

Key Native Ecosystem Operational Plan for Akatarawa Forest

2019-2024



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1. Purpose

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

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

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

2. Policy Context

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

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

Long Term Plan

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

Proposed Natural Resources Plan

The Proposed Natural Resources 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 Akatarawa Forest Park as a whole is guided by the Greater Wellington Parks Network Plan (PNP)³. This plan guides the recreational and amenity uses of Akatarawa Forest as well as identifying opportunities to protect biodiversity values.

Greater Wellington Biodiversity Strategy

The Greater Wellington Biodiversity Strategy⁴ (the Strategy) is an internal document that sets a framework that guides how Greater Wellington protects and manages biodiversity in the Wellington region to work towards the Vision.

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

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

Goal One
Areas of high biodiversity value are protected or restored

3. The Key Native Ecosystem Programme

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

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

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

A site must be identified as ecologically significant using the above criteria and be considered “sustainable” for management in order to be considered for inclusion in the KNE Programme. “Sustainable” for the purposes of the KNE Programme is defined as: a site where the key ecological processes remain intact or continue to influence the site and resilience of the ecosystem is likely under some realistic level of management. KNE sites can be located on private or publicly owned land. However, land managed by the Department of Conservation (DOC) is generally excluded from this programme.

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

4. Akatarawa Forest Key Native Ecosystem site

The Akatarawa Forest KNE site is a large area (12,400 ha) of mature and regenerating native forest located on hill country at the southern end of the Tararua Range between Upper Hutt and Paraparaumu (see Appendix 1, Map 1).

The KNE site contains a mosaic of indigenous forest, natural wetlands and sub-alpine ecosystems and, also includes the headwaters of the Whakatikei River, Akatarawa River West and Maungakōtutuku Stream. The KNE site is important regionally for its diversity of floral communities and supports a number of threatened flora.

The KNE site includes all the indigenous parts of the Akatarawa Forest, which is managed as a future water collection area by Greater Wellington and a private block on the eastern boundary of the KNE site that is contiguous with the Akatarawa Forest itself.

5. Parties involved

5.1. Landowners

Most of the land within the KNE site is owned by Greater Wellington and is managed primarily as a future water collection area by the Greater Wellington Parks department (see Appendix 1, Map 2). Greater Wellington manages Akatarawa Forest under the Local Government Act 2002 and the Wellington Regional Water Board Act 1972. Akatarawa Forest is part of the regional parks network and its management is guided by the PNP⁵.

As a future water collection area, the forest is primarily managed to ensure that the water resource remains stable, fresh and clean. Secondary considerations are to protect native forest vegetation, manage production forestry, and offers a range of back-country recreational experiences (including motorised recreation)⁶. This KNE operational plan is consistent with the wider objectives and policies of the PNP.

Fifty-seven hectares of the KNE site are privately owned by Martin Bradley who permits access to this land for ecological weed and pest animal control.

5.2. Operational delivery

Within Greater Wellington, the Biodiversity, Biosecurity, and Parks departments are responsible for delivering the KNE operational plan. The Biodiversity department is the over-arching lead department for Greater Wellington on the development and planning of biodiversity management 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.

OSPRI's TBfree programme is scheduled to be undertaken within this area. 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 Akatarawa Forest 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.

5.3. Mana whenua partners

Ngāti Toa Rangatira (Ngāti Toa), Taranaki Whānui ke te Upoko o te Ika a Maui (Taranaki Whānui) and Te Ātiawa ki Whakarongotai are Greater Wellington's mana whenua partners at Akatarawa Forest KNE site. 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.

The majority of the KNE site is recognised in Schedule D of the PNRP as a Statutory Acknowledgement Area for Ngāti Toa⁷ and Taranaki Whānui⁸ as the KNE site contains the headwaters and tributaries of the Hutt River (Te Awa Kairangi). The river is also recognised in Schedule B as Ngā Taonga Nui a Kiwa for Wai Māori for Ngāti Toa⁹ and Taranaki Whānui¹⁰.

Te Atiawa ki Whakarongotai (TAKW) also have an association to with the site as part of it is within their rohe. We acknowledge that TAKW have huge demands on their time and recognise they have been unable to contribute to the plan and we look forward to future opportunities to engage with them.

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 site
- ensure people working in KNE sites understand the requirements of the Accidental Discovery Protocol
- endeavour to ensure that Ngāti Toa, Taranaki Whānui and Te Ātiawa ki Whakarongotai values for the site are protected

5.4. Stakeholders

Though the majority of the KNE site is within Upper Hutt City Council, the Kāpiti Coast District Council (KCDC) has an interest in the management of the KNE site as part of the Wainui catchment, which supplies water for Paekākāriki, lies within the KNE site.

Recreational activities are popular within the KNE site including mountain biking, walking/tramping, horse riding, running, four wheel driving, quad biking, trail biking, hunting, fishing, and nature study.

Motorised recreation is particularly popular and Greater Wellington is working closely with the Akatarawa Recreational Access Committee and has a Memorandum of Understanding and track assessment protocol that guides the relationship and activities.

Transpower New Zealand as several high-voltage AC transmission lines in the KNE site.

6. Ecological values

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

6.1. Ecological designations

Table 1, below, lists ecological designations at all or part of the Akatarawa KNE site.

Table 1: Designations at the Akatarawa KNE site

Designation level	Type of designation
Regional	<p>Parts of the KNE site are designated under Greater Wellington's proposed Natural Resources Plan (PNRP) as Ecosystems and habitats with significant indigenous biodiversity values;</p> <ul style="list-style-type: none"> • Akatarawa River and all tributaries; High macroinvertebrate community health, Migratory fish & threatened and At-Risk fish (Schedule F1) • Whakatikei River and all tributaries; High macroinvertebrate community health (Schedule F1) • Whakatikei Headwater swamp; significant natural wetland (Schedule F3) • Martin's River wetland; significant natural wetland (Schedule F3) • Whakatikei wetland (also known as Drapers Flats) ; significant natural wetland (Schedule F3) <p>Parts of the KNE site are designated under Greater Wellington's proposed Natural Resources Plan (PNRP) as an important trout fishery rivers and spawning waters (Schedule I):</p> <ul style="list-style-type: none"> • Akatarawa River • Akatarawa River West • Whakatikei River
District	<p>Some parts of the KNE site have been identified within KCDC's District Plan Heritage register (E17):</p> <ul style="list-style-type: none"> • Upper Akatarawa Valley • Akatarawa, West Deep Creek, Plateau • Mt Maunganui • Mt Wainui summit

6.2. Ecological significance

The 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, including several naturally uncommon ecosystems
- 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 bird species within the KNE site

Representativeness

The Threatened Environment Classification system¹¹ indicates that parts 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 Zealand¹². Areas that are identified as Acutely and Chronically Threatened are mostly located on river terraces. Areas identified as At Risk are located on lower slopes and low ridge lines (see Appendix 1, Map 3).

The Singers and Rogers (2014)¹³ classification of pre-human vegetation indicates the Akatarawa Forest was comprised of a number of differing forest types. Most forest types are fairly well represented still in the wellington region. However, there is only 2%, 15%, and 22% of the pre-human extents of forest types tōtara, mataī, ribbonwood forest (WF2), kohekohe, tawa forest (MF6), and tawa, kāmahi, podocarp forest (MF7) remaining in the Wellington region respectively, making them Threatened ecosystem types¹⁴.

Several wetlands exist within the KNE site. Wetlands are now considered an uncommon habitat type in the Wellington Region with less than 3% remaining of their original extent¹⁵. Two wetlands (Whakatikei Headwater and Martin's River) within the KNE site have been considered of National Importance for Biodiversity.

Rarity/distinctiveness

Several naturally uncommon ecosystem types are present within the KNE site. These include two ephemeral wetlands (a Naturally Uncommon ecosystem type¹⁶ classified as Critically Endangered¹⁷). Freshwater wetlands are a naturally rare habitat type in the Wellington region¹⁸.

The KNE site offers support and protection to a number of nationally and regionally threatened species. According to New Zealand's national threat classification system¹⁹ One Threatened, eight At Risk, one Data Deficient, and nine regionally threatened plant species have been recorded in the KNE site. The site also provides habitat for one Threatened and five At Risk bird species, and one Threatened and seven At Risk freshwater fish species. Nationally Threatened and At Risk species are listed in Appendix 2 and regionally threatened plant species are listed in Appendix 3.

Diversity

The Singers and Rogers (2014)²⁰ classification of pre-human vegetation indicates the Akatarawa Forest was comprised of a number of differing forest types; kāmahī, broadleaved, podocarp forest (MF8), tawa, kāmahī, podocarp forest (MF7), hard beech forest (MF20), red beech, podocarp forest (CLF9), red beech, silver beech forest (CLF10), Hall's tōtara, pāhautea, kāmahī forest (CDF4), kohekohe, tawa forest (MF6), and tōtara, mataī, ribbonwood forest (WF2). Whilst, The Akatarawa Forest has been modified by selective logging and fires, there are still valuable aspects of these ecosystem types still present today. In addition to the forested ecosystems present natural wetlands, riverine, fernlands and subalpine habitats are also present adding to the habitat mosaic and diversity.

The resultant mosaic of old-growth forest, regenerating forest, shrublands, wetlands, rivers, fernlands and subalpine habitats has created a variety of habitats and ecotones supporting a high diversity of flora and fauna.

Ecological context

The size of the Akatarawa forest as an intact and highly diverse ecosystem well connected to the Tararua ranges means that it supports a wide variety of native birds.

6.3. Ecological features

The Akatarawa Forest KNE site is located within the Tararua Ecological District²¹. The KNE site is characterised by steep, dissected hill country (altitudinal range c.60-722 m asl), high rainfall (1,700-2,400 mm rainfall per annum in the valleys) and strong westerly winds. Several fault lines run through the site in a north-easterly direction. The underlying geology is greywacke and the hilltops are remnants of an eroded peneplain which are now covered in a layer of loess.

Habitats (inc. vegetation communities and plants)

Forests

The forests are dominated by tawa (*Beilschmiedia tawa*) with emergent rimu (*Dacrydium cupressinum*) and northern rātā (*Metrosideros robusta*) up to 400 m above sea level (asl), kamahi (*Weinmannia racemosa*) and hīnau (*Elaeocarpus dentatus*) up to 550 m asl, and kāmahī, Hall's tōtara (*Podocarpus totara*) and miro (*Prumnopitys ferruginea*) above 550 m asl. Hard beech (*Fuscospora truncata*) is present at some sites, usually on poorer soils or in association with rātā-rimu-hīnau-kāmahī forest²². The montane miro-kāmahī cloud forest and Hall's tōtara-kāmahī forest present in the site are regionally uncommon habitat types. Smaller areas of indigenous fernland, shrubland are also present, with subalpine vegetation noted above the tree-line where bush tussock and *Astelia* spp. are present.

Within these forests are New Zealand's two largest recorded northern rata (*Metrosideros robusta*) trees, both with trunk diameters of nearly 5 m.

Rivers

The KNE site contains the headwaters of the Whakatikei River and the West Akatarawa River. Both of these large gravel-bed rivers flow into Te Awa Kairangi (Hutt River). The smaller Maungakotukutuku Stream forms the KNE site's north-western boundary and drains the north-western slopes, before flowing into the Waikanae River.

Wetlands

Four wetlands occur within the KNE site. Three of these wetlands, Whakatikei Wetland (also known as Drapers Flats), Martin's River Wetland and Whakatikei Headwater Swamp are identified as significant natural wetlands in the Proposed Natural Resources Plan for the Wellington Region²³. The latter two of these have also been identified as wetlands of national importance for biodiversity²⁴. Kahikatea (*Dacrydium dacrydioides*) swamp forest, which is present in these wetlands, is a regionally uncommon ecosystem type.

Species

Birds

Targeted bird monitoring is not undertaken within the Akatarawa Forest, however incidental sightings have noted twenty indigenous bird species in the KNE site. These include New Zealand falcon (*Falco novaeseelandiae*), red-crowned parakeet (*Cyanoramphus novaezelandiae*), bellbird (*Anthornis melanura*), whitehead (*Mohoua albicilla*), kererū (*Hemiphaga novaeseelandiae*) and rifleman (*Acanthisitta chloris granti*).

Reptiles (herpetofauna)

Few studies of reptiles have been completed in the Akatarawa Forest and no reptiles have been confirmed present, however it is likely that ngahere gecko (*Mokopirirakau* 'southern North Island')²⁵ are present in the KNE.

Fish and kōura/crayfish

Seven indigenous freshwater fish species and kōura (*Paranephrops planifrons*) have been recorded in the KNE site. Species of fish recorded include longfin eel (*Anguilla dieffenbachii*), lamprey (*Geotria australis*), kōaro (*Galaxias brevipinnis*), dwarf galaxias (*Galaxias divergens*), giant kōkopu (*Galaxias argenteus*), bluegill bully (*Gobiomorphus hubbsi*), redfin bully (*Gobiomorphus huttoni*), and torrentfish (*Cheimarrichthys fosteri*)^{26,27}.

Invertebrates

No studies of invertebrates have been completed in the Akatarawa Forest, but land snails; Charopidae sp. 43 (NMNZ M.126198) and Charopidae sp. 226 (NMNZ M.115260)²⁸ and common insects such as cicada and stick insects are known from incidental sightings.

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

Pest animals that could have the greatest potential impact on the ecological values of Akatarawa Forest KNE site are possums (*Trichosurus vulpecula*), feral goats (*Capra hircus*), feral deer (*Cervus elaphus scoticus*), feral pigs (*Sus scrofa*), stoats (*Mustela erminea*) and rats (*Rattus* spp.).

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 2 presents a summary of all known threats to the 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 2: Summary of all threats to ecological values present at the Akatarawa Forest 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>) and Montbretia (<i>Crocsmia × crocosmiiflora</i>) (see full list in Appendix 4)	A-G
EW-2	Woody weed species displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. Key weed species include Buddleia (<i>Buddleia davidii</i>) and Gorse (<i>Ulex europaeus</i>) (see full list in Appendix 4)	A-G
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 Old man's beard (<i>Clematis vitalba</i>) (see full list in Appendix 4)	A-G
Pest animals		
PA-1	Possums (<i>Trichosurus vulpecula</i>) browse palatable canopy vegetation until it can no longer recover ^{29,30} . This destroys the forest's structure, diversity and function. Possums may also prey on native birds and invertebrates ³¹	H-J
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 ^{32,33}	H-J
PA-3*	Mustelids (stoats ^{34,35} (<i>Mustela erminea</i>), ferrets ^{36,37} (<i>M. furo</i>) and weasels ^{38,39} (<i>M. nivalis</i>)) prey on native birds, lizards and invertebrates, reducing their breeding success and potentially causing local extinctions	H-J

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
PA-4*	Hedgehogs (<i>Erinaceus europaeus</i>) prey on native invertebrates ⁴⁰ , lizards ⁴¹ and the eggs ⁴² and chicks of ground-nesting birds ⁴³	H-J
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 ^{44,45}	H-J
PA-6*	Feral, stray and domestic cats (<i>Felis catus</i>) prey on native birds ⁴⁶ , lizards ⁴⁷ and invertebrates ⁴⁸ , reducing native fauna breeding success and potentially causing local extinctions ⁴⁹	H-J
PA-7	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 ⁵⁰	H-J
PA-8	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 ^{51,52,53}	H-J
PA-9	Feral pigs (<i>Sus scrofa</i>) root up the soil and eat roots, invertebrates, seeds and native plants preventing forest regeneration ⁵⁴	H-J
PA-10	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 ⁵⁵	H-J
PA-11*	Brown trout (<i>Salmo trutta</i>) and rainbow trout (<i>Oncorhynchus mykiss</i>) prey on native fish and compete with them for food resources ⁵⁶	H-J
Human activities		
HA-1	Recreational use such as tramping, mountain biking and horse riding can cause damage and disturbance of the native ecosystem. It is also likely to disturb native fauna and introduce ecological weeds	Site-wide
HA-2	Plantation forestry on adjoining land parcels to the KNE site have the potential to cause habitat loss or degradation, disturb native wildlife, damage boundary fencing and increase sediment load in watercourses via surface run-off during harvesting operations	Site-wide
HA-3	Barriers to native fish passage are present in streams within the KNE site preventing migrating fish from completing their life-cycle	Site-wide
HA-4	Recreational vehicles such as 4WDs and motorbikes can cause damage and disturbance of the native ecosystem	Site-wide

*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 3), and are used to ensure that actions taken are targeted to specific threats. A map of operational areas can be found in Appendix 1 (see Maps 3 and 4).

8. Vision and objectives

8.1. Vision

Maintain and enhance all native ecosystems present within the KNE site to ensure that they continue to support a wide range of native flora and fauna whilst maintaining the future water collection area as a healthy, sustainable source of secure, fresh, clean water for the region.

8.2. Objectives

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

The following objectives will guide the operational activities at the KNE site:

- 1. Enhance the site's natural wetland and main riverine ecosystems**
- 2. Protect the integrity of the indigenous forest cover and core forest areas**
- 3. Maintain and advocate for the values of the regionally uncommon ecosystems and habitat features within the KNE site**

9. Operational activities

Operational activities are targeted to work towards the vision and objectives above (Section 8) and 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 3).

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

Weed control is undertaken within the KNE site aimed at protecting a number of wetland sites and the river terraces and to target specific weed infestations that may if left unchecked affect the integrity of the native canopy and forest cover.

As significant natural wetlands; the Whakatikei Headwater swamp (Operational area A), Martin's River wetland (Operational area G) and Whakatikei wetland (Operational area D) are priority ecosystems targeted for weed control on an annual basis. The Whakatikei River and the West Akatarawa River (the two main river systems within the KNE site boundary) are also monitored as important habitat features. If sustained weed control is required this will be prioritised as is already occurring within operational area C.

Other operational areas have been identified where specific weed incursion are known and have been targeted for control in previous years (Operational areas B, E, and F). These historic weed control sites are most commonly found within the KNE site at sites

of human activity; previous human habitation (house, mill, and hut sites), transport routes, and on the edges of neighbouring plantation forestry. Control of the worst infestations of ecological weeds has been undertaken annually since 2001 and whilst weeds are now fairly sparse, some species still prevail and require ongoing monitoring and control.

The ecological weeds listed in Appendix 4 will be controlled at historic locations within the KNE site (see ecological weed operational areas in Appendix 1, Map 4). These are the locations of what were or still are the worst infestations of the more invasive ecological weeds within the KNE site.

Surveillance will be undertaken throughout the KNE site during the course of other duties within the forest. When encountered or identified weed incursions will be assessed and prioritised for control.

9.2. Pest animal control

The purpose of pest animal control is to maintain the integrity of the overall forest cover and protect uncommon ecosystem types and habitat features from further degradation. This is achieved through the control of mammalian browsers; primarily possums and goats, with deer and pigs also controlled as encountered during targeted goat hunting operations.

Aerially-sown 1080 operations

Possums are controlled by the use of aerially-sown 1080 (sodium fluoroacetate) throughout the majority of the KNE site (operational area H) and some surrounding plantain areas if feasible at the time, and via toxin bait stations within operational area I, which is too close to residential areas for aerially sown 1080 to be safely used (see pest animal operational areas map, Appendix 1, Map 3).

Past monitoring results have shown aerial 1080 operations are likely to be needed every five to seven years to maintain the overall possum population density below 5% residual trap catch (RTC).

The last aerial possum control operation was carried out in July 2013. A recent possum monitoring survey in January 2019 found possums were present throughout the KNE site well in excess of the 5% RTC target. Therefore, pending funding confirmation, an aerial 1080 operation will be required within the timeframe of this operational plan. This operation will be undertaken as part of OSPRI's TBfree programme. However, the exact schedule is not yet known.

Poison bait stations

The network of poison bait stations (in operational area I) will continue to be serviced at three-monthly intervals to control possums. It is likely that this poisoning regime will also control rats to low levels in this area, as has been shown by monitoring of rat populations at similar forest sites where similar regimes are being used.

Ungulate control

Feral goats are culled annually to maintain populations at low levels where goats are considered to have a negligible impact on native plant regeneration. The current approach to culling operations will continue to be used. This involves targeting the areas of the KNE site that are most favoured by goats, while still checking other less favourable areas intermittently to ensure that any unanticipated population increases are managed.

Current resources don't allow for any targeted culling of feral deer or pigs to be undertaken. However any feral deer or pigs encountered during goat culling operations will be destroyed.

9.3. Fish passage prioritisation

There are many man-made structures in watercourses throughout the KNE site associated with the road, track and drainage networks. Structures in watercourses can be barriers to native fish migration.

The biodiversity department will continue to work with Parks to prioritize and advise on fish passage barriers for removal or remediation and also comment on the design of new/replacement structures in accordance with the National fish passage guidelines⁵⁷.

9.4. Advocacy for the KNE site's values

The Akatarawa Forest has many partners and user groups including recreational users and plantation forestry managers. It is important to recognise needs of these user groups and work together in the management of the site as a whole. Greater Wellington will continue to work with these groups and to advocate for the biodiversity values of the KNE site as highlighted in this KNE operational plan.

9.5. Surveillance of uncommon ecological features

Throughout the life time of this KNE plan a number of important habitat features and uncommon ecosystems will be monitored to ensure their continued health is maintained and advocated for. Examples of the important habitat features include the sub-alpine mounts (Mt Wainui and Mt Maunganui), fernland areas, other wetlands present e.g., Gratton's and Valley View wetlands) and large northern rātā tree areas.

10. Biodiversity management opportunities

Revegetation

Should opportunities arise for revegetation it is recommended that wetlands and rivers corridors and threatened forest ecosystem types should be prioritised.

Ecological surveys

Relatively few ecological studies have been undertaken within the Akatarawa Forest ranges. There is great opportunity to understand more about the bat, snail, lizard and bird communities within the KNE site, should the opportunity arise.

11. Operational delivery schedule

The operational delivery schedule shows the actions planned to achieve the stated objectives for the Akatarawa KNE site, and their timing and cost over the five-year period from 1 July 2019 to 30 June 2024. The budget for years 2020/21 to 2023/24 are indicative only and subject to change. A map of operational areas can be found in Appendix 1 (see Map 3 and 4).

Table 3: Five-year operational plan for the Akatarawa KNE site

Objective	Management Activity	Operational area	The actions: description/detail/comments	Intended 5 year outcome	Implementing party	Frequency (and assigned budget where known)					
						2019/20	2020/21	2021/22	2022/23	2023/24	
2	Pest animal control	H	Aerial 1080 operation. Exact scheduling requirements to be determined.	Possums kept to low numbers to protect the indigenous canopy cover	OSPRI	✓	✓	✓	✓	✓	Aerial operation scheduling unknown. However, Akatarawa Forest operation is expected within the life-cycle of this KNE operational plan.
2	Pest animal control	I	Quarterly servicing of ground-based poison bait stations	Possums kept to low numbers to protect the indigenous canopy cover	GWRC Biosecurity	✓	✓	✓	✓	✓	\$10,000
1	Ecological weed control	A, C, D, G	Annual weed control in priority wetlands and river corridors	Wetlands / river corridors are native dominant and enhanced in value	GWRC Biosecurity	✓	✓	✓	✓	✓	\$10,000
2	Ecological weed control	B, E, F	Monitoring historic weed control sites and control where necessary	Reduction in weed distribution at historic sites	GWRC Biosecurity	✓	✓	✓	✓	✓	\$7,500
1	Fish passage prioritisation	Site wide	Fish passage assessments and prioritisation	Fish passage enhanced throughout the KNE site	GWRC Biodiversity / Parks	✓	✓	✓	✓	✓	\$7,500

Objective	Management Activity	Operational area	The actions: description/detail/comments	Intended 5 year outcome	Implementing party	Frequency (and assigned budget where known)				
						2019/20	2020/21	2021/22	2022/23	2023/24
2	Pest animal control	H, I, J	Goat hunting – exact operational areas to be determined on an annual basis by Greater Wellington	Forest understorey and sub-canopy continues to regenerate naturally	GWRC Biosecurity / Contractors	✓ \$23,500	✓ \$23,500	✓ \$23,500	✓ \$23,500	✓ \$23,500
3	Advocacy	Side-wide	Participation in track development and assessment protocols, PNP reviews/processes	Advocated for and protected core forest areas and uncommon ecosystem features	GWRC Biodiversity	✓	✓	✓	✓	✓
3	Surveillance	Side-wide	Surveillance of uncommon ecosystems and habitat features during the life-cycle of this operational plan	Maintenance of existing value and enhanced where possible	GWRC Biodiversity	✓	✓	✓	✓	✓

12. Funding contributions

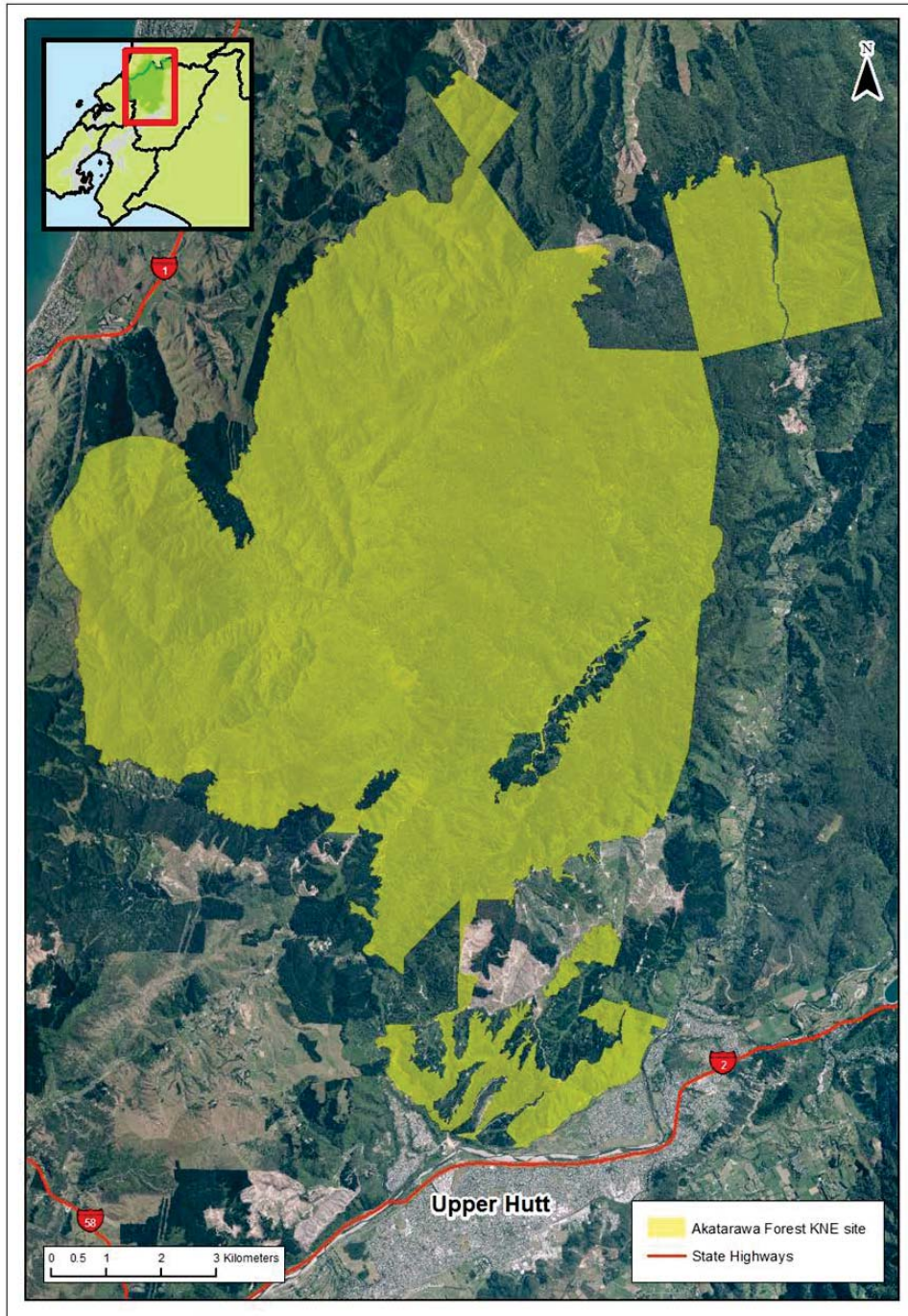
12.1. Budget allocated by Greater Wellington

Table 4: Greater Wellington allocated budget for the Akatarawa KNE site

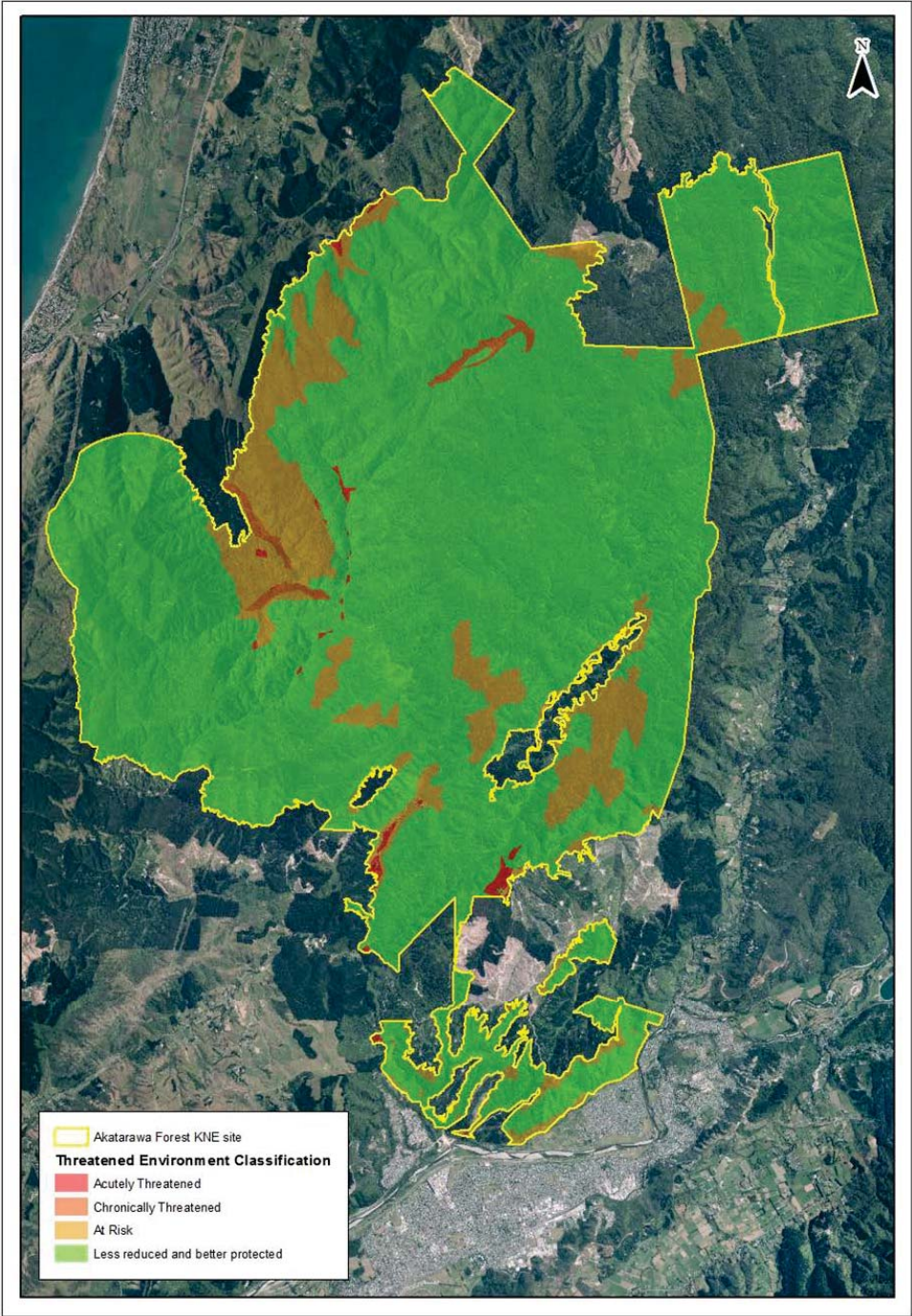
Management activity	Annual budget allocation
Ecological weed control	\$17,500
Pest animal control	\$33,500
Aerial 1080 operation winter 2020	<i>Funding requirements to be determined. Operation is currently expected to be joint funded with OSPRI</i>
Total	\$51,000

The annual budget indicative only for the years 2020/21 to 2023/24 and subject to change.

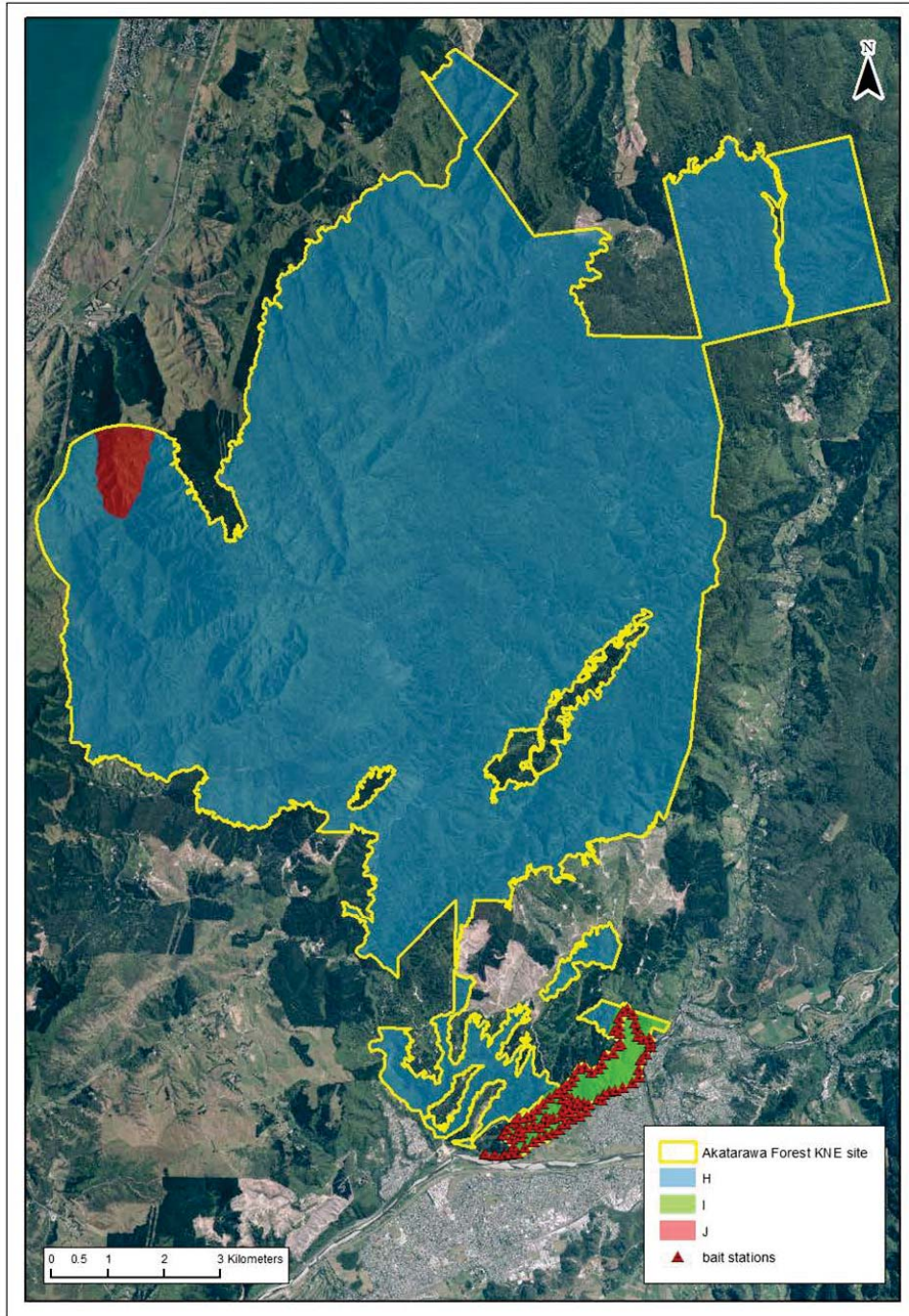
Appendix 1: Site maps



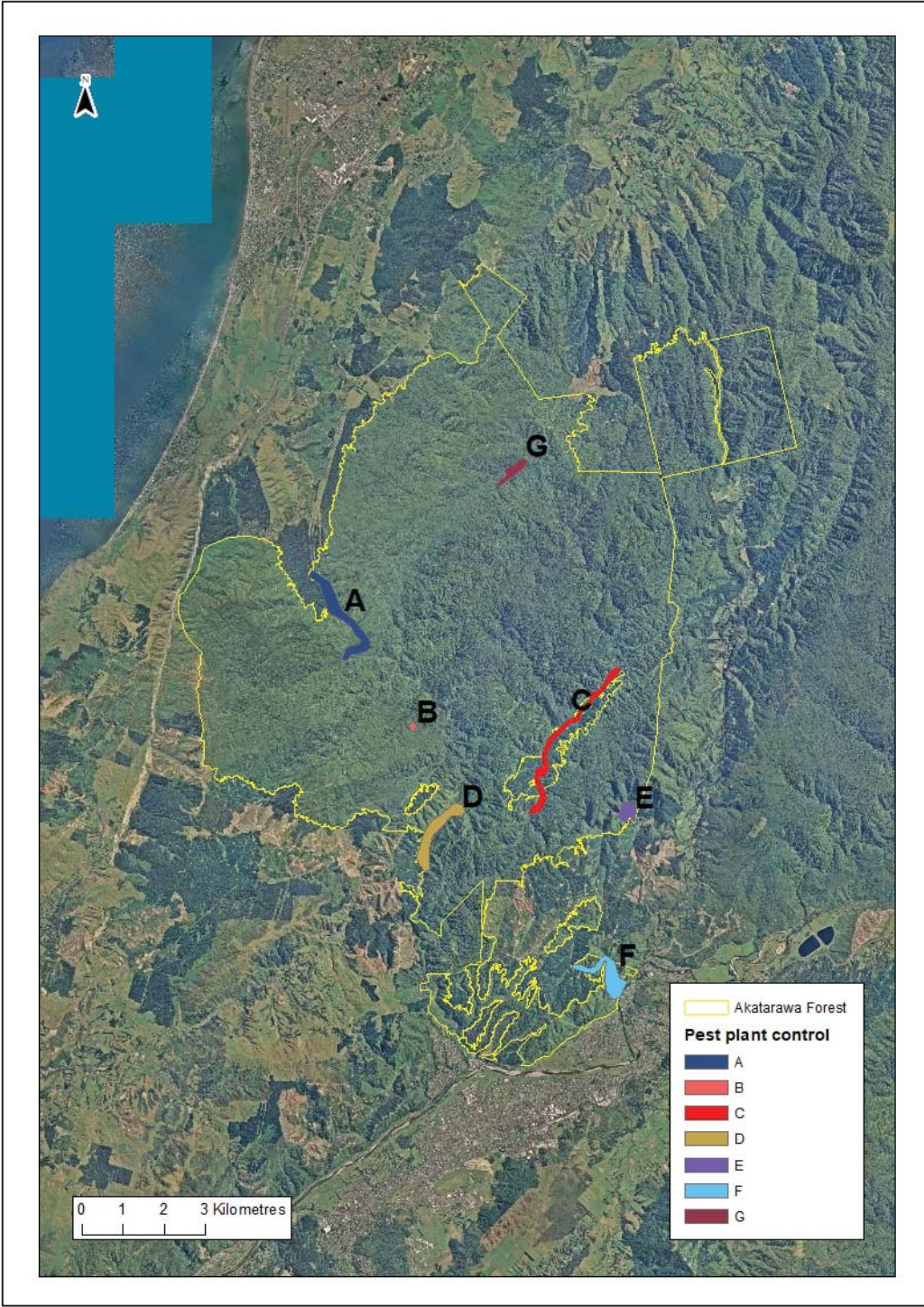
Map 1: The Akatarawa Forest KNE site



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



Map 3: pest animal operational areas in the Akatarawa Forest KNE site



Map 4: Pest plant control in the Akatarawa Forest 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 five-year cycle⁵⁸. Species are regarded as Threatened if they are classified as Nationally Critical, Nationally Endangered or Nationally Vulnerable. They are regarded as At Risk if they are classified as Declining, Recovering, Relict or Naturally Uncommon. The following table lists Threatened and At Risk species that are resident in, or regular visitors to, the Akatarawa Forest KNE site.

Table 5: Threatened and At Risk species at the Akatarawa Forest KNE site

Scientific name	Common name	Threat status	Source
Plants(vascular) ⁵⁹ (lichens) ⁶⁰ (bryophytes) ⁶¹			
<i>Dactylanthus taylorii</i>	Dactylanthus, woodrose	Threatened-Nationally Vulnerable	GWRC 2008 ⁶²
<i>Polyphlebium colensoi</i>	Bristle fern	At Risk-Naturally Uncommon	GWRC 2011 ⁶³ (as <i>Trichomanes colensoi</i>)
<i>Hymenophyllum australe</i>	Filmy fern	At Risk-Naturally Uncommon	GWRC 2011 (as <i>Hymenophyllum atrovirens</i>)
<i>Brachyglottis kirkii</i> var. <i>kirkii</i>	Kirk's daisy	At Risk-Declining	GWRC 2008, 2011
<i>Leptinella tenella</i>		At Risk-Declining	DOC 2013 ⁶⁴
<i>Mazus novaezeelandiae</i> subsp. <i>novaezeelandiae</i>	Dwarf musk	At Risk-Declining	GWRC 2008
<i>Peraxilla colensoi</i>	Scarlet mistletoe	At Risk-Declining	GWRC 2008
<i>Peraxilla tetrapetala</i>	Red mistletoe	At Risk-Declining	GWRC 2008
<i>Streblus banksii</i>	Large-leaved milk tree, turepo	At Risk-Relict	GWRC 2008
<i>Anthosachne multiflora</i> subsp. <i>multiflora</i>		Data Deficient	DOC 2013 ⁶⁵ (as <i>Elymus multiflorus</i>)
Birds ⁶⁶			
<i>Acanthisitta chloris granti</i>	Rifleman	At Risk-Declining	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Anthus novaeseelandiae</i>	New Zealand pipit	At Risk-Declining	http://ebird.org/content/newzealand/ (accessed 22/01/2014)

Scientific name	Common name	Threat status	Source
<i>Cyanoramphus novaezelandiae</i>	Red-crowned parakeet	At Risk-Relict	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Eudynamys taitensis</i>	Long-tailed cuckoo	At Risk-Naturally Uncommon	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Falco novaeseelandiae</i>	New Zealand falcon	Threatened-Nationally Vulnerable	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Phalacrocorax carbo novaehollandiae</i>	Black shag	At Risk-Naturally Uncommon	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
Freshwater fish ⁶⁷			
<i>Geotria australis</i>	Lamprey	Threatened-Nationally Vulnerable	GWRC 2008
<i>Anguilla dieffenbachii</i>	Longfin eel	At Risk-Declining	NIWA 2014 ⁶⁸
<i>Cheimarrichthys fosteri</i>	Torrentfish	At Risk-Declining	GWRC 2008
<i>Galaxias argenteus</i>	Giant kōkopu	At Risk-Declining	GWRC 2008
<i>Galaxias brevipinnis</i>	Kōaro	At Risk-Declining	NIWA 2014
<i>Galaxias divergens</i>	Dwarf galaxias	At Risk-Declining	NIWA 2014
<i>Gobiomorphus hubbsi</i>	Bluegill bully	At Risk-Declining	NIWA 2014
<i>Gobiomorphus huttoni</i>	Redfin bully	At Risk-Declining	NIWA 2014

Appendix 3: Regionally threatened plant species list

The following table lists regionally threatened species that have been recorded in the Akatarawa Forest KNE site. Native plant species have been identified in the Plant Conservation Strategy, Wellington Conservancy 2004-2010⁶⁹.

Table 6: Regionally threatened plant species recorded in the Akatarawa Forest KNE site

Scientific name	Common name	Threat status ⁷⁰	Source
<i>Abrodictyum elongatum</i>	Bristle fern	Regionally critical	GWRC 2011 (as <i>Trichomanes elongatum</i>)
<i>Abrodictyum strictum</i>	Erect bristle fern	Data Deficient	GWRC 2011 (as <i>Trichomanes strictum</i>)
<i>Adiantum diaphanum</i>	Tuberous maidenhair	Data Deficient	GWRC 2008
<i>Adiantum fulvum</i>	Maidenhair	Sparse	GWRC 2008, 2011
<i>Adiantum viridescens</i>	Maidenhair	Sparse	GWRC 2008, 2011
<i>Botrychium biforme</i>	Parsley fern	Gradual Decline	DOC 2013
<i>Notogrammitis pseudociliata</i>	Strapfern	Data Deficient	GWRC 2011 (as <i>Grammitis pseudociliata</i>)
<i>Pittosporum cornifolium</i>	Perching kohuhu	Sparse	GWRC 2008
<i>Raukawa edgerleyi</i>	Raukawa	Sparse	GWRC 2008

The liverwort *Drucella integristipula*, which is only known from a few sites in New Zealand, has also been recorded in the KNE site⁷¹.

Appendix 4: Ecological weed species

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

Table 7: Ecological weed species recorded in the Akatarawa Forest KNE site

Scientific name	Common name	Operational area
<i>Acer pseudoplatanus</i>	Sycamore	C
<i>Alnus glutinosa</i>	Alder	C, E
<i>Berberis darwinii</i>	Darwin's barberry	C
<i>Berberis glaucocarpa</i>	Barberry	F
<i>Buddleia davidii</i>	Buddleia	A, C, D, E, F
<i>Cestrum elegans</i>	Red cestrum	E
<i>Clematis vitalba</i>	Old man's beard	A, D, F
<i>Cortaderia selloana</i>	Pampas	C
<i>Cotoneaster glaucophylla</i>	Cotoneaster	B, E, F
<i>Crocsmia × crocosmiiflora</i>	Montbretia	G
<i>Dendrobenthamia capitata</i>	Strawberry dogwood	C
<i>Fraxinus excelsior</i>	Narrow leaved ash	C
<i>Humulus lupulus</i> var. <i>lupulus</i>	Hops	C
<i>Hydrangea macrophylla</i>	Hydrangea	C, E
<i>Hypericum androsaemum</i>	Tutsan	C
<i>Ilex aquifolium</i>	Holly	C
<i>Lamium galeobdolon</i>	Aluminium plant	G
<i>Lathyrus latifolius</i>	Everlasting pea	A
<i>Lonicera japonica</i>	Japanese honeysuckle	C
<i>Pinus radiata</i>	Radiata pine	A
<i>Salix fragilis</i>	Crack willow	A, D
<i>Selaginella kraussiana</i>	African club moss	C
<i>Tradescantia fluminensis</i>	Tradescantia	C, G
<i>Ulex europaeus</i>	Gorse	A
<i>Chamaecyparis lawsoniana</i>	Lawson's cypress	A & Scattered throughout KNE site spreading from abandoned forestry trial sites
<i>Pseudotsuga menziesii</i>	Douglas fir	Scattered throughout KNE site spreading from abandoned forestry trial sites
<i>Thuja plicata</i>	Western red cedar	Scattered throughout KNE site spreading from abandoned forestry trial sites
<i>Allium triquestrum</i>	Onion weed	Scattered throughout KNE site

Scientific name	Common name	Operational area
<i>Arctium minus</i>	Burdock	Scattered throughout KNE site
<i>Calystegia sepium</i>	Pink bindweed	Scattered throughout KNE site
<i>Camellia</i> sp.	Camellia	Scattered throughout KNE site
<i>Conium maculatum</i>	Hemlock	Scattered throughout KNE site
<i>Cytisus scoparius</i>	Broom	Scattered throughout KNE site
<i>Kerria japonica</i>	Japanese kerria	Scattered throughout KNE site
<i>Foeniculum vulgare</i>	Fennel	Scattered throughout KNE site
<i>Leycestearia formosa</i>	Himalayan honeysuckle	Scattered throughout KNE site
<i>Lupinus arboreus</i>	Tree Lupin	Scattered throughout KNE site
<i>Phytolacca octandra</i>	Inkweed	Scattered throughout KNE site
<i>Rubus fruticosus</i>	Blackberry	Scattered throughout KNE site
<i>Teline monspessulana</i>	Montpellier broom	Scattered throughout KNE site

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

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