is found on the ridgelines. The regionally rare southern rata (*Metrosideros umbellata*) is also found here. The area known as the “Puffer” is a nationally recognised ground orchid site with over 30 species of orchid having been recorded there.

#### *Pākuratahi River valley (Rimutaka Rail Trail area)*

The vegetation in the middle section of the Pākuratahi River valley where the rail trail passes through the site is now a mosaic of regenerating scrubland and forest, and small pockets of original forest. Four areas of notable vegetation and a wetland are located within this zone. They are known as Rifle Range Bush, Pākuratahi Terrace Bush, Rimutaka Bush A and B, and Ladle Bend Wetland.

Rifle Range Bush is a remnant of podocarp/broadleaf/hard beech forest. It contains a significant area of swamp maire (*Syzygium maire*), a once common, but now rare species in the Kaitoke/Upper Hutt district.

Pākuratahi Terrace Bush contains kahikatea, hard beech, black maire (*Nestegis cunninghamii*), rata, rewarewa and swamp maire as canopy emergents. This small remnant provides an important seed source to the surrounding regenerating forest.

Rimutaka Bush A and B contain excellent stands of red beech (*Fuscospora fusca*) forest. Hard, silver and black beech (*Fuscospora solandri*) are also present.

Ladle Bend Wetland is a 1.5 ha rain-fed wetland (bog) dominated by manuka. There is no open water but the area is probably subject to occasional flooding. Two distinct communities make up the wetland: a less boggy region with dense manuka and a wetter region with grass, sedge and sphagnum where the manuka is less dense.

#### *Tunnel Gully to Mt Climie*

A large pocket of original forest remains at Tunnel Gully, while the rest of the area is a mosaic of mixed scrub and regenerating bush. The original forest is the only example of podocarp-tawa forest on alluvial terrace left in the region. Large terrestrial rata and both swamp and black maire are found in this forest.

The road to Mt Climie demonstrates the altitudinal vegetation sequence for the Hutt Valley. It is one of the only places in the region that this sequence can be easily accessed. At Tunnel Gully (altitude 200m) northern rata (*Metrosideros robusta*), rimu, matai (*Plumnopitys taxifolia*), kahikatea and pukatea (*Laurelia novae-zealandiae*) emerge above a canopy of tawa (*Beilschmiedia tawa*), hinau (*Elaeocarpus dentatus*),

rewarewa and kamahi (*Weinmania racemosa*). Above this lowland forest a mixed podocarp/broadleaf with beech mixture forms an intermediate band before the beech forest proper. In this band miro (*Plumnopitys ferruginea*) and Hall's totara (*Podocarpus hallii*) become more abundant, and rimu and rata become less common. Beech trees appear on ridge crests and spurs. This forest type covers the lower slopes and fertile valley floors between 400-500m.

With increasing altitude the podocarp/broadleaf forest gradually gives way to beech forest. Moisture loving kamahi become abundant and cold hardy species such as horopito (*Pseudowintera colorata*), stinkwood (*Coprosma foetidissima*) and tree fuchsia (*Fuchsia excortitata*) become common. Black and hard beech are restricted to dry infertile sites, while red beech is found on slightly more fertile and moist sites. The Pākuratahi KNE site is the southern limit for red beech in the Wellington Region.

Above 550m, as soils become less fertile, temperature falls and rainfall increases, silver beech increasingly predominates. Mountain beech tree (*Cordyline indivisa*) appears and *Astelia* spp. become more common on the forest floor. By 700m the canopy is almost entirely silver beech. Haumakaroa (*Raukaua simplex*) and horopito form the shrubby understory. Mountain five-finger (*Pseudopanax colensoi*) is found here – a species now rare in the region, due to it being a preferred food of browsing animals such as deer and possums.

#### *Pākuratahi headwaters*

The sequence described in the previous section makes up the bulk of the vegetation of this large area of largely unmodified mature native forest. The regionally threatened perching kohukohu (*Pittosporum cornifolium*) and *Pimelea gnidea* are present here, as is the nationally at risk kohurangi/Kirk's daisy (*Brachyglottis kirkii* var. *kirkii*). A fire in the 1920s cleared the Mt Climie summit of forest and only a few scattered silver beech have returned. Sub alpine and bog communities now predominate. A dense sward of *Astelia* sp. aff. *nervosa* spreads over the boggy ground, grasses such as mountain toetoe (*Cortaderia fulvida*) and *Chionachloa conspicua* are found on better draining areas, and areas of *Oreobolus* cushionfield are found with low emergent shrubs. The only area of snow tussock (*Chionachloa flavescens*) on the Rimutaka Range is found at spot height 826m.

## Species

### *Birds*

Nineteen species of native bird have been recorded in the KNE site<sup>25</sup>. The site contains a large enough area of mature forest to support large breeding populations of all native forest bird species present in the region. Of particular note are the nationally threatened species rifleman (*Acanthisitta chloris*), New Zealand falcon (*Falco novaeseelandiae*) and New Zealand pipit (*Anthus novaeseelandiae*). In addition, the KNE site also supports species such as tomtit (*Petroica macrocephala*) and whitehead (*Mohoua albicilla*) that are now uncommon to the region.

### *Reptiles*

The barking gecko (*Naultinus punctatus*) is the only lizard species that has been recorded in the KNE site, but it is likely that ngahere gecko (*Mokopirirakau* "southern

North Island”), northern grass skink (*Oligosoma polychroma*) and ornate skink (*O. ornatum*) are also present, as these species have been recorded nearby in similar habitat<sup>26</sup>.

#### *Fish*

Five species of native fish have been recorded within the Pākuratahi KNE site. These are longfin eel (*Anguilla dieffenbachia*), dwarf galaxid (*Galaxias divergens*), kōaro (*Galaxias brevipinnis*), redfin bully (*Gobiomorphus huttoni*) and Cran's bully (*Gobiomorphus basalis*). All but Cran's bully are classified as At-Risk — Declining<sup>27</sup>.

Shortfin eel (*Anguilla australis*), bluegill bully (*Gobiomorphus hubbsi*) and upland bully (*Gobiomorphus breviceps*) have been recorded in the Pākuratahi River downstream of the KNE site boundary<sup>28</sup>. However, as there are no barriers to fish passage in the main river channel, it is possible that these species are also present within the KNE site.

## 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

The most significant threats to the ecological values of Pākuratahi KNE site come from a range of ecological weeds, browsing and predatory pest animals, and the potential impacts of some management and recreational activities.

Ecological weeds are prevalent and widespread throughout the northern half of the KNE site, with the densest known infestations concentrated in discrete locations. Often, these are sites of historic interest or present human activity, such as Tunnel Gully and the summit yards. Wilding pines, primarily *Pinus radiata* and *Pinus contorta* are the most significant and widespread ecological weeds within the KNE site. *Pinus radiata*, associated with existing plantation forestry blocks has spread through large areas of native forest in the middle section of the KNE site. *Pinus contorta* is spreading from abandoned commercial forestry trial stands. In addition, Gorse (*Ulex europaeus*) and broom (*Cytisus scoparius*) pose a significant threat to sensitive sub-alpine tussockland habitat on the Climie ridgeline. A small infestation of perennial nettle (*Urtica dioica*), a total control species in the Wellington Region is present at the historic Summit yards near the top of the Rimutaka Incline.

There are a number of pest animal species known to exist within the KNE site. The species considered to pose the greatest threat to the ecological values of the KNE site are rats (*Rattus* spp.), stoats (*Mustela erminea*), possums (*Trichosurus vulpecula*), feral goats (*Capra hircus*) and feral deer (*Cervus elaphus scoticus*).

Rats and stoats, thought to be present in moderate to high numbers within the KNE site are likely to be having the greatest impact on ecological values of all pest animals present as there is currently no targeted control of these species.



Possoms are generally present in very low numbers due to regular aerial control operations carried out in the past. If possum control is not ongoing it is likely that they will increase in numbers over time to levels that will significantly impact on forest health and regeneration.

Feral goats and deer also affect the natural regeneration of the forest by browsing on palatable plant species. Both goats and deer are thought to be present in low to moderate numbers as a result of control programmes that have been ongoing since 2005. However, reinvasion of goats and deer from adjacent Crown and private land where they are currently uncontrolled is ongoing.

Some park management and recreational activities have the potential to impact the ecological values of the KNE site if not undertaken in environmentally sensitive ways. Vehicle and walking tracks within the site require maintenance from time to time which could impact native plant and animal communities if not carried out in an appropriate manner. The harvesting of the commercial forests that neighbour the KNE site could damage native vegetation and stream health within the site if not undertaken appropriately. Other commercial activities such as film production and some recreational activities such as tramping and hunting may also impact the native biodiversity by damaging native flora, altering ecological processes or introducing ecological weeds. Some management and recreational activities also present the risks of fire, rubbish discharge, and pollution of soil and water through discharge of vehicle and machinery fluids.

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 4 presents a summary of all known threats to the Pākuratahi 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 4: Summary of all threats to ecological values present at the Pākuratahi 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 weed species for control include tradescantia ( <i>Tradescantia fluminensis</i> ), periwinkle ( <i>Vinca major</i> ) and pampas ( <i>Cortaderia selloana</i> and <i>C. jubata</i> ) (see full list in Appendix 4) | B, J and possibly other locations within the KNE site                   |
| EW-2             | Woody weed species displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. Key weed species include prickly hakea ( <i>Hakea sericea</i> ), buddleia ( <i>Buddleja davidii</i> ) and pine ( <i>Pinus contorta</i> and <i>P. radiata</i> ) (see full list in Appendix 4)  | A, F, G, H, I, K, L, M and possibly other locations within the KNE site |

| Threat code  | Threat and impact on biodiversity in the KNE site  | Operational area/location                                   |
|--------------|--|---|
| EW-3         | Climbing weeds smother and displace native vegetation often causing canopy collapse, inhibit indigenous regeneration, and alter vegetation structure and composition. Key weed species include Japanese honeysuckle ( <i>Lonicera japonica</i> ) and old man's beard ( <i>Clematis vitalba</i> ) (see full list in Appendix 4) | C, D, E, H and possibly other locations within the KNE site |
| Pest animals |  |   |
| PA-1         | Possums ( <i>Trichosurus vulpecula</i> ) browse palatable canopy vegetation until it can no longer recover <sup>29,30</sup> . This destroys the forest's structure, diversity and function. Possums may also prey on native birds <sup>31</sup> and invertebrates  | Entire KNE site   |
| PA-2         | 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 <sup>32</sup>  | Entire KNE site   |
| PA-3         | 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 <sup>33,34,35</sup>  | Entire KNE site   |
| PA-4*        | 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 <sup>36,37</sup>   | Entire KNE site   |
| PA-5*        | Mustelids (stoats <sup>38,39</sup> ( <i>Mustela erminea</i> ), ferrets <sup>40,41</sup> ( <i>M. furo</i> ) and weasels <sup>42,43</sup> ( <i>M. nivalis</i> )) prey on native birds, lizards and invertebrates, reducing their breeding success and potentially causing local extinctions                                      | Entire KNE site   |
| PA-6*        | Hedgehogs ( <i>Erinaceus europaeus</i> ) prey on native invertebrates <sup>44</sup> , lizards <sup>45</sup> and the eggs <sup>46</sup> and chicks of ground-nesting birds <sup>47</sup>  | Entire KNE site   |
| PA-7*        | 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 <sup>48,49</sup>  | Entire KNE site   |
| PA-8*        | Feral and domestic cats ( <i>Felis catus</i> ) prey on native birds <sup>50</sup> , lizards <sup>51</sup> and invertebrates <sup>52</sup> , reducing native fauna breeding success and potentially causing local extinctions <sup>53</sup>   | Unknown but may be present anywhere within the KNE site     |
| PA-9*        | Rabbits ( <i>Oryctolagus cuniculus</i> ) and hares ( <i>Lepus europaeus</i> ) graze on palatable native vegetation and prevent natural regeneration in some environments <sup>54</sup>   | Forest margins  |
| PA-10*       | 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 <sup>55</sup>   | Entire KNE site   |

| Threat code      | Threat and impact on biodiversity in the KNE site   | Operational area/location                                |
|------------------|---|--|
| PA-11*           | Feral pigs ( <i>Sus scrofa</i> ) root up the soil and eat roots, invertebrates, seeds and native plants preventing forest regeneration <sup>56</sup>  | Entire KNE site  |
| 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 <sup>57</sup>   | Pākuratahi river and its tributaries                     |
| 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 <sup>58,59</sup> | Entire KNE site  |
| PA-14*           | Australasian magpies are known to modify the behavior of native birds which could inhibit the ability of native birds to feed and breed freely  | Forest margins   |
| Human activities |   |  |
| HA-1             | Recreational use such as tramping, hunting, mountain biking and horse riding, and commercial activities such as film making can cause damage and disturbance of the native ecosystem. They can also disturb native fauna and introduce ecological weeds   | Entire KNE site  |
| HA-2             | Plantation forestry on land parcels adjoining 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  | In the vicinity of plantation forests and forestry roads |
| HA-3             | Management activities such as track development, pest control and ecological monitoring can damage and destroy 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-4             | Fire can be destructive to native flora and fauna and create conditions for pest plant invasion   | Entire KNE site  |
| HA-5*            | Barriers to native fish passage are present in streams within the KNE site preventing migrating fish from completing their life-cycle   | Pākuratahi river tributaries                             |

\*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 5), and are used to ensure that actions taken are targeted to specific threats. Maps of operational areas can be found in Appendix 1 (see Maps 4, 5 and 6).

## 8. 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 Pākuratahi KNE site.

1. **To improve the structure\* and function† of native plant communities**
2. **To improve the habitat for native birds**
3. **To protect threatened native forest plants (orchids)**
4. **To raise community awareness of the ecological values of the KNE site**
5. **To engage the community in management of the KNE site**

\* The living and non-living physical features of an ecosystem. This includes the size, shape, complexity, condition and the diversity of species and habitats within the ecosystem.

† The biological processes that occur in an ecosystem. This includes seed dispersal, natural regeneration and the provision of food and habitat for animals.

## 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 5).

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 aim of ecological weed control at the Pākuratahi KNE site is to reduce the density and slow the spread of ecological weeds. Ecological weed control has been undertaken in a coordinated approach since 2005. During this time, good progress has been made in reducing the density of weed infestations; however, follow up control is required at all previous control sites to ensure that ecological weeds do not regenerate. As progress and long lasting control is achieved in operational areas identified in approach 1 below, funding will be progressively reduced and increased for activities undertaken within approach 2 and 3. This will allow more focused searching for new weed infestations, rather than just surveillance, to be undertaken.

The following approaches are taken when planning and undertaking ecological weed control work to build on the progress that has been made to date:

#### 1. Multi-species control in targeted areas:

The ecological weeds listed in Table 9, Appendix 4, will be controlled at 10 different previous control sites within the KNE site (operational areas A-J, see Appendix 1, Map 4). The intention is to reduce infestations at these locations within the term of this plan, and eliminate them as soon as possible thereafter. All plants in identified infestations will be controlled annually before they set seed. This way the seed bank will be exhausted over time as existing seed germinates and resulting plants are

controlled prior to seeding. It is expected that all ecological weed control will be carried out using ground control methods.

## 2. Wilding pine control:

The initial control of a stand of *Pinus contorta* in Maire Stream catchment (operational area K, see Appendix 1, Map 4) which commenced in 2015, will be completed in 2017-18. Initially the drill and fill method of control was used to control trees in this stand; however, locating all trees from the ground has proved very difficult within the thick scrub resulting in many trees being missed. Therefore, the initial control stage will be completed using helicopter boom spraying. The operational area will then be checked for surviving and new *Pinus contorta* plants during year two and three of the plan.

Work on controlling wilding pines that are dispersed throughout a large part of the KNE site (operational area M, Appendix 1, Map 5) commenced in 2016. This work will continue by progressively moving control into new parts of the operational area, including within the Ladle Bend wetland during the first year of the plan. In the past this work has utilised the drill and fill method of control which avoids damage to surrounding native vegetation that felling would cause and allows native plants to regenerate and replace the poisoned trees as they gradually die and collapse. However, this work will become more difficult and time consuming as the work moves into more remote areas of the site. Therefore, aerial spraying using a single nozzle mounted on a helicopter or other precise aerial application method may also be used if precise and effective application can be achieved.

The stand of *Pinus contorta* near the Puffer Saddle at the north of the KNE site (operational area L) will not be controlled during the period of this plan unless additional funding becomes available.

## 3. Ad-hoc control outside of target areas:

All ecological weeds listed in Table 1, other than gorse and broom, will be controlled if discovered beyond the current operational areas. Such discoveries may be made by operational staff in the course of carrying out the above or other operational work, or by contractors or members of the public. The locations of new weed infestations will be recorded and ongoing control and surveillance of these infestations will be undertaken.

## 9.2. **Pest animal control**

The aim of pest animal control currently undertaken in the Pākuratahi KNE site is to reduce the density of possums, goats and deer to levels that will allow the recovery of the forest canopy and regeneration of the forest floor to occur. This is currently achieved through a combination of aerial 1080 poison control, targeted ground-based trapping and poisoning, and hunting. Predator control, targeting rats and mustelids over this scale of site and terrain is very difficult to achieve and expensive. Therefore, no targeted control of these high impact species is currently undertaken.

A possum population density under 5% RTC (residual trap catch) is desirable for maintaining forest canopy cover. This is currently being achieved throughout most of the KNE site (operational area N; see Appendix 1, Map 6) by control operations undertaken by OSPRI under their Tbfree programme. This programme is part of a

national strategy aiming to eradicate bovine tuberculosis from New Zealand. Possums being the main vector of bovine tuberculosis are controlled in areas where the disease has been found in wildlife or in cattle or deer herds, and the Pākuratahi KNE site is within one of these areas. Although the objectives of the TBfree programme are somewhat different to the biodiversity objectives of this plan, the possum control carried out under the TBfree programme is expected to deliver positive biodiversity outcomes and therefore it is not necessary for Greater Wellington to plan and fund any possum control in the area where OSPRI undertake their aerial operations. OSPRI's possum control operations will involve a combination of aeriably-sown 1080 (sodium fluoroacetate) and ground-based trapping and poisoning and are generally carried out at five-yearly intervals. It is likely that the next control operation will take place in 2018. This work will be wholly funded by OSPRI but is likely to require the input of a small amount of time by Greater Wellington staff to assist with planning and communications.

From 2007 until 2016, members of UHF&B controlled possums in a small part of the KNE site (operational area O; see Appendix 1, Map 6) which was excluded from OSPRI's past possum control operations. A small network of traps was operated to protect the rare podocarp-tawa forest located in this area at Tunnel Gully recreation area. UHF&B ceased their trapping as the number of possums being caught in the traps had reduced significantly, to the point that it was agreed that their efforts were better utilised on other activities elsewhere.

No targeted rat and mustelid (weasel, stoat and ferret) control will be undertaken in the KNE site as ground control over such a large and remote site is extremely difficult and expensive, and the alternative of frequent aerial operations isn't favoured by the community. However, monitoring at similar sites has shown that aerial 1080 operations used to target possums will also control these species to very low levels. This control is likely to be short-lived though, with populations returning to pre-control levels within 18 months<sup>60</sup>. Native plants and animals may still benefit to some degree in the long term from these periods of reduced threat.

Feral goats will be culled annually to reduce population numbers to very low levels. Culling will utilise a combination of ground-based and aerial hunting methods to target areas most frequented by the species. Forty days of ground-based hunting and two hours of aerial hunting are planned to be undertaken annually. Feral deer will also be targeted by aerial hunting and will be culled when encountered in the course of ground hunting. The aerial 1080 operation planned for 2018 may mean that it won't be possible to complete the full amount of ground hunting in either of the first two years of this plan due to the risk to hunting dogs. In this case more aerial hunting will be undertaken to make up for the reduced amount of ground hunting. "Judas" goats attached with radio tracking collars may be used to find mobs of goats, which will then be culled. Transportation of hunters to and from remote locations by helicopter will be used if required. An output target of no more than one goat per eight hours of ground-based hunting, or five goats per hour of helicopter hunting will be used for culling operations.

### 9.3. Park management

#### Environmental care

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

Biosecurity guidelines<sup>61</sup> will be used by all Greater Wellington personnel when entering and working in the KNE site. These guidelines involve checking for and removing seeds and plant fragments from vehicles, equipment and clothing before entering the site. Operators working in the adjacent plantation forests and needing to travel through the KNE site, such as silviculture crews, harvesters and trucking company personnel will also be requested to follow these guidelines.

Instructional information on how to avoid introducing ecological weeds and damage to ecological values will be included in the conditions contained in permits issued to private hunters, possum trappers and researchers entering the KNE site. Such information will also be provided to trampers when the opportunity arises.

#### Fire control

To reduce the risk of uncontrolled fires occurring in the KNE site, the present policy of no open fires will be continued. This policy is communicated to users through the park information brochure and the Parks Network Plan<sup>62</sup>. Wilderness camping is permitted with cooking on gas cookers only.

#### Managing 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. However, illegal collection of native plants and animals has occurred occasionally in the Parks. This has included some species of native tree, which are valued for domestic uses such as fence building and for firewood, some species of orchid, which are sought after by collectors and traders, and may have also included lizards and invertebrates. The Park Ranger will watch for this activity while carrying out normal duties within the Park.

#### Revegetation

From time to time revegetation may be undertaken in the KNE site as a result of community or corporate interest in assisting native habitat recovery, or as a result of the need to rehabilitate an area after management works. In the process of planning any revegetation, Parks and Biodiversity staff will work together to decide on appropriate locations for revegetation and the appropriate species for the location. Plant species will be selected from the indigenous plant species list contained in the Regional Forest Lands Resource Statement<sup>63</sup>. Planting guidance may be taken from the unpublished report "Pākuratahi Forest, plants recommended for amenity and/or restoration"<sup>64</sup>. Plant selection could favour threatened species or species uncommon within the site to increase numbers of these species. Examples of these are Kirk's daisy, raukawa (*Raukawa edgerleyi*) and southern rata (*Metrosideros umbellata*).

Additionally, species that are thought to have originally been present in the KNE site but have since been eliminated could also be used.

#### **9.4. Community engagement**

The purpose of community engagement is to raise awareness of the KNE site's ecological values and involve the community in management activities to protect those values. Information about the site's ecological values will be conveyed to the public during Greater Wellington Great Outdoors events held at the site. Articles regarding the site's ecological values will also be published in social and local print media when opportunities arise.



## 10. Operational delivery schedule

The operational delivery schedule shows the actions planned to achieve the stated objectives for the Pākuratahi KNE site, and their timing and cost over the three-year period from 1 July 2017 to 30 June 2020. The budget for the 2018/19 and 2019/20 years are indicative only and subject to change. Maps of operational areas can be found in Appendix 1 (see Maps 3, 4 and 5).

**Table 5: Three-year operational delivery schedule for the Pākuratahi KNE site**

| Objective | Threat               | Activity                | Operational area       | Delivery                    | Description/detail  | Target                                   | Timetable and resourcing |         |         |
|-----------|----------------------|-------------------------|------------------------|-----------------------------|---|--|--------------------------|---------|---------|
|           |                      |                         |                        |                             |   |  | 2017/18                  | 2018/19 | 2019/20 |
| 1,2,3     | EW-1<br>EW-2<br>EW-3 | Ecological weed control | A, B, C, D, E, F, G, H | GWRC Biosecurity department | Check for and control hakea, tradescantia, periwinkle, Japanese honeysuckle, pampas, old man's beard and buddleia at historic infestation sites | All plants controlled                    | \$7,000                  | \$6,500 | \$6,000 |
| 1,2       | EW-2                 | Ecological weed control | I                      | GWRC Biosecurity department | Check for and control gorse and broom on the Climie ridgeline (North Climie to Climie No 2)   | All plants controlled                    | \$1,000                  | \$500   | \$500   |
| 1,2       | EW-1                 | Ecological weed control | J                      | GWRC Biosecurity department | Check for and control perennial nettle at the summit yards  | All plants controlled                    | \$700*                   | \$700*  | \$700*  |
| 1,2       | EW-2                 | Ecological weed control | K                      | GWRC Biosecurity department | Aerial boom spray <i>Pinus contorta</i> stand in year 1, and check for and control all surviving plants in years 2 and 3                        | Site inspected and all plants controlled | \$11,000**               | \$1,000 | \$1,000 |
| 1,2,3     | EW-2                 | Ecological weed control | M                      | GWRC Biosecurity department | Control wilding pines ( <i>P. radiata</i> , <i>P. contorta</i> and <i>P. nigra</i> ), including within the Ladle Bend wetland in year 1         | Reduction in distribution                | \$4,000                  | \$4,000 | \$4,000 |

| Objective | Threat               | Activity                | Operational area | Delivery  | Description/detail  | Target  | Timetable and resourcing |          |          |
|-----------|----------------------|-------------------------|------------------|---|---|---|--------------------------|----------|----------|
|           |                      |                         |                  |   |   |   | 2017/18                  | 2018/19  | 2019/20  |
| 1,2,3     | EW-1<br>EW-2<br>EW-3 | Ecological weed control | Entire KNE site  | GWRC Biosecurity department   | Control hakea, tradescantia, periwinkle, Japanese honeysuckle, pampas, old man's beard, buddleia, cotoneaster, hawthorn, holly, willow and any other invasive ecological weeds discovered through surveillance, searches and casual observations by staff, contractors or members of the public | Reduction in distribution   | \$1,000                  | \$1,000  | \$1,500  |
| 1,2,3     | PA-1                 | Pest animal control     | N                | OSPRI   | Control possums using aerial 1080, bait stations and traps  | Maintain possum population to below 5% RTC†   | Funded by OSPRI          | Nil      | Nil      |
| 1,2,3     | PA-2<br>PA-3         | Pest animal control     | Entire KNE site  | GWRC Biosecurity department   | Control goats and deer, focussing on preferred habitats, using ground-based and aerial methods: 40 days ground hunting (goats) two hours aerial hunting (goats and deer)  | Maintain goat populations to below 1 animal culled/hunter day or 5 animals culled/helicopter hunting hour | \$20,300                 | \$20,300 | \$20,300 |
| 1,2,3     | HA-1                 | Park Management         | Entire KNE site  | GWRC Parks, Biodiversity, Biosecurity & Environmental Science departments | Ensure ecological weed biosecurity guidelines are adhered to while carrying out all management activities   | Guidelines available and adhered to in all cases  | Nil                      | Nil      | Nil      |

| Objective | Threat | Activity        | Operational area            | Delivery   | Description/detail   | Target  | Timetable and resourcing |         |         |
|-----------|--------|-----------------|-----------------------------|--|--|---|--------------------------|---------|---------|
|           |        |                 |                             |  |  |   | 2017/18                  | 2018/19 | 2019/20 |
| 1,2,3     | HA-2   | Park Management | Plantation forestry margins | GWRC Parks & Biodiversity departments                        | Request commercial forestry operators to follow ecological weed biosecurity guidelines   | Guidelines supplied to commercial forestry operators                          | Nil                      | Nil     | Nil     |
| 1,2,3,4   | HA-3   | Park Management | Entire KNE site             | GWRC Biodiversity & Parks departments                        | Include instructional information on how to avoid introducing ecological weeds and damage to ecological values with all permits issued to hunters, trappers and researchers, and provide this information to trampers when opportunities arise | Information disseminated to all permit holders, and to trampers when possible | Nil                      | Nil     | Nil     |
| 1,2,3,4   | HA-4   | Park Management | Entire KNE site             | GWRC Parks department  | Environmental impact assessment procedures are adhered to when carrying out construction and maintenance of assets, and when allowing potentially impacting use by others  | Procedures available and adhered to in all cases                              | Nil                      | Nil     | Nil     |
| 4,5       |        | Park Management | Entire KNE site             | GWRC Parks, Biodiversity and Customer Engagement departments | Incorporate biodiversity information into community events and media   | Increased community awareness of the values of the KNE site                   | Nil                      | Nil     | Nil     |
| 1,2,3     | HA-6   | Park Management | Entire KNE site             | GWRC Parks and Customer Engagement departments               | Continue to communicate policy of no open fires being allowed in the KNE site through the park brochure and signage  | No human induced wild fires occur   | Nil                      | Nil     | Nil     |

| Objective    | Threat | Activity        | Operational area | Delivery              | Description/detail  | Target                       | Timetable and resourcing |                 |                 |
|--------------|--------|-----------------|------------------|-----------------------|---|------------------------------|--------------------------|-----------------|-----------------|
|              |        |                 |                  |                       |   |                              | 2017/18                  | 2018/19         | 2019/20         |
| 1,2,3        | HA-7   | Park Management | Entire KNE site  | GWRC Parks department | Park Ranger is alert to illegal plant and animal collecting activities during patrols | No illegal collection occurs | Nil                      | Nil             | Nil             |
| <b>Total</b> |        |                 |                  |                       |   |                              | <b>\$34,000</b>          | <b>\$34,000</b> | <b>\$34,000</b> |

\* Funded by Greater Wellington Biosecurity department as the species is a total control species listed in the Regional Pest Management Strategy (RPMS)<sup>65</sup>

\*\* Funding for this activity has been provided by NZTA via OPUS NZ to provide mitigation for environmental impacts sustained as a result of improvements to SH2 adjacent to the KNE site

† 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.

## 11. Funding contributions

### 11.1. Budget allocated by Greater Wellington

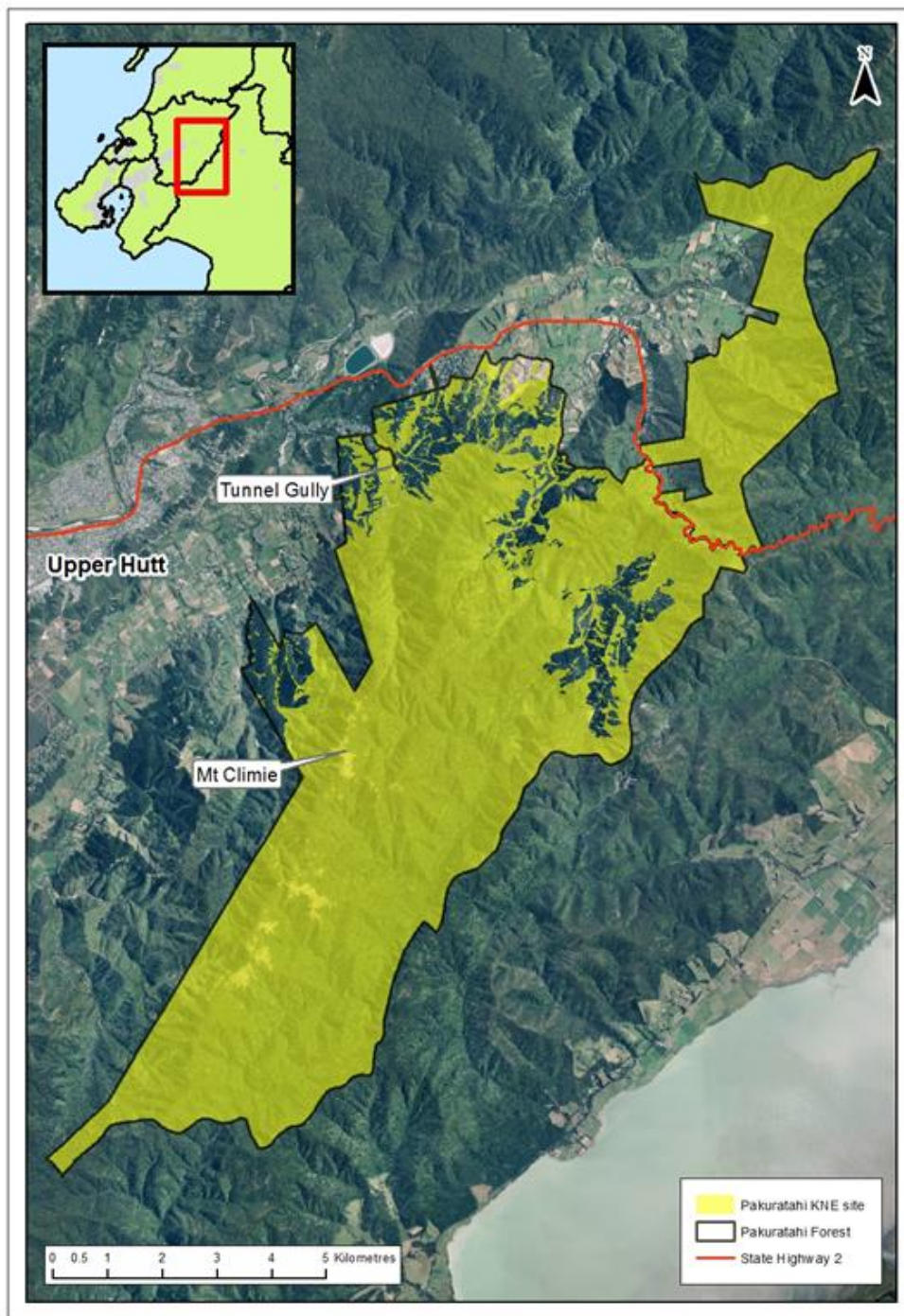
The budget for the 2018/19 and 2019/20 years are indicative only and subject to change.

**Table 6: Greater Wellington allocated budget for the Pākuratahi KNE site**

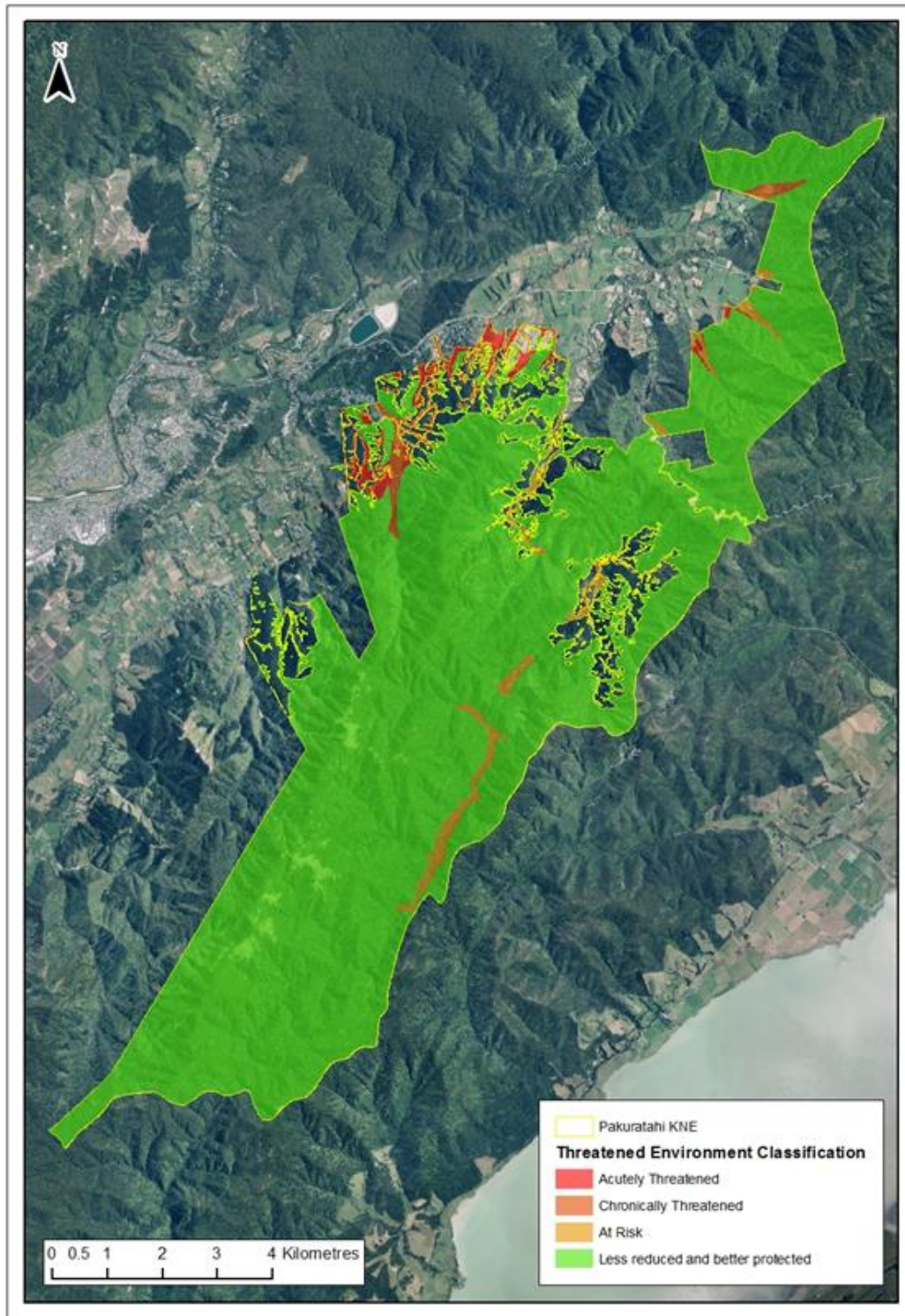
| Management activity     | Timetable and resourcing |                 |                 |
|-------------------------|--------------------------|-----------------|-----------------|
|                         | 2017/18                  | 2018/19         | 2019/20         |
| Ecological weed control | \$13,700*                | \$13,700*       | \$13,700*       |
| Pest animal control     | \$20,300                 | \$20,300        | \$20,300        |
| <b>Total</b>            | <b>\$34,000</b>          | <b>\$34,000</b> | <b>\$34,000</b> |

\* \$700 funded by Greater Wellington Biosecurity department as part of RPMS total control species programme

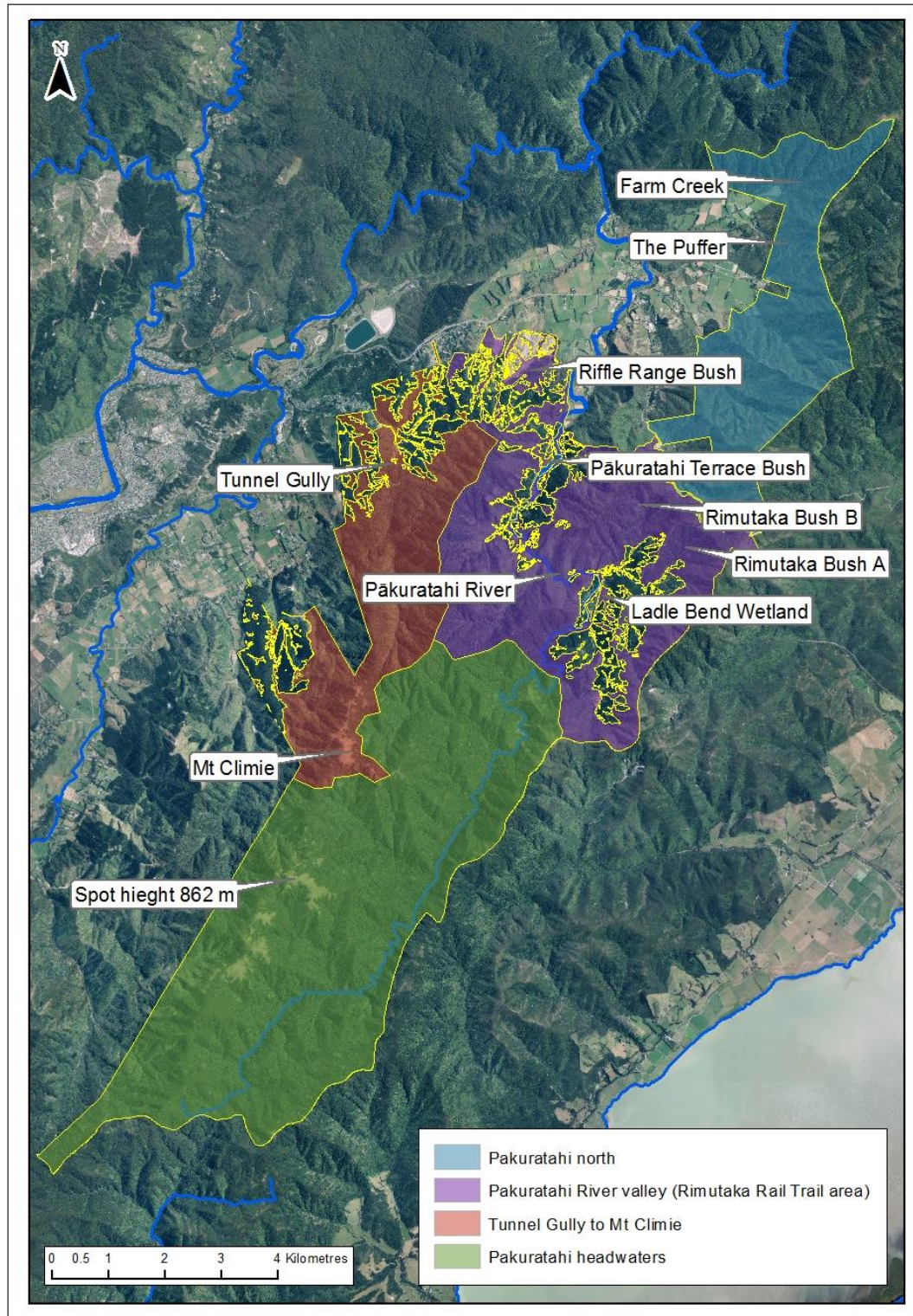
## Appendix 1: Site maps



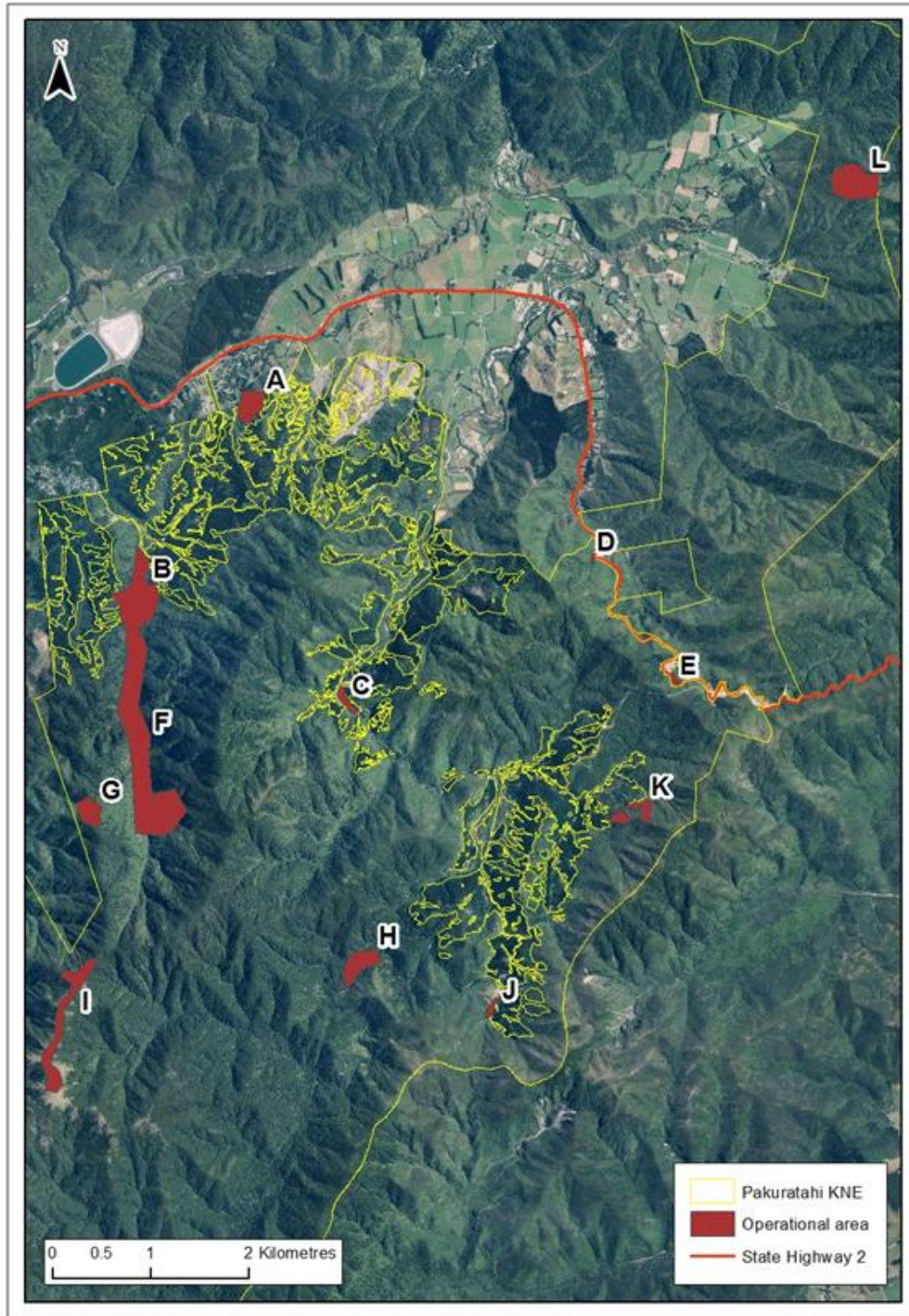
Map 1: Pākūratahi KNE site boundary. The Pākūratahi KNE site does not include areas of commercial exotic forest located within Greater Wellington's Pākūratahi Forest management area



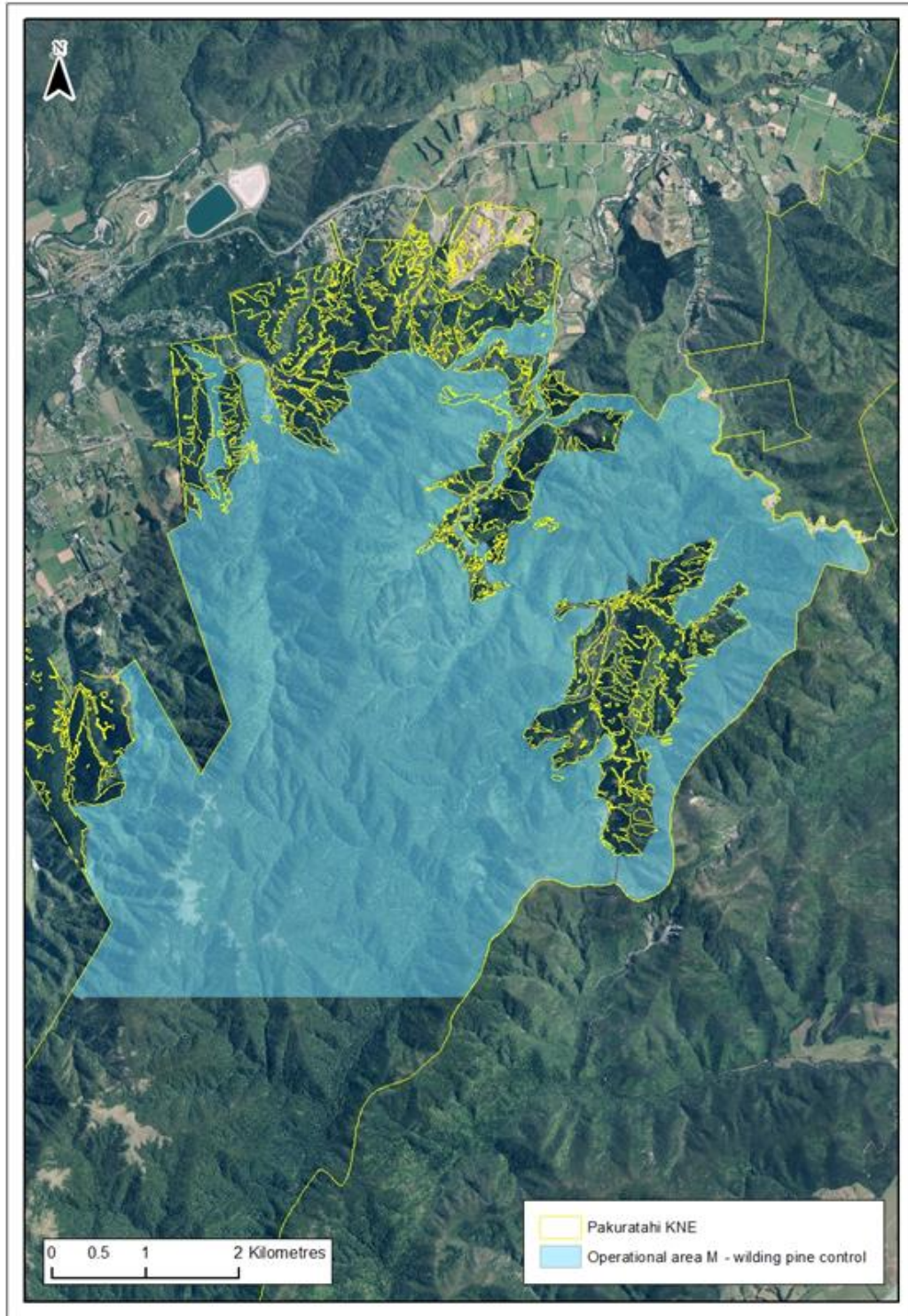
Map 2: Land Environment New Zealand threat classifications for the Pākuratahi KNE site



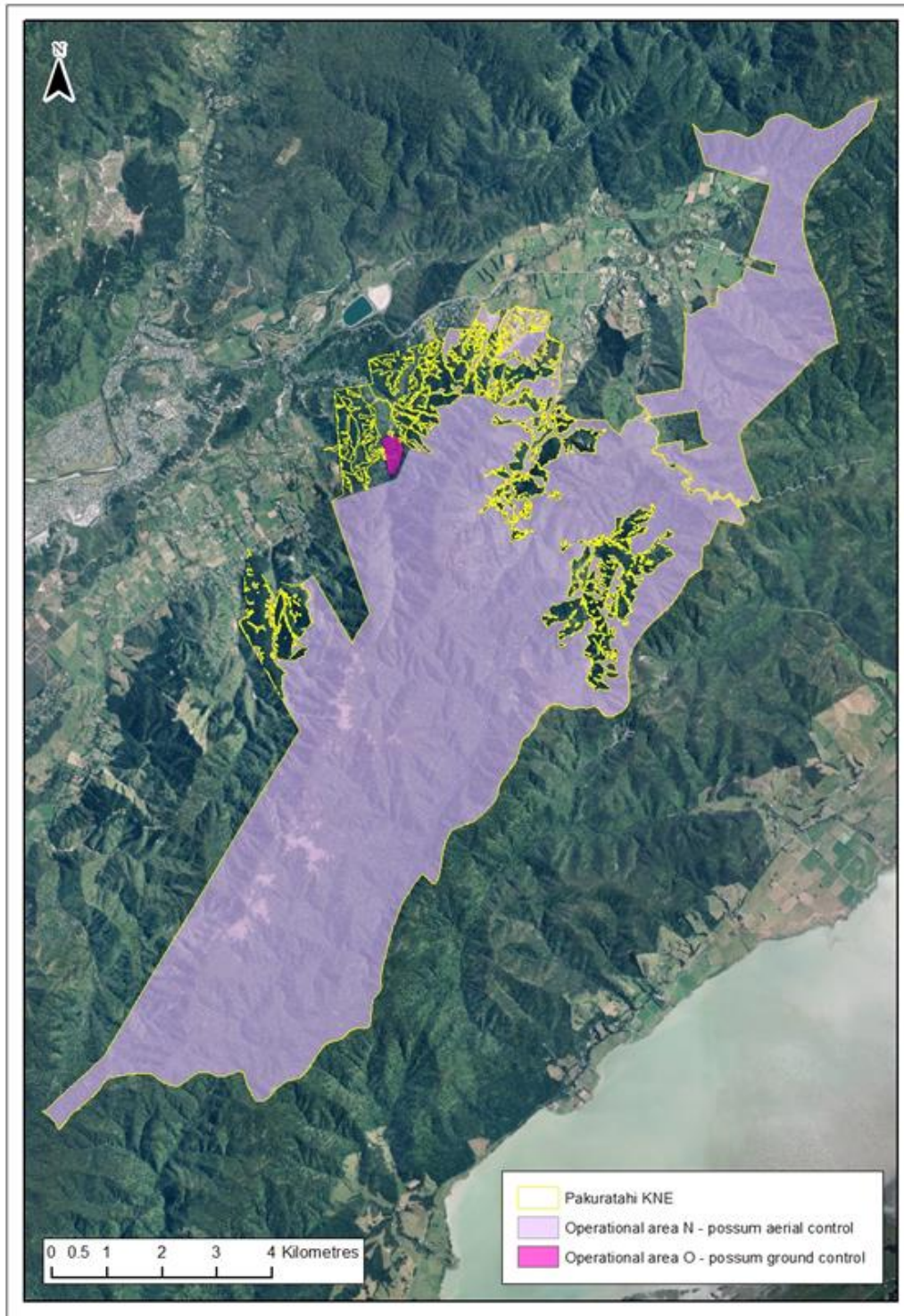




Map 4: Operational areas A to L for ecological weed control in the Pākuratahi KNE site



Map 5: Operational area M for wilding pine control in the Pākuraahi KNE site



Map 6: Operational areas N and O for possum control in the Pākuratahi KNE site

## 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 three-year cycle<sup>66</sup>. 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 Pākuratahi KNE site.

**Table 7: Threatened and At Risk species at the Pākuratahi KNE site**

| Scientific name                                | Common name             | Threat status                      | Source  |
|--|-------------------------|------------------------------------|---|
| Plants (vascular) <sup>67</sup>                |                         |                                    |   |
| <i>Brachyglottis kirkii</i> var. <i>kirkii</i> | Kohurangi/Kirk's daisy  | At Risk– Declining                 | GWRC 2008 <sup>68</sup>   |
| <i>Peraxilla colensoi</i>                      | Red mistletoe           | At Risk– Declining                 | GWRC 2008   |
| <i>Peraxilla tetrapetala</i>                   | Pirirangi/red mistletoe | At Risk– Declining                 | GWRC 2008   |
| <i>Pterostylis foliata</i>                     | greenhood               | At Risk – Naturally uncommon       | GWRC 2008   |
| <i>Pterostylis tasmanicum</i>                  | Plumed orchid           | Threatened – Nationally Vulnerable | GWRC 2008   |
| <i>Teucrium parvifolium</i>                    |                         | At Risk– Declining                 | GWRC 2008   |
| Birds <sup>69</sup>                            |                         |                                    |   |
| <i>Acanthisitta chloris</i>                    | Rifleman                | At Risk– Declining                 | <a href="http://ebird.org/content/newzealand/">http://ebird.org/content/newzealand/</a> (accessed 22/01/2014) |
| <i>Anthus novaeseelandiae</i>                  | New Zealand pipit       | At Risk– Declining                 | <a href="http://ebird.org/content/newzealand/">http://ebird.org/content/newzealand/</a> (accessed 22/01/2014) |
| <i>Eudynamis taitensis</i>                     | Long-tailed cuckoo      | At Risk– Naturally Uncommon        | <a href="http://ebird.org/content/newzealand/">http://ebird.org/content/newzealand/</a> (accessed 22/01/2014) |
| <i>Falco novaeseelandiae</i>                   | New Zealand falcon      | Threatened – Nationally vulnerable | <a href="http://ebird.org/content/newzealand/">http://ebird.org/content/newzealand/</a> (accessed 22/01/2014) |
| Reptiles <sup>70</sup>                         |                         |                                    |   |
| <i>Naultinus punctatus</i>                     | Barking gecko           | At Risk– Declining                 | GWRC Reptile distribution database  |
| Freshwater fish <sup>71</sup>                  |                         |                                    |   |
| <i>Anguilla dieffenbachii</i>                  | Longfin eel             | At Risk– Declining                 | GWRC NZ Freshwater Fish database  |
| <i>Galaxias brevipinnis</i>                    | Kōaro                   | At Risk– Declining                 | GWRC NZ Freshwater Fish database  |

| Scientific name             | Common name    | Threat status      | Source                           |
|-----------------------------|----------------|--------------------|----------------------------------|
| <i>Galaxias divergens</i>   | Dwarf galaxias | At Risk– Declining | GWRC NZ Freshwater Fish database |
| <i>Gobiomorphus huttoni</i> | Redfin bully   | At Risk– Declining | GWRC NZ Freshwater Fish database |

### Appendix 3: Regionally threatened plant species list

The following table lists regionally threatened species that have been recorded in the Pākūratahi KNE site. Native plant species have been identified in the Plant Conservation Strategy, Wellington Conservancy 2004-2010<sup>72</sup>.

**Table 8: Regionally threatened plant species recorded in the Pākūratahi KNE site**

| Scientific name                                | Common name                      | Threat status   | Observation             |
|--|----------------------------------|-----------------|-------------------------|
| Plants   |                                  |                 |                         |
| <i>Brachyglottis kirkii</i> var. <i>kirkii</i> | Kohurangi/Kirk's daisy           | Declining       | GWRC 2008 <sup>73</sup> |
| <i>Carex flaviformis</i>                       |                                  | Sparse          | GWRC 2008               |
| <i>Cyathea cunninghamii</i>                    | Punui/gully tree fern            | Sparse          | GWRC 2008               |
| <i>Hoheria</i> aff. <i>sexstylosa</i>          | Houhere/hoheria                  | Data deficient  | GWRC 2008               |
| <i>Ileostylus micranthus</i>                   | Pirinoa/small-flowered mistletoe | Gradual decline | GWRC 2008               |
| <i>Korthalsella lindsayi</i>                   | Dwarf mistletoe                  | Sparse          | GWRC 2008               |
| <i>Lindsaea linearis</i>                       |                                  | Gradual decline | GWRC 2008               |
| <i>Lycopodiella lateralis</i>                  |                                  | Data deficient  | GWRC 2011 <sup>74</sup> |
| <i>Mida salicifolia</i>                        | Maire-taiki/willow-leaved maire  | Sparse          | GWRC 2008               |
| <i>Peraxilla colensoi</i>                      | Red mistletoe                    | Critical        | GWRC 2008               |
| <i>Peraxilla tetrapetala</i>                   | Pirirangi/red mistletoe          | Critical        | GWRC 2008               |
| <i>Pimelea gnidia</i>                          |                                  | Data deficient  | GWRC 2008               |
| <i>Pittosporum cornifolium</i>                 | Tawhirikaro/perching kohukohu    | Sparse          | GWRC 2008               |
| <i>Pterostylis cardiostigma</i>                | Greenhood                        | Sparse          | GWRC 2008               |
| <i>Pterostylis foliata</i>                     | Greenhood                        | Sparse          | GWRC 2008               |
| <i>Raukawa edgerleyi</i>                       | Raukawa/raukawa                  | Sparse          | GWRC 2008               |
| <i>Teucrium parvifolium</i>                    |                                  | Gradual decline | GWRC 2008               |

## Appendix 4: Ecological weed species

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

**Table 9: Ecological weed species recorded in the Pākuratahi KNE site**

| Scientific name                                 | Common name          | Weed type    |
|---|----------------------|--------------|
| <i>Buddleja davidii</i>                         | Buddleia             | woody        |
| <i>Clematis vitalba</i>                         | Old man's beard      | climber      |
| <i>Cortaderia selloana</i> and <i>C. jubata</i> | Pampas               | ground cover |
| <i>Cotoneaster glaucophyllus</i>                | Cotoneaster          | woody        |
| <i>Crataegus monogyna</i>                       | Hawthorn             | woody        |
| <i>Cytisus scoparius</i>                        | Broom                | woody        |
| <i>Hakea sericea</i>                            | Prickly hakea        | woody        |
| <i>Ilex aquifolium</i>                          | Holly                | woody        |
| <i>Lonicera japonica</i>                        | Japanese honeysuckle | climber      |
| <i>Pinus contorta</i>                           | Lodgepole pine       | woody        |
| <i>Pinus nigra</i>                              | Corsican pine        | woody        |
| <i>Pinus radiata</i>                            | Radiata pine         | woody        |
| <i>Salix</i> spp.                               | Willow               | woody        |
| <i>Tradescantia fluminensis</i>                 | Tradescantia         | ground cover |
| <i>Ulex europaeus</i>                           | Gorse                | woody        |
| <i>Urtica dioica</i> subsp. <i>Dioica</i>       | Perennial nettle     | ground cover |
| <i>Vinca major</i>                              | Periwinkle           | ground cover |

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