

Key Native Ecosystem Operational Plan for Baring Head/Ōrua-pouanui

2017-2020



**Greater
Wellington**
Te Pane Matua Taiao

Contents

1. Purpose	1
2. Policy Context	1
3. The Key Native Ecosystem programme	2
4. Baring Head/Ōrua-pouanui Key Native Ecosystem	3
5. Parties involved	3
6. Ecological values	5
7. Key threats to ecological values at the site	8
8. Objectives	11
9. Operational activities	11
10. Operational delivery schedule	15
11. Funding contributions	19
Appendix 1: Site maps	20
Appendix 2: Threatened species list	26
Appendix 3: Regionally threatened species list	29
References	30

1. Purpose

The purpose of the three-year Key Native Ecosystem (KNE) Operational Plan for Baring Head/Ōrua-pouanui 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)¹.

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

Greater Wellington 10 Year Plan

The 10 Year Plan (2015-2025)² outlines the long term direction of 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 Regional Council (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 East Harbour Regional Park as a whole, which Baring Head/Ōrua-pouanui KNE site is sited within, is guided by the Greater Wellington Parks Network

Plan (PNP)³. This plan guides the recreational and amenity uses of East Harbour Regional Park 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 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. Baring Head/Ōrua-pouanui Key Native Ecosystem

Baring Head/Ōrua-pouanui KNE (256 ha) is located on the coast south between Palliser Bay and Wellington Harbour approximately 12km south of Wainuiomata, (see Appendix 1, Map 1).

The KNE site is home to a number of ecosystems within its boundary. The beach and coastal escarpment provide a habitat for birds such as the banded dotterel, many lizard species, and rare invertebrates. Cushion plants, spinifex and sand tussock are also found here. The Wainuiomata River is an important native fish habitat and the lower reaches are a spawning habitat for inanga. The nationally endangered plant tororaro (*Muehlenbeckia astonii*) is also found near the river.

5. Parties involved

Greater Wellington takes a collaborative approach to managing KNE sites. This means we will seek to work with landowners and other interested parties (stakeholders) where appropriate to achieve shared objectives for the site. In preparing this plan Greater Wellington has sought input from landowners and relevant stakeholders, and will continue to involve them as the plan is implemented.

5.1. Landowners

The majority of the KNE site (197 ha) is owned by Greater Wellington and is managed as part of the East Harbour Regional Park. Management of East Harbour Regional Park as a whole is guided by the Greater Wellington Parks Network Plan⁵. The Parks Network Plan guides the recreational and amenity uses of the park as well as identifying opportunities to protect biodiversity values. This KNE Plan is consistent with the objectives and policies of the Parks Network Plan. The Biodiversity and Parks departments work collaboratively to ensure the delivery of activities that have been identified in the plans that apply to the KNE site are consistent and efficient.

The land within the KNE site not owned by Greater Wellington (59 ha) is owned by the Tūpoki Takarangi Trust. Greater Wellington works collaboratively with the Tūpoki Takarangi Trust to plan and implement operational activities on the Tūpoki Takarangi Trust-land. See Appendix 1, Map 2 for landownership boundaries.

5.2. Operational delivery

The primary operational delivery partners within Greater Wellington are the Biodiversity department (co-ordination of biodiversity management activities and biodiversity advice), the Parks department (overall park planning and site management) and the Biosecurity department (pest control).

The Friends of Baring Head Trust (FOBHT) has been actively involved in restoration activities in the KNE since the land was purchased in 2010. The primary purpose of the Trust is:

- (i) to support and promote the protection, maintenance, enhancement and restoration of the values of Baring Head and its environs, including its natural, historic, landscape, scientific, recreational and cultural values, for the benefit of current and future generations; and
- (ii) to disseminate information about the features and values of Baring Head and its environs to increase public understanding, enjoyment and stewardship of the area

The FOBHT has funded fencing and an intensive predator control programmes to protect banded dotterel nesting sites and lizard habitat, assisted with the small mammal monitoring programme, hosted corporate volunteers, and have begun a planting project within the KNE site. The FOBHT is working with corporate groups on horned poppy control, small mammal monitoring and revegetation planting days. They also service the predator control kill-traps and poison bait station over the whole of the KNE site.

5.3. Mana whenua partner

Taranaki Whānui ki Te Upoko o Te Ika a Maui (Taranaki Whānui) are Greater Wellington's mana whenua partners at the Baring Head/Ōrua-pouanui 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.

Table 1: Taranaki Whānui sites of significance in Baring Head/Ōrua-pouanui KNE site⁶

Sites of significance	Mana whenua values
Okakaho Stream	kāinga, mahinga kai, tauranga waka
Wainuiomata River mouth and foreshore	mahinga kai
Parangārahu (Fitzroy Bay), Orua-poua-nui	kāinga, pā, mahinga kai, tohu ahurea, wāhi tapu

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:

- ensure people working in KNE sites understand the requirements of the Accidental Discovery Protocol
- endeavour to ensure that Taranaki Whānui values for the site are protected

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

6. Ecological values

Ecological values are a way to describe indigenous biodiversity found at a site, and what makes it special. These ecological values can be various components or attributes of ecosystems that determine an area's importance for the maintenance of regional biodiversity. Examples of values are the provision of important habitat for a threatened species, or particularly intact remnant vegetation typical of the ecosystem type. The ecological values of a site are used to prioritise allocation of resources to manage KNE sites within the region.

The Baring Head/Ōrua-pouanui KNE site is one of the highest value coastal ecosystem sites in the Wellington region⁷. It has uninterrupted sequences of different ecosystem types ranging from coastal and valley escarpments through to the coast. Although highly modified by farming practices, it retains many components of its former flora and fauna.

The KNE site falls within the Tararua Ecological District but has greater affinities with the Cook Strait Ecological District with its exposed steep coastal escarpments, terraces and headlands combined with a maritime climate⁸.

Of note in recognising the ecological values at Baring Head/Ōrua-pouanui are the following:

Naturally uncommon ecosystems: A number of naturally uncommon ecosystems⁹ are present at Baring Head/Ōrua-pouanui. These are: coastal turf (Nationally Critical); stony beach ridges, shingle beaches, stable sand dunes, coastal lagoon (all Nationally Endangered), and estuary (Nationally Vulnerable)¹⁰.

Threatened ecosystems: The Land Environment New Zealand (LENZ) national environmental classification rates all the ecosystem types in the KNE as 'Threatened'. The freshwater wetlands, river terraces and coastal platform shingle beaches and dune ecosystem types are 'Acutely Threatened', and the coastal and valley escarpment ecosystem type is 'Critically Under-protected'¹¹ (see Appendix 1, Map 3).

Threatened species: Within the KNE site there are nine 'Threatened' or 'At Risk' plant species. Among the fauna there are ten bird species, nine fish species, one lizard species and five invertebrate species that are 'Threatened'. Appendix 2 and 3 contain lists of nationally and regionally threatened species found within the KNE site.

There are four distinct ecosystems within the KNE site. A brief description of each follows:

Coastal escarpment

The Singers and Rogers (2014)¹² classification of pre-human vegetation indicates the steep coastal escarpments would have been a coprosma, muehlenbeckia

shrubland/herbfield/rockland (CL3). This vegetation type is still present today in a modified form and consists of coastal rockland and colluvial slopes, with mosaics of wind-shorn low-lying scrub dominated by divaricating shrubs, including species of *Coprosma* such as mingimingi (*Coprosma propinqua*), *Muehlenbeckia* such as Pohuehue (*Muehlenbeckia australis*), and *Melicytus* such as thick-leaved māhoe (*Melicytus crassifolius*). Other species present in this vegetation include coastal flax / wharariki (*Phormium cookianum* subsp. *hookeri*), tauhinu (*Ozothamnus leptophyllus*), taupata (*Coprosma repens*), and locally silver tussock (*Poa cita*) and speargrass (*Aciphylla squarrosa* var. *squarrosa*).

This plant community is generally referred to as 'grey scrub', which is salt-tolerant and provides important lizard, invertebrate and small bird nesting habitat in this extreme coastal climate.

Valley escarpment

The Singers and Rogers classification¹³ of pre-human vegetation indicates the valley escarpment would have been a tītoki, ngaio (WF1) broadleaved forest. This vegetation type consists of tītoki (*Alectryon excelsus* subsp. *excelsus*), ngaio (*Myoporum laetum*), māhoe (*Melicytus ramiflorus*), five-finger (*Pseudopanax arboreus*), red māpou (*Myrsine australis*), kaikōmako (*Pennantia corymbosa*), kowhai (*Sophora microphylla*), akeake (*Dodonaea viscosa*) and akiraho (*Olearia paniculata*), locally occasional matai (*Prumnopitys taxifolia*), tōtara (*Podocarpus totara* var. *totara*) and kahikatea (*Dacrydium dacrydioides*), and locally nīkau (*Rhopalostylis sapida*), tawa (*Beilschmiedia tawa*) and rewarewa (*Knightia excelsa*) in northern and central part of range.

The valley escarpments are currently regenerating back towards this original vegetation type with ngaio, tītoki, mānuka (*Leptospermum scoparium*) and kaikōmako all present. However, the valley escarpment is still largely dominated by mingimingi and coastal flax. The escarpment also contains some rarer species including the largest population of matagouri (*Discaria toumatou*) in the Wellington district, *Brachyglottis greyii*, leafless clematis (*Clematis afoliata*) and two species of mistletoe; leafless mistletoe (*Korthalsella lindsayi*) and green mistletoe (*Ileostylus micranthus*).

Four species of native lizard have been recorded on the Baring Head escarpments including spotted skink (*Oligosoma lineoocellatum*) which was recorded on the valley escarpment. Scree slopes on the escarpments provide lizards with a refuge from predators¹⁴.

Wainuiomata River and river terraces

The river terrace's dominating feature is the Wainuiomata River; a Waterbody of National Importance (WONI)¹⁵.

In the lower reaches of the river itself, there is only periodic salt water influence due to earthquake uplifts which have raised the river mouth several metres. The river mouth is an 'hāpua' coastal lagoon, an ecosystem classified as nationally endangered¹⁶, which breaks through the gravel barrier when river levels rise.

Whilst much of the original native vegetation cover is not present, some important species have survived locally. On the riverbank near the estuary, naturally uncommon

species such as *Crassula mataikona*, Kirk's crassula (*Crassula kirkii*) and teasel sedge (*Carex dipsacea*) are found¹⁷ and two examples of shrubby tororaro (*Muehlenbeckia astonii*), a species classified as nationally endangered, are found on the lower river terraces known as Khyber Pass. Sedges and toetoe in the lower reaches of the river provide good spawning habitat for inanga. Eleven species of native fish have been recorded in the river¹⁸, nine of which are 'Threatened'.

The Singers and Rogers classification¹⁹ of pre-human vegetation indicates the river terrace would have consisted of a totara, matai, ribbonwood podocarp forest. However, little native vegetation remains following cultivation for grazing purposes except for areas that have been subject to extensive revegetation planting by FOBHT/Greater Wellington.

Three oxbow wetlands are present along the river terrace adjacent to the Wainuiomata River. These are largely dominated by exotic plant species but, are subject to extensive restoration plans by FOBHT and Greater Wellington.

Coastal platform

The coastal platform extends from the high water mark along the beach to the bottom of the coastal escarpment. These areas too small to have been classified by the Singers and Rogers classification²⁰ of pre-human vegetation however, this dynamic environment consists of highly modified and often disturbed gravel/stonefield ecosystems such as stony beach ridges, shingle beaches, stable sand dunes and cushionfield.

The gravel /stonefields on the coastal platform following extensive weed control (primarily boxthorn, lupin, marram and gorse) now consist of native dunes species such as kōwhangatara (*Spinifex sericeus*), pīngao (*Ficinia spiralis*); and a significant population of the threatened sand tussock (*Poa billardierei*). Other native woody vegetation is now also starting to take hold, particularly along the Fitzroy Bay coastal platform, and include saltmarsh ribbonwood (*plagianthus divaricatus*), māhoe, taupata and mingimingi.

A *Raoulia australis*-dominated cushionfield occupies a large area of the Fitzroy Bay coastal platform. It provides habitat for native insects such as Wellington coastal moth (*Notoreas perornata*), katipō spider, (*Latrodectus katipo*), and Myers' cicada (*Maoricicada myersi*)²¹. Lizards have been found in driftwood accumulated behind the beach²².

The Wainuiomata River estuary consists of gravel/stonefields where banded dotterel (*Charadrius bicinctus*) and variable oystercatchers (*Haematopus unicolor*) nest. It is also an important roosting and potential nesting site for Caspian tern (*Hydroprogne caspia*), white-fronted tern (*Sterna striata*) and red-billed gull (*Larus novaehollandiae*).

A number of small wetlands are present at the bottom of the escarpment, fed by springs and seeps. Although native wetland species are present, the wetlands are degraded from the effects of grazing. However, recent fencing projects are protecting some wetland areas from sheep grazing and are recovering.

7. Key threats to ecological values at the site

Ecological values can be threatened by human activities, and by introduced animals and plants, that change the natural composition of native ecosystems. The key to protecting and restoring biodiversity as part of the KNE programme is to manage the threats to the ecological values at the site.

The Baring Head/Ōrua-pouanui KNE site has a number of threats which prevent natural ecological process and change the composition of the vegetation. Ecological weeds displace native plant species, preventing natural regeneration and altering the natural values of the KNE site. On the coastal platform, marram (*Ammophila arenaria*), gorse (*Ulex europaeus*), boxthorn (*Lycium ferocissimum*) and lupin (*Lupinus arboreus*) threaten native plant communities. The escarpments have a number of ecological weeds including gorse and some non-local native species such as karo (*Pittosporum crassifolium*) and hybrid *Pseudopanax*. Gorse and pasture grass are the dominant weeds on the river terraces and the river has several aquatic weed species.

Throughout the KNE site introduced predators and browsers are having an impact on the ecological values of the KNE site. For example, high numbers of hedgehogs (78% Tracking Tunnel Index (TTI) in November 2013²³ and 83% TTI in November 2012²⁴) reduce the breeding success of ground nesting birds. Trapping of a small area east of the river mouth in the 2013-14 nesting season showed that cats and mustelids may also impact nesting success.

Off-road vehicles accessing the beaches destroy cushionfields and can disturb or crush nests and eggs of breeding birds. Fencing to exclude grazing will be gradually installed by the Greater Wellington Parks department. Stock not only browse native vegetation, but camp under plants, trampling seedlings and opening up areas to weed invasion and excessive desiccation.

The table below (Table 2) shows the identified threats at the KNE site, which operational areas of the KNE they affect, and how the threats impact on ecological values. 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. Operational areas are shown in Map 4 (Appendix 1).

Table 2: Key threats to ecological values present at Baring Head KNE

Code	Impact on biodiversity in the KNE	Operational area
Ecological weeds		
EW-1	Woody weed species displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. Key weed species include: boxthorn (<i>Lycium ferocissimum</i>), gorse (<i>Ulex europaeus</i>), karo (<i>Pittosporum crassifolium</i>) and lupin (<i>Lupinus arboreus</i>)	A-E
EW-2	Ground covering ecological weeds smother and displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. Key weed species for control include: Marram grass (<i>Ammophila arenaria</i>), horned poppy (<i>Glaucium flavum</i>), pasture grasses and purple ragwort (<i>Senecio glastifolius</i>)	A,B,D,E

Code	Impact on biodiversity in the KNE	Operational area
EW-3	Aquatic weeds out-compete native aquatic species and choke watercourses. Key weed species include Cape pondweed (<i>Aponogeton distachyos</i>) and curly pondweed (<i>Potamogeton crispus</i>)	C
Pest animals		
PA-1	Possums (<i>Trichosurus vulpecula</i>) browse palatable canopy vegetation until it can no longer recover ^{25,26} . This destroys the forest's structure, diversity and function. Possums may also prey on native birds and invertebrates ²⁷	A-E
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 ^{28,29}	A-E
PA-3	Mustelids (stoats ^{30,31} (<i>Mustela erminea</i>), ferrets ^{32,33} (<i>M. furo</i>) and weasels ^{34,35} (<i>M. nivalis</i>)) prey on native birds, lizards and invertebrates, reducing their breeding success and potentially causing local extinctions	A-E
PA-4	Hedgehog (<i>Erinaceus europaeus</i>) prey on native invertebrates ³⁶ , lizards ³⁷ and the eggs ³⁸ and chicks of ground-nesting birds ³⁹	A-E
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 ^{40,41}	A-E
PA-6	Feral, stray and domestic cats (<i>Felis catus</i>) prey on native birds ⁴² , lizards ⁴³ and invertebrates ⁴⁴ , reducing native fauna breeding success and potentially causing local extinctions ⁴⁵	A-E
PA-7*	Rabbit (<i>Oryctolagus cuniculus</i>) and hare (<i>Lepus europaeus</i>) are known to graze on palatable native vegetation and prevent natural regeneration in some environments ⁴⁶ . Rabbits are particularly damaging in sand dune environments where they graze native binding plants and restoration plantings. In drier times hares especially, will penetrate into wetland forest areas browsing and reducing regenerating native seedlings	A-E
PA-8*	Feral pig (<i>Sus scrofa</i>) root up the soil and eat roots, invertebrates, seeds and native plants preventing forest regeneration ⁴⁷	A-E
PA-9*	Feral goat (<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 ⁴⁸	A-E
PA-10*	Brown trout (<i>Salmo trutta</i>) prey on native fish and compete with them for food resources ⁴⁹	C
Human activities		
HA-1	Agricultural practices, particularly grazing livestock can result in pugging soils, grazing native vegetation inhibiting regeneration, wildlife disturbance and increasing nutrient content of soils and watercourses ⁵⁰	A-E

Code	Impact on biodiversity in the KNE	Operational area
HA-2*	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	A-E
HA-3*	Poor water quality affects a range of species in the estuary and stream. High nutrient levels and contaminants within watercourses are often caused by upstream land management practices and pollution events including development practices, forestry and agricultural practices, road run-off and storm water entering the watercourse, and septic tank leakages	C
HA-4*	Dogs (<i>Canis lupus familiaris</i>), if uncontrolled/unleashed can disturb or kill nesting birds and chicks, and lizards within the KNE site, particularly in close proximity to walking tracks ⁵¹	A-E
HA-5*	Freshwater activities such as boating, fishing, white baiting and duck shooting can introduce aquatic weed species to waterways	A-E
HA-6*	Recreational vehicles such as 4WDs and motorbikes can cause damage to dune systems and disturbance of the native ecosystem	D
Other threats		
OT-1*	Fire is a natural occurrence, which can be instrumental in creating new ecosystems and providing for new succession opportunities; however, fire can be destructive to native flora and fauna and create conditions for pest plant invasion	A-E

***Threats marked with an asterisk are not addressed by actions in the Operational delivery schedule. Not all threats can be adequately addressed. Threats might not be managed for a number of reasons including financial, legal, or capacity restrictions. However, in order to manage the KNE site as a whole, it is important to be aware of all threats to ecological values**

8. Objectives

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

8.1. Objectives

The following objectives guide the management activities at Baring Head/Ōrua-pouanui KNE site.

1. **To improve the structure* and function† of native plant communities**
2. **To improve the physical condition and ecological functioning of freshwater ecosystems**
3. **To improve the habitat for native birds**
4. **To improve the habitat for native lizards**
5. **To improve the habitat for threatened native animals (shorebirds)**

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 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

Ecological weed control at the KNE site has aimed to reduce the overall extent and density of target species that had started to transform the habitats at the KNE site towards habitats dominated by invasive and exotic plant species.

Past ecological weed control work has been successful, significantly reducing large infestations of gorse and boxthorn on the valley escarpment, the river terraces and the coastal platform. Woody weed species have been mostly eliminated from areas where shorebirds nest, and some of the karo and hybrid *Pseudopanax* infestation on the southern escarpment below the lighthouse have been removed.

Control work will continue with the strategy of targeting woody weeds, primarily gorse, boxthorn, and lupin across the whole KNE site. In addition, targeted control of marram grass, horned poppy and cape pondweed will also be undertaken.

Control will follow up on previous operational areas where required and then expand into new previously uncontrolled operational areas. See Appendix 1, Map 4 for operational areas.

Primary operations to be undertaken by Greater Wellington during the timescale of this KNE plan are:

- Follow up aerial control to maintain the gains on the Valley Escarpment (operational area B)
- Initial and follow up aerial control on the Southern Coastal Escarpment (operational area E)
- Ground-based woody weed control along both sides of the Wainuiomata River (operational area C)
- Marram grass control along the entire Coastal Platform (operational area D).
- Cape pondweed control from three oxbow wetlands along the River Terrace (operational area C) and follow up by volunteers
- Follow up ground-based control along the Southern Coastal Platform (operational area D)
- Follow up ground-based control along the Fitzroy Bay Coastal Platform (operational area D) within GWRC-land
- Follow up aerial control on the Fitzroy Bay Coastal Escarpment (operational area A)
- Commence progressive control of woody weeds on the Coastal Platform within the Tūpoki-Takarangi Trust land (operational area D)

In addition, FOBHT volunteers will continue to control horned poppy and purple ragwort on the entire coastal platform by hand weeding (operational area D).

9.2. Pest animal control

The aim of pest animal control at the KNE site is to suppress the impacts of predatory and browsing pest animals across the KNE site enabling the native fauna (eg, nesting shorebirds) and flora (eg, regenerating grey scrub) present to continue breeding or regenerating.

In order to achieve this, an extensive network of DOC 200 and Timms kill-traps (targeting mustelids, feral cats, rats and hedgehogs), and poison bait stations (targeting possums and rats) has been installed across the KNE site (see Appendix 1, Map 5).

Kill-traps and bait stations are spaced at 100m-200m intervals throughout the KNE site. However, the kill-traps on the southern coastline are positioned more intensively (50m apart) to provide greater protection for nesting banded dotterels. These kill-traps are checked more frequently during spring and early summer when the banded dotterels are present and predator numbers are likely to increase⁵². All of the kill-traps and bait stations will be serviced by FOBHT volunteers.

Greater Wellington Biosecurity staff will undertake an annual service of the trap and bait station network to undertake any maintenance required and to ensure they are able to be operated in a safe and effective manner by the FOBHT volunteers.

Greater Wellington will also fund and undertake a trial, using Goodnature A24 gas traps on the coastal platform to target the control hedgehogs in these environments for the protection of nesting shorebirds. This trial will commence in 2017/18.

9.3. Revegetation

Revegetation at the KNE site has two primary goals:

1. To increase the abundance of uncommon or missing species
2. To improve the functionality of the freshwater ecosystems by:
 - a. assisting natural regeneration in areas retired from grazing along the river terrace (operational area C) by planting nodes in riparian margins and oxbow wetlands to provide a native seed sources and shelter from the wind
 - b. Improving fish habitat and spawning sites along the Wainuiomata River estuary
 - c. To improve the physical condition of the Wainuiomata River through stabilisation

Revegetation will continue to focus on the two goals highlighted above and will be agreed annually in collaboration with FOBHT who generally undertake working bees or organise other volunteer groups (eg, schools or corporate groups).

GWRC has a small revegetation budget that is aimed to support sourcing and planting uncommon or missing species in line with objective 1 and may require seed collection from known sources on-site to be undertaken.

9.4. Fencing

The aim of fencing at the KNE site has primarily been to protect existing native plant and animal species from sheep browsing and/or vehicle damage.

Fences installed over the past few years on the southern and eastern boundaries of the park have meant a significant reduction of vehicle damage on the coastal platform, whilst fencing at the top of the valley escarpment and in areas of the river terraces within the park are now effectively excluding sheep from all of the valley escarpment and most of the river terraces and river within the park.

However, stock still have access to the coastal escarpments and most of the coastal platform throughout the KNE site. In order to manage the effect of grazing in these areas fences have been erected around sensitive areas such as wetland habitat, turf plant communities and identified inanga spawning areas.

During the timescale of this KNE plan, further temporary fencing will be erected along the costal platform around areas of regenerating low stature scrub to protect from sheep browsing. Materials for this fencing have previously been purchased and are stored by GWRC for use at the KNE site for this purpose.

Temporary fencing is also erected annually around the shorebird nesting habitat during the breeding season (August to February). This aims to protect nesting shorebirds from disturbance by visitors to the beach. Materials for this fencing have previously been purchased and are stored by Greater Wellington for use at the KNE site annually for this purpose.

9.5. Lizard habitat project

Following surveys of the distribution and abundance of lizard species in 2013 and 2014 that highlighted priority areas for intensive habitat protection and enhancement work, FOBHT initiated a lizard habitat project utilising a grant from DOC's Community Fund along suitable areas of the river terrace.

In these priority areas intensive rodent (rat and mice) control using poison bait stations has been initiated and exotic grasses have been controlled to maintain the size of suitable scree habitat available for lizards.

Although funded by FOBHT, this work has been undertaken on the ground by GWRC given the tough terrain on the escarpment.

The exotic grass and rodent control will continue to be funded and maintained by GWRC utilising the Park's Department's Environment Enhancement Fund until further funding sources are confirmed by FOBHT.

See Appendix 1, Map 6 for lizard habitat intensive rodent control areas.

9.6. Monitoring

Small mammal monitoring

Greater Wellington undertakes small mammal monitoring (quarterly for rodents and six-monthly for mustelids/hedgehogs) in the KNE site. Tracking Tunnel Index (TTI) method is used to monitor the presence of small mammal species. The results of this monitoring are reported in the KNE programme's Small Mammal Monitoring quarterly reports and will provide an indication of the effectiveness of the pest animal control network.

Lizard monitoring

The Wellington Regional Lizard Strategy identified Baring Head KNE site as one of a number of sites of importance in the region for lizards. The KNE site contains nationally threatened species that are now very uncommon on the mainland.

As a result, Greater Wellington Environmental Science department established regional monitoring programme to survey for changes in lizard occupancy, distribution and abundance over time. Baring Head is one site where these surveys are undertaken. Surveys are conducted every four years, with the next survey to be completed in December 2017.

10. Operational delivery schedule

The operational delivery schedule below shows the activities planned to achieve the stated objectives for Baring Head/Ōrua-pouanui KNE site. Their timing and cost are shown 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 are subject to change. See Appendix 1, Map 4, for operational areas.

Table 3: Three-year operational delivery schedule for Baring Head/Ōrua-pouanui KNE site

Objective	Threat	Activity	Operational area	Delivery	Description/detail	Target	Timetable and resourcing		
							2017/18	2018/19	2019/20
1, 2	EW-3	Ecological weed control	C	FOBHT	Control of Cape Pondweed within the three Oxbow wetlands - Hand-pulling by FOBHT	Eradicate target species within 10 years	3,000	3,000	Nil
1	EW-1	Ecological weed control	B	GWRC Biosecurity department	Control gorse, boxthorn, lupin on the Valley Escarpment - Follow up aerial control required Year 1	Reduction in distribution and abundance of target species	4,000	Nil	Nil
1	EW-1	Ecological weed control	E (southern escarpment)	GWRC Biosecurity department	Control of boxthorn, gorse, lupin and karo on the Southern Escarpment by aerial spraying - Initiate control in Year 2 - Follow up control Year 3	Existing native stock to expand range on the escarpment within 3 years	Nil	4,000	4,000
1	EW-2	Ecological weed control	C	GWRC Biosecurity department	Control marram along the Coast Platform - Commence marram control sweep using a knapsack on Fitzroy Bay coastal platform between beach and coastal track - Follow up marram control on southern coast platform	Eradicate marram from the operational areas within 5 years	3,000	1,000	1,000

Objective	Threat	Activity	Operational area	Delivery	Description/detail	Target	Timetable and resourcing		
							2017/18	2018/19	2019/20
1, 2	EW-1	Ecological weed control	D	GWRC Biosecurity department	<p>Woody weed control along the Wainuiomata River</p> <ul style="list-style-type: none"> - Gorse, boxthorn, lupin, & willow gun and hose control on true-right of Wainuiomata River, includes follow up on 2016/17 operational areas - Control gorse, boxthorn, lupin & willow on true left of Wainuiomata River 	Successful control of target species ahead of planting season	3,000	Nil	3,000
1	EW-1	Ecological weed control	D (southern coastal platform)	GWRC Biosecurity department	<p>Control woody weeds on southern coastal platform</p> <ul style="list-style-type: none"> - Follow up and extension of gun and hose control of boxthorn, lupin and gorse on southern coast working work west to east Years 1 & 3 - Follow up control of all woody weed species in shorebird nesting areas by gun and hose or knapsack spraying in Year 2 	Suppression of target weed species to allow existing native stock to expand range in operational area	4,000	2,000	4,000
4	EW-2	Ecological weed control	B	GWRC Biosecurity department	Control grasses in and around scree edges of lizard habitat. No surfactant to be used	Maintain size of existing scree habitats	1,500	Nil	1,500
1	EW-1	Ecological weed control	A (Fitzroy Bay escarpment)	GWRC Biosecurity department	<p>Woody weed control on the Fitzroy Bay coastal escarpment</p> <ul style="list-style-type: none"> - Aerial control of boxthorn and gorse 	Suppression of target weed species to allow existing native stock to expand range in operational area	Nil	6,000	Nil

Objective	Threat	Activity	Operational area	Delivery	Description/detail	Target	Timetable and resourcing		
							2017/18	2018/19	2019/20
1	EW-1	Ecological weed control	D (Fitzroy Bay coastal platform - T.Takarangi block)	GWRC Biosecurity department	Woody weed control on the coastal platform in the T.Takarangi block - Progressive control boxthorn, gorse and lupin working south to north	Suppression of target weed species to allow existing native stock to expand range in operational area	Nil	Nil	6,000
1	EW-1	Ecological weed control	D (Fitzroy Bay coastal platform)	GWRC Biosecurity department	Follow up control of boxthorn, gorse, lupin and briar rose by gun & hose spraying Year 2 & 3	Suppression of target weed species to allow existing native stock to expand range in operational area	Nil	3,000	1,000
1	EW-2	Ecological weed control	D	FOBHT	Annual control of horned poppy by hand-pulling along entire coastal platform	Eradication of target species within 5 years	Nil	Nil	Nil
1, 3, 4	PA-1, 2	Pest animal control	Entire KNE site	FOBHT	Service bait stations to control possums and rats every 3 months - GWRC to provide bait	Possums: < 5% RTC* Rats: < 10% TTI**	1,000	1,000	1,000
3, 5	PA-3,4,5,6	Pest animal control	Entire KNE site	FOBHT	Service DOC200 and Timms traps monthly, and more frequently from August to February to control mustelids and cats - GWRC to provide bait	Mustelids <2% TTI**	400	400	400
1, 2, 3, 4, 5		Pest animal control	Entire KNE site	GWRC Biosecurity department	Annual maintenance service and safety audit of bait station and trap network to ensure safe and effective operation	No accidents caused by defective infrastructure. 90% of pest animal network effective at all times	3,000	3,000	3,000
4	PA-2	Lizard habitat project	B	GWRC Biosecurity department	Service bait stations in lizard habitat	N/A	6,000	6,000	6,000

Objective	Threat	Activity	Operational area	Delivery	Description/detail	Target	Timetable and resourcing		
							2017/18	2018/19	2019/20
5	PA-4	Pest animal control	D	GWRC Biosecurity department	Commence hedgehog control trial on coastal platform using A24 gas kill-traps	N/A – trial activity	2,000	2,000	2,000
1, 2		Revegetation	C	FOBHT	Plant native plants on the river terrace to enable natural regeneration and erosion control	80% plant survival			
1		Revegetation	B, C, D, E	GWRC Biodiversity department / FOBHT	Plant missing and under-represented native plant species - Plants funded by GWRC and planted by FOBHT	Approximately 50 plants planted each year	1,500	1,500	1,500
1	HA-1	Fencing	D,E,F	GWRC Parks department / FOBHT	Fence sensitive areas with temporary fencing as a trial: - Temporary fencing already purchased	N/A – trial activity	Nil	Nil	Nil
1, 3, 4	PA-3,4,5,6	Monitoring	Entire KNE site	GWRC Environmental Science department	Small mammal monitoring and reporting - Rodents – February, May, August, November - Mustelids and hedgehogs – November and February	Rats: < 10% TTI** Mustelids <2% TTI**	\$10,000	\$10,000	\$10,000
Total							\$44,900	\$44,900	\$44,900

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

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

11. Funding contributions

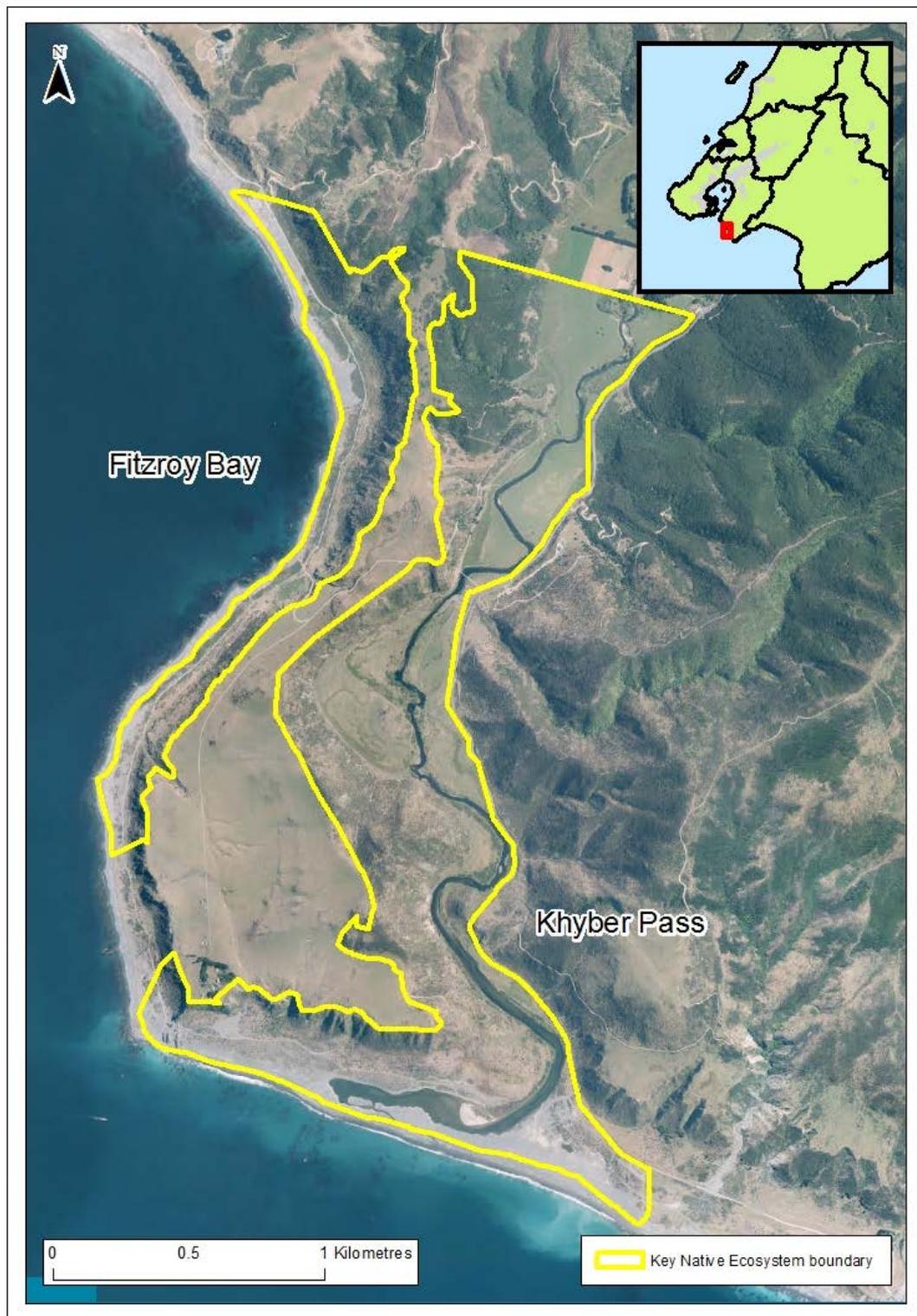
11.1. Greater Wellington contribution

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

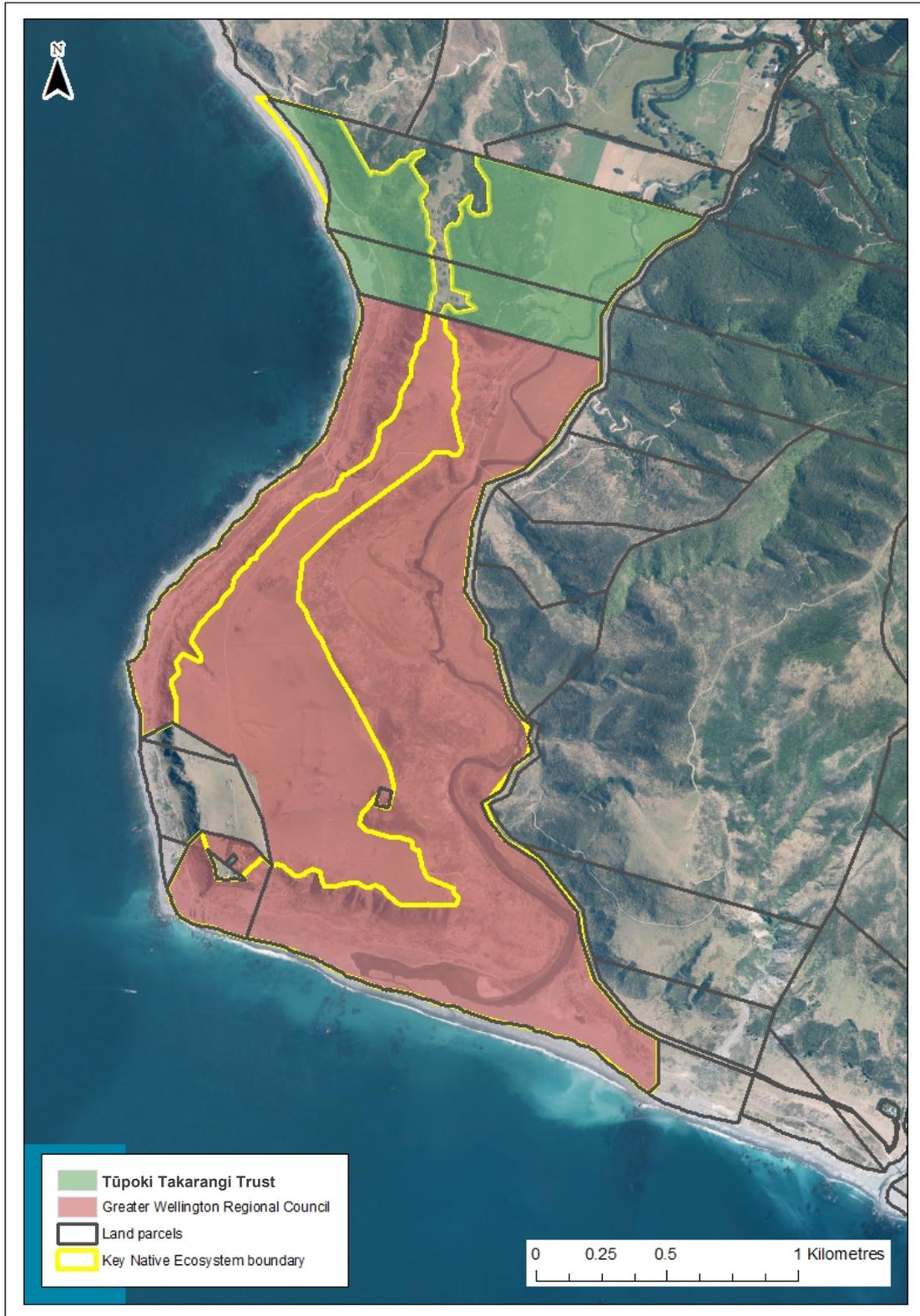
Table 4: Greater Wellington allocated budget for Baring Head/Ōrua-pouanui KNE site

Management activity	Timetable and resourcing		
	2017/2018	2018/2019	2019/2020
Pest plant control	\$19,000	\$19,000	\$19,000
Pest animal control	\$6,400	\$6,400	\$6,400
Revegetation	\$1,500	\$1,500	\$1,500
Small mammal monitoring	\$10,000	\$10,000	\$10,000
Environment Enhancement Fund [administered by Parks]	\$8,000	\$8,000	\$8,000
Total	\$44,900	\$44,900	\$44,900

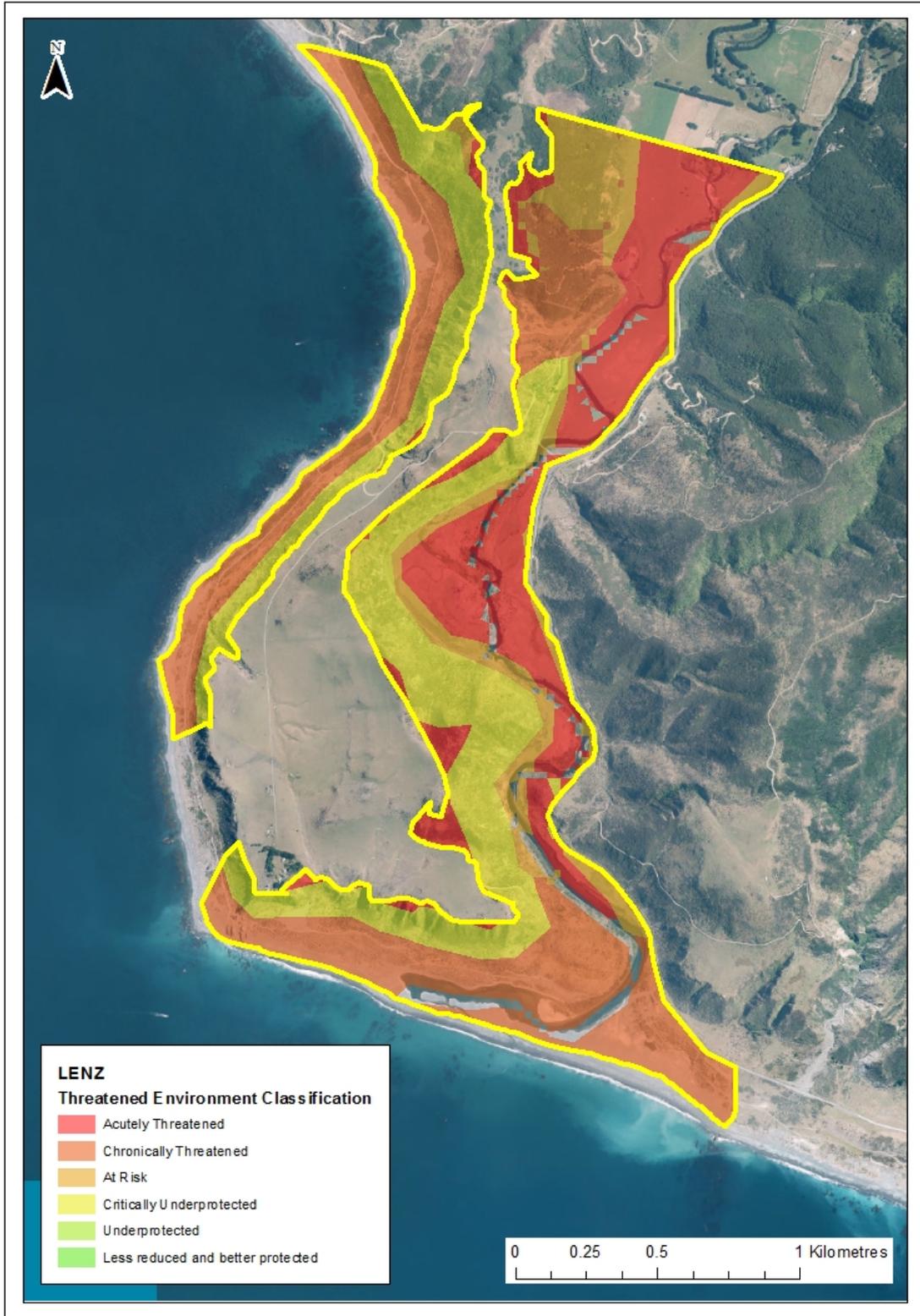
Appendix 1: Site maps



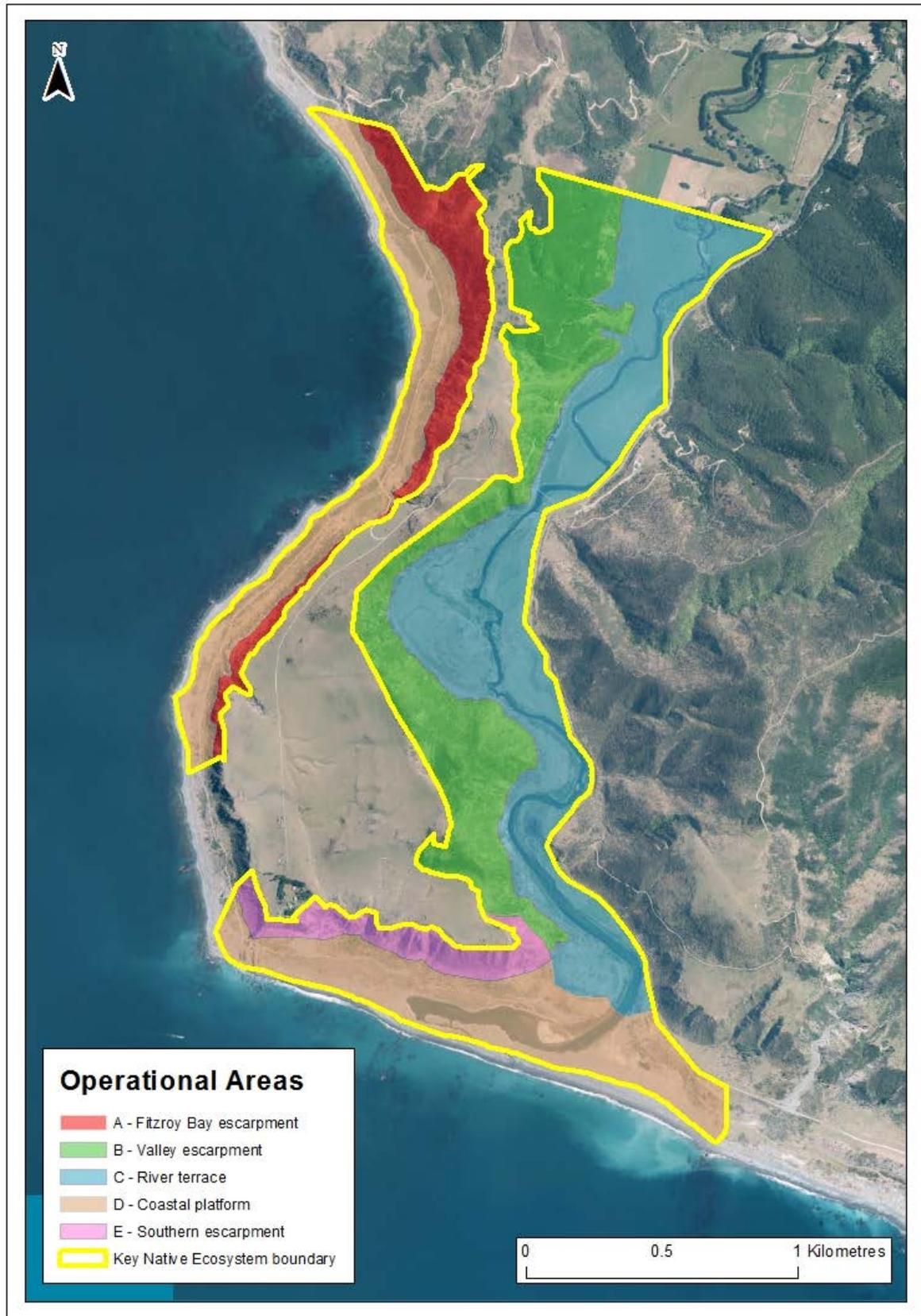
Map 1: Baring Head/Ōrua-pouanui KNE site location map



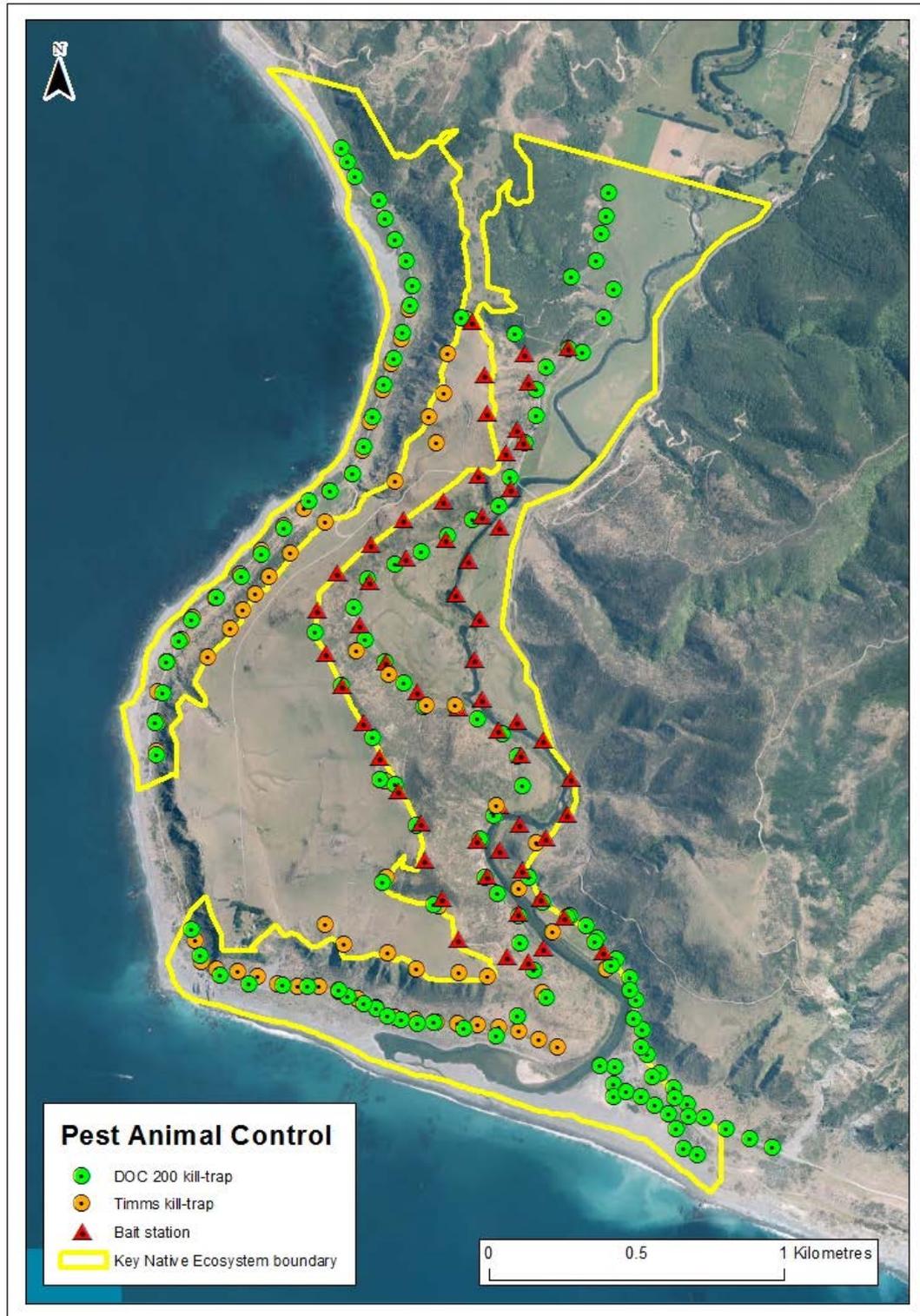
Map 2: Baring Head/Ōrua-pouanui KNE site property boundaries



Map 3: Land Environment New Zealand classification map for Baring Head/Ōrua-pouanui KNE site



Map 4: Operational areas in Baring Head/Ōrua-pouanui KNE site



Map 5: Pest animal control (excluding lizard habitat protection areas) at Baring Head/Ōrua-pouanui KNE site



Map 6: Pest animal control for lizard habitat protection at Baring Head/Ōrua-pouanui KNE site

Appendix 2: 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 cycle⁵³. 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 KNE site.

Table 5: Nationally threatened species at Baring Head/Ōrua-pouanui KNE

Scientific name	Common name	Threat status	Source
Plants(vascular) ⁵⁴ (lichens) ⁵⁵ (bryophytes) ⁵⁶			
<i>Brachyglottis greyii</i>		Threatened – Naturally Uncommon	Hopkins et al 2010 ⁵⁷
<i>Crassula kirkii</i>	Kirk's crassula	Threatened – Naturally Uncommon	Hopkins et al 2010
<i>Crassula mataikona</i>		Threatened – Naturally Uncommon	Hopkins et al 2010
<i>Ficinia spiralis</i>	Pīngao	At Risk – Declining	Hopkins et al 2010
<i>Geranium aff. microphyllum</i>		Threatened – Naturally Uncommon	Hopkins et al 2010
<i>Isolepis basilaris</i>	Pygmy clubrush	Threatened – Naturally Vulnerable	Hopkins et al 2010
<i>Leptinella tenella</i>		At Risk – Declining	Hopkins et al 2010
<i>Muehlenbeckia astonii</i>	Tororaro	Threatened - Nationally Endangered	Hopkins et al 2010
<i>Muehlenbeckia ephedroides</i>	Leafless pōhuehue, dead stick plant	At Risk – Declining	Hopkins et al 2010
<i>Melicytus crassifolius</i>	Porcupine bush	At Risk – Declining	Hopkins et al 2010
<i>Pimelea arenaria</i>	New Zealand daphne	At Risk – Declining	Hopkins et al 2010

Scientific name	Common name	Threat status	Source
<i>Poa billardierei</i> (syn. <i>Austrofestuca littoralis</i>)	Sand tussock	At Risk – Declining	Hopkins et al 2010
<i>Trisetum antarcticum</i>		At Risk – Declining	Hopkins et al 2010
Birds ⁵⁸			
<i>Anas superciliosa</i>	Grey duck	Threatened – Nationally Critical	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)
<i>Charadrius bicinctus</i>	Banded dotterel	Threatened – Nationally Vulnerable	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Eudyptula minor</i>	Little (blue) penguin	At Risk – Declining	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Haematopus unicolor</i>	Variable oystercatcher	At Risk – Recovering	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Hydroprogne caspia</i>	Caspian tern	Threatened – Nationally Vulnerable	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Larus novaehollandiae scropulinus</i>	Tarāpunga, red billed gull	At Risk – Declining	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Phalacrocorax varius varius</i>	Pied Shag	At Risk – Recovering	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Sterna striata striata</i>	Tara, white fronted tern	At Risk – Declining	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
Reptiles ⁵⁹			
<i>Oligosoma lineocellatum</i>	Spotted skink	At Risk – Relict	Romijn 2011 ⁶⁰
Freshwater fish ⁶¹			
<i>Anguilla dieffenbachii</i>	Longfin eel	At Risk – Declining	New Zealand Freshwater Fish Database (accessed 2013)
<i>Galaxias argenteus</i>	Giant kōkopu	At Risk – Declining	New Zealand Freshwater Fish Database (accessed 2013)
<i>Galaxias brevipinnis</i>	Kōaro	At Risk – Declining	New Zealand Freshwater Fish Database (accessed 2013)
<i>Galaxias maculatus</i>	Inanga, whitebait	At Risk – Declining	New Zealand Freshwater Fish Database (accessed 2013)
<i>Galaxias postvectus</i>	Shortjaw kōkopu	Threatened – Nationally Vulnerable	New Zealand Freshwater Fish Database (accessed 2013)

Scientific name	Common name	Threat status	Source
<i>Geotria australis</i>	Lamprey	Threatened – Nationally Vulnerable	New Zealand Freshwater Fish Database (accessed 2013)
<i>Gobiomorphus hubbsi</i>	Bluegill bully	At Risk – Declining	New Zealand Freshwater Fish Database (accessed 2013)
<i>Gobiomorphus huttoni</i>	Redfin bully	At Risk – Declining	New Zealand Freshwater Fish Database (accessed 2013)
(Araneae – spiders) ⁶² (Lepidoptera – butterflies and moths) ⁶³ (Hemiptera – true bugs) ⁶⁴			
<i>Ericodesma aerodana</i>	Moth	Threatened – Nationally Endangered	Patrick 2004 ⁶⁵
<i>Latrodectus katipo</i>	Katipō spider	Threatened – Nationally Endangered	Crisp 2011
<i>Maoricicada myersi</i>	Orongorongo black cicada / Myers' cicada	Threatened – Nationally Threatened	Borger 1997
<i>Notoreas perornata</i> (Wellington)	Coastal moth	Threatened – Nationally Critical	Patrick 2004

Appendix 3: Regionally threatened species list

The following table lists regionally threatened species that have been recorded in the Baring Head/Ōrua-pouanui KNE site. Native plant species have been identified in the Plant Conservation Strategy, Wellington Conservancy 2004-2010⁶⁶.

Native invertebrates have been identified in Coastal butterflies and moths of Wellington and South Wairarapa prepared by BH Patrick (2004).

Table 6: Regionally threatened species at Baring Head/Ōrua-pouanui KNE

Scientific name	Common name	Threat status
Vascular plants		
<i>Aciphylla squarrosa</i> var. <i>squarrosa</i>	Spaniard	Regionally Vulnerable
<i>Anthosachne solandri</i> (syn. <i>Elymus solandri</i>)	Blue wheatgrass	Data Deficient
<i>Clematis afoliata</i>	Leafless clematis	Regionally Declining
<i>Discaria toumatou</i>	Matagouri	Serious Decline
<i>Rubus squarrosus</i>	Leafless lawyer	Regionally Sparse
<i>Scandia geniculata</i>	Scandia	Serious Decline
Native Invertebrates		
<i>Austrocidaria lithurga</i>		Rare species of the Wellington coast
<i>Helastia siris</i>		Rare species of the Wellington coast

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