

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

2021-2026





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## 1. Purpose

The purpose of the five-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 vision and objectives to guide management decision-making
- Describe operational activities to improve ecological condition (eg, ecological weed control) that will be undertaken, who will undertake the activities and the allocated budget

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

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

## 2. Policy Context

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

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

### **Greater Wellington Long Term Plan**

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

### **Proposed Natural Resources Plan**

The Proposed Natural Resources Plan for the Wellington Region (PNRP)<sup>3</sup> 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 Baring Head/Ōrua-pouanui (part of East Harbour Regional Park) as a whole is guided by the Greater Wellington Parks Network Plan (PNP)<sup>4</sup>. This plan guides the recreational and amenity uses of Baring Head/Ōrua-pouanui as well as identifying opportunities to protect biodiversity values.

### **Greater Wellington Regional Pest Management Plan 2019-2039**

The Regional Pest Management Plan<sup>5</sup> is an important driver for managing many of the pests that are prioritised in this KNE Operational Plan. Without active management of KNE sites, many native plants and animals in these ecosystems would struggle to thrive. The KNE programme aims to provide protection to maintain or restore the ecological function of these ecosystems as well as the native plants and animals they support. This is done mainly by managing threats such as harmful pests or introduced plants and animals.

### **Greater Wellington Biodiversity Strategy**

The Greater Wellington Biodiversity Strategy<sup>6</sup> (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

#### **Principles**

Use best practice   work with others   Lead by example   partner with mana whenua

#### **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. Baring Head/Ōrua-pouanui Key Native Ecosystem site

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

The KNE site has a number of coastal and riverine ecosystem types and threatened species within its boundary. The coastal platform and escarpment provide a habitat for shorebirds such as the banded dotterel (*Charadrius bicinctus*), lizard species, rare invertebrates including katipō (*Latrodectus katipo*) and rare cushion plants, kōwhangatara (*Spinifex sericeus*) and sand tussock (*Poa cita*) are also found here. The Wainuiomata River and river valley escarpment are important areas for native fish such as inanga, rare lizards and other threatened plants such as the nationally endangered plant tororaro (*Muehlenbeckia astonii*) which is found near the river.

The KNE site has a number of freshwater ecological and cultural (wai Māori) values present with not only the Wainuiomata River and estuary/hapua present but also a number of oxbow wetlands along the river corridor and coastal wetlands. The farmland within the Regional Park also contains a number of seepage wetlands.

The KNE site contains land within the Regional Park and adjacent private land block owned and managed by the Tūpoki Takarangi Trust. The Friends of Baring Head Trust (FOBHT) are instrumental in the delivery of biodiversity management within the KNE site and in partnership with Greater Wellington.

## 5. Parties involved

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

### 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 Plan<sup>7</sup>. The Parks Network Plan guides the recreational and amenity uses of the park as well as identifying opportunities to protect biodiversity values. This KNE Operational 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 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 activities on the Trust's land.

See Appendix 1, Map 2 for landownership boundaries.

### 5.2. Operational delivery

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

- The Biodiversity department is the overarching lead department for Greater Wellington on the longer term planning and coordination of biodiversity management activities and advice within the KNE site.
- The Biosecurity department coordinates and implements pest control measures at the KNE site. The Biodiversity department's funds the Biosecurity department to coordinate and carry out pest control activities.
- The Parks department manages/funds ecological restoration work within the KNE site. Greater Wellington's Park department make available on an annual basis an Environmental Restoration budget for use by volunteer groups within the Regional Park. The purpose and use of this fund is jointly agreed by the Greater Wellington Park Ranger and the volunteer group. The Park Ranger is the primary contact for FOBHT and other volunteers or contractors. The Parks' department also manages recreational access and maintains assets such as roads, tracks and amenity areas within the KNE site.
- The Environmental Science department coordinate monitoring (Small Mammal Monitoring, Lizard project), undertake the review and approval of research and collection permits, and assessment of environmental effects of proposed activities within the regional park.

FOBHT has been actively involved/leading restoration activities in the KNE site since the land was purchased in 2010. The FOBHT has funded fencing and an intensive



predator control programme to protect banded dotterel nesting sites, 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.

The stated purpose of the FOBHT 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.

### 5.3. Mana whenua partners

The Baring Head area is significant to Taranaki Whānui ki te Ika a Maui, who are mana whenua partners with Greater Wellington. There are many archaeological sites from early occupation within the regional park including shell middens, rock shelters, pa, village sites and burial sites. An extensive cultural values report on Ōrua-poua-nui / Baring Head is available<sup>8</sup>.

The area has been identified under the Proposed Natural Resources Plan (PNRP)<sup>9</sup> as important culturally with particular reference to freshwater (wai māori) and sea water (wai tai) recognising that these are areas where mana whenua lived and practiced māhinga kai, tauranga waka, kainga and wāhi tapu (see table 1).

Greater Wellington is committed to identifying ways in which kaitiakitanga can be strengthened by exploring how mana whenua partners wish to be involved in the plan development or operational delivery of the KNE site. This is currently being developed with Te Rōpū Tiaki (the co-management board for the nearby Parangarahu Lakes Block, who also have an interest in this KNE site and, Tūpoki Takarangi Trust who are landowners within this KNE site.

**Table 1: Taranaki Whanui sites of significance in the KNE site<sup>10</sup>**

Sites of significance	Values
The Wainuiomata River mouth and foreshore	mahinga kai
The Parangarahu (Fitzroy Bay) shoreline	kāinga, pā, mahinga kai, tohu ahurea, wāhi tapu
The Baring Head/Oruapouanui shoreline	kāinga, pā, mahinga kai, tohu ahurea, wāhi tapu
The Okakaho stream	kāinga, mahinga kai, tauranga waka

## 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.

The Baring Head/Ōrua-pouanui KNE site is one of the highest value coastal ecosystem sites in the Wellington region. 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 climate.

### 6.1. Ecological designations

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

**Table 2: Designations at the Baring Head/Ōrua-pouanui KNE site**

Designation level	Type of designation
National	Parts of the KNE site are designated as Scenic Reserve: <ul style="list-style-type: none"> <li>Baring Head [WN42B/597]</li> </ul>
Regional	Parts of the KNE site are designated under Greater Wellington's Proposed Natural Resources Plan (PNRP) as: <ul style="list-style-type: none"> <li>River with Significant Indigenous Ecosystems - habitat for threatened and at risk fish species (Schedule F1): Wainuiomata River and all tributaries excluding Black Creek</li> <li>River with Significant Indigenous Ecosystems - habitat for six or more migratory fish species (Schedule F1): Wainuiomata River and all tributaries excluding Black Creek</li> <li>River with Significant Indigenous Ecosystems – high macroinvertebrate community health (Schedule F1): Unnamed tributary of the Wainuiomata River entering at point easting 1757332, northing 5415709</li> <li>River and parts of the coastal marine area with īnanga spawning habitat (Schedule F1b): Wainuiomata River</li> <li>Habitats for indigenous birds in the coastal marine area (Schedule F2): Baring Head and Wainuiomata River mouth and foreshore</li> <li>Site with significant indigenous biodiversity values in the coastal marine area (Schedule F4): Wainuiomata Estuary</li> </ul>
District	Parts of the KNE site are identified as a Significant Natural Resource in Hutt City Council's (HCC) district plan: <ul style="list-style-type: none"> <li>Baring Head foreshore</li> <li>Baring Head Reserve</li> </ul> The follow parts of the KNE site are identified as DOC Ecosites: <ul style="list-style-type: none"> <li>Baring Head Escarpments</li> <li>Baring Head Rivermouth</li> </ul>

	<ul style="list-style-type: none"> <li>• Baring Head Beach</li> <li>• Fitzroy Bay Beach</li> </ul>
Other	<p>Parts of the KNE site are designated under Greater Wellington’s Proposed Natural Resources Plan (PNRP) as:</p> <ul style="list-style-type: none"> <li>• Important trout fishery river and spawning waters (Schedule I): Wainuiomata River</li> </ul>

## 6.2. Ecological significance

The Baring Head/Ōrua-pouanui 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 shorebird, lizard, and invertebrate species within the KNE site.

### *Representativeness*

The Threatened Environment Classification system<sup>11</sup> indicates 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’.

The Singers and Rogers<sup>12</sup> classification of pre-human vegetation indicates the KNE site would likely have comprised of five different ecosystem types including riverine, cliff and forest types, most of which are regionally threatened: *WF1- Titoki, ngaio forest* of which only 3% remains of the original extent in the Wellington region; *WF2- Tōtara, mataī, ribbonwood forest (3% remaining)*; *CL3-Coprosma, Muehlenbeckia shrubland/herbfield/rockland*; *BR1- Hard tussock, scabweed gravelfield/stonefield*; and *MF5-Black beech forest*<sup>13</sup>.

Remnants of cliff, riverine, titkoi, ngaio and black beech vegetation types are still present today although in a modified form. Most of the *tōtara, mataī, ribbonwood forest* ecosystem type along the river corridor is no longer present due to clearance for farming practices. This area is now part of a large scale restoration planting project.

Wetlands are now considered an uncommon habitat type in the Wellington Region with less than 3% remaining of their original extent<sup>14</sup>.

### *Rarity/distinctiveness*

Several naturally uncommon ecosystems<sup>15</sup> are present at Baring Head/Ōrua-pouanui KNE site. These are: coastal turf (Nationally Critical); stony beach ridges, shingle

beaches, stable sand dunes, coastal lagoon (all Nationally Endangered), and estuary (Nationally Vulnerable).

New Zealand's national threat classification system<sup>16</sup> lists many nationally 'Threatened' or 'At Risk' plant, bird, fish, lizard and invertebrate species within the KNE site. Appendix 2 and 3 contain lists of nationally and regionally threatened species found within the KNE site.

#### *Diversity*

Remaining within the KNE site today are four distinct broad ecosystems, the coastal escarpment, the valley escarpment, the Wainuiomata River and river terraces and the coastal platform (See Appendix 1, Map 3). Although these ecosystems are in a modified form today they contain a great deal of diversity of habitats and ecotones that support a high diversity of flora and fauna including cushion field, oxbows and other wetlands, and river turf communities.

#### *Ecological context*

The KNE site contains several distinct ecosystem types which provide a link to other similar sites nearby: Parangarahu Lakes and Pencarrow dunes to the north and Turakirae Head to the south-east. The KNE site also contains the lower reaches of the Wainuiomata River, which is a natural connection to the inland catchments.

### **6.3. Ecological features**

See Appendix 1 Map 3 for the four broad ecosystem locations and Map 4 for the key ecological features which are discussed below.

Appendix 2 and 3 contain lists of nationally and regionally threatened species found within the KNE site.

#### **Vegetation communities and plants**

##### *Coastal escarpment*

The Singers and Rogers<sup>17</sup> 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 mingimingi (*Coprosma propinqua*), pohuehue (*Muehlenbeckia australis*), and thick-leaved māhoe (*Melicytus crassifolius*). Other species present in this vegetation include wharariki (*Phormium cookianum* subsp. *hookeri*), tauhinu (*Ozothamnus leptophyllus*), taupata (*Coprosma repens*), and 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<sup>18</sup> classification 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, 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 (*Dacrycarpus 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 greyi*, Cook Strait kōwhai (*Sophora molloyi*), leafless clematis (*Clematis afoliata*) and two species of mistletoe; leafless mistletoe (*Korthalsella lindsayi*) and green mistletoe (*Ileostylus micranthus*).

#### *Wainuiomata River and river terraces*

In the lower reaches of the Wainuiomata River there is 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 endangered, 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*), teasel sedge (*Carex dipsacea*) and 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 īnanga.

The Singers and Rogers<sup>19</sup> classification 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. They are largely dominated by exotic plant species and 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. This dynamic environment consists of highly modified and often disturbed gravel/stonefield ecosystems such as stony beach ridges, shingle beaches, stable sand dunes and cushionfields.

The gravel/stonefields on the coastal platform following extensive weed control of boxthorn (*Lycium ferocissimum*), lupin (*Lupinus arboreus*), marram (*Ammophila arenaria*) and gorse (*Ulex europaeus*), now consist of native dunes species such as kōwhangatara, 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 (*Melicytus ramiflorus*), taupata (*Coprosma repens*) and mingimingi.

A fenced area off Fitzroy Bay protects a *roulia australis*-dominated cushionfield where *roulia* aff. *hookeri*, sand daphne (*Pimelea prostrata*) and mingimingi are also present.

A number of small wetlands are present at the bottom of the escarpments, 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 these wetlands are recovering.

## Species

### Birds

Thirty-one bird species have been recorded from the KNE site of which 10 are nationally threatened and 15 regionally threatened. The Wainuiomata River estuary consists of gravel/stonefields where banded dotterel 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*).

### Reptiles

Four species of native lizard have been recorded at the KNE site primarily on the escarpments and coastal platform where scree slopes and driftwood piles provide lizards with a refuge from predators. The site is important for the nationally At Risk northern spotted skink (*Oligosoma kokowai*), and regionally Critical copper skink (*Oligosoma aeneum*), whilst also supporting good populations of raukawa gecko (*Woodworthia maculata*) and northern grass skink (*Oligosoma polychroma*).

### Fish

Eleven species of native fish have been recorded in the river, seven of which are 'Threatened'. The lower reaches of the river provide known spawning habitat for īnanga.

### Invertebrates

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*), NZ red admiral butterfly (*Vanessa gonerilla*) and Myers' cicada (*Maoricicada myersi*).

## 7. Threats to ecological values at the KNE site

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

### 7.1. Key threats

The ecosystems within the Baring Head/Ōrua-pouanui KNE site have a number of threats which are preventing natural ecological process from occurring effectively and have changed the composition of the habitat available for native species.

The Wainuiomata River and other freshwater wetlands are impacted by aquatic weeds. *Egeria densa*, *Lagarosiphon major*, cape pondweed (*Aponogeton distachyus*), amongst others are present through these freshwater systems affecting the ability of native aquatic plants to establish. The Wainuiomata River is a much altered aquatic system with few shaded areas affecting water temperature, low native aquatic plant presence, poor spawning capabilities or refuge areas for native fish.

The coastal platform and escarpments have been very weedy with marram grass (*Ammophila arenaria*), boxthorn (*Lycium ferocissimum*), gorse (*Ulex europaeus*), karo (*Pittosporum crassifolium*) and lupin (*Lupinus arboreus*) all previously well-established, outcompeting native vegetation and having an adverse impact of the natural dune processes. This has ultimately reduced the sites' ability to support native plant and animal species such as pīngao and katipō.

Native animal and plant species are under threat from introduced pest animals that either predate or disturb the native animals (eg, banded dotterels, lizards) or over-browse the vegetation and habitat they rely on. Introduced pests currently managed at the KNE site include hedgehogs (*Erinaceus europaeus*), mustelids (*Mustela* sp.), feral cats (*Felis catus*), possums (*Trichosurus vulpecula*), hares (*Lepus europaeus*) and feral goats (*Capra hircus*).

Off-road vehicles are known to access the beaches on the coastal platform and can destroy areas of sensitive vegetation such as the cushion fields and, can disturb or crush nests and eggs of breeding shorebirds.

While the key threats discussed in this section are recognised as the most significant, it is important to note that not all threats can be adequately addressed. This can be for a number of reasons including financial, legal, or capacity restrictions. A number of other threats to the KNE site's values have also been identified. Appendix 3 presents a summary of 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.

## 8. Vision and objectives

### 8.1. Vision

The KNE site is a dynamic, interconnected coastal, riverine and wetland ecosystems supporting a diverse range of indigenous wildlife and plants in functioning populations.

### 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 Baring Head/Ōruapouanui KNE site:

- 1. Enhance the site's freshwater and wetland values***
- 2. Protect and enhance the habitat for threatened shorebird, invertebrate and lizard***
- 3. Improve rare and uncommon plant species abundance***
- 4. Enhance landscape-scale regeneration***
- 5. Support the FOBHT in achieving their ecological aspirations at the site and in their adaptive management processes.***



## 9. Operational activities

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

### 9.1. KNE site boundary review

Greater Wellington are undertaking a significant programme of wetland delineation in response to the development of new regional and national legislation guidance for wetlands. The Regional Park's grazing areas have a number of potential wetland features that are in the process of being assessed. Once this process is completed, identified natural wetlands should be included within the KNE site boundary and managed appropriately.

### 9.2. 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 (eg, the coastal platform, river corridor and wetlands) towards habitats dominated by invasive and exotic plant species.

In the course of the last operational plan, ecological weed control has been successful in significantly reducing large infestations of lupin, marram, horned poppy and boxthorn on the coastal platform, including into the Takarangi Trust block (where control was undertaken for the first time). Site-wide surveillance of other isolated weeds such as boxthorn, old man's beard, monkey musk, briar rose has also been undertaken and recently FOBHT have funded abseil contractors to target control of karo, succulents and boxthorn on the southern coastal escarpment. Greater Wellington has also supported the restoration planting programme along the Wainuiomata River by undertaking gorse, tradescantia and willow control prior to planting [See restoration project below for more details on the restoration planting].

Over the course of this operational plan pest plant control will largely continue to follow up on previous operations consolidating the gains made to date. See Appendix 1; Map 3 for operational areas.

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

- Ground-based woody weed control along both sides of the Wainuiomata River (operational area C) targeting gorse and willows as needed ahead of plantings.
- Marram grass control along the entire Coastal Platform in year 3 (operational area D)
- Follow up control on isolated weeds throughout the KNE site and surveillance for boundary incursions of weeds such as Spanish heath.
- Follow up ground-based control along the Southern Coastal Platform (operational area D) targeting lupin and boxthorn.

- Follow up ground-based control along the Fitzroy Bay Coastal Platform within Greater Wellington-land and Tūpoki-Takarangi Trust land (operational area D) targeting lupin, gorse and boxthorn.
- Monitor the need for follow up aerial control of gorse along the river valley escarpment.

In addition to the operations outlined above, the need for professional abseiling contractors to target karo, boxthorn and succulent species along the southern escarpment will be determined by FOBHT/Greater Wellington on an annual basis. These operations are largely funded by FOBHT through the Environmental Restoration Budget made available to them by Greater Wellington Parks' Department or via external funding applications.

FOBHT and Greater Wellington will also review the best approach for cape pondweed control from the oxbow wetlands along the River Terrace (operational area C). Current best practice indicates this is best achieved by hand removal of the plants' corms to achieve successful eradication, however, previous attempts to undertake this task have proven unsuccessful at this location. The priority location for control of this species would be the oxbow wetlands south of the bridge.

FOBHT volunteers will continue to control horned poppy and small patches of lupin seedlings and marram on the coastal platform by hand weeding (operational area D) during regular working bees, and identify and control (where practicable) new weed infestations.

FOBHT volunteers will also monitor and weed as required the newly fenced off area on the southern coastal escarpment to maximise the restoration of this area and support any plantings placed here.

### **9.3. 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 kill-traps (targeting mustelids, feral cats, rats and hedgehogs) and poison bait stations (targeting possums and rats) have been installed across the KNE site. Kill-traps on the southern coastline are positioned more intensively (50 m apart) to provide greater protection for nesting shore birds such as the banded dotterels (see Appendix 1; map 5). In the course of the last operational plan this network received a completed upgrade and overhaul to ensure it remains effective and safe.

All of the kill-traps are serviced monthly by FOBHT volunteers. Greater Wellington's Park Ranger currently services the poison bait station network on a three-monthly basis.

From July to February when the banded dotterels are present and predator numbers are likely to increase<sup>20</sup> Greater Wellington and FOBHT combine servicing efforts to

ensure the kill-traps are serviced twice-monthly. This was initiated in the course of the last operational plan and will be continued during the course of this operational plan.

During the July to February period, night shooting is undertaken on a monthly basis targeting feral cats and hedgehogs. This is undertaken by Greater Wellington biosecurity staff as a voluntary firearms training opportunity.

Greater Wellington's Biosecurity staff will undertake an annual safety and maintenance audit 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. An annual trappers' catch up is also undertaken as an opportunity to discuss any changes to trapping best practice and ensure any safety concerns are addressed.

Rabbits, hares and feral goats are targeted for control on an 'as needed' basis and determined annually in conjunction with Greater Wellington. These operations are largely funded by FOBHT through the Environmental Restoration Budget made available to them by Greater Wellington Parks' Department or via external funding applications. Rabbits, hares and goats were last controlled in 2020/21.

#### **9.4. Lizard habitat project**

Following surveys of the distribution and abundance of lizard species in 2013 and 2014, priority areas for habitat protection were identified along the river escarpment where northern spotted skinks had been recorded, along with copper skinks, northern grass skinks, and raukawa geckos. FOBHT initiated a lizard habitat protection project utilising a grant from DOC's Community Conservation Fund along five small suitable areas of the river terrace to install an intensive bait station and kill-trap network to protect the skink habit from pest animal threats such as feral cats, rats, mice and hedgehogs. See Appendix 1; map 6 for lizard habitat project area.

In the course of the last operational plan, the five project areas were amalgamated to form a much larger (~4 ha) and more defensible area. This intensive bait station and kill-trap network is serviced six times per year by Greater Wellington. In addition, a chew card monitoring programme was also installed to monitor the effectiveness of the intensive rodent control. The monitoring is undertaken bi-annually in April and November by Greater Wellington.

Greater Wellington have recently commissioned consultants to undertake specific baseline survey for northern spotted skink in the project area. This baseline survey found over 20 northern spotted skinks in the project area, well in excess of numbers previously encountered. Follow up surveys are recommended in December 2021 and 2022 to determine population status and temporal trends in the northern spotted skink as a result of the intensive pest management programme. These surveys have not been confirmed to date. Results of these surveys will be used to inform future management required for the species.

#### **9.5. Restoration planting**

Revegetation will continue to focus on the objectives highlighted above. The work will be agreed annually in collaboration with FOBHT who generally undertake the planting

through working bees or by organising other volunteer groups (eg, schools or corporate groups).

Restoration planting at the KNE site has three primary target outcomes. These are outlined below.

#### **To increase the abundance of uncommon or missing species**

In the course of the last operational plan Greater Wellington developed a projected that is aimed to expanding populations of rare/uncommon plants through reintroduction of missing species where possible/permitted. This is implemented by an annual programme of seed collection from existing plants on-site and nearby.

Planting of rare and uncommon species from this project will be in areas deemed to be safe from browsing animals. This is likely to include the newly fenced off southern escarpment project area and any new fenced/sheltered areas across the KNE site identified during the course of this operational plan.

#### **To assist natural regeneration in areas retired from grazing along the river terrace (operational area C)**

In the course of the last operational plan, FOBHT, Conservation Volunteers New Zealand (CVNZ), Million Meters Project and Greater Wellington have collaborated to restore 91 ha of retired grazing land along the Wainuiomata River.

FOBHT, CVNZ and Greater Wellington will agree to an annual planting plan once the budget is confirmed from crowd sourcing via Million Meters. To date over 20,000 plants have been planted in nodes along riparian margins and associated wetlands.

#### **Improve the protection and value of the wetlands**

FOBHT have been undertaking planting in and around the margins of the oxbow wetlands for a number of years since the river valley was retired from grazing. A small annual planting programme will continue in these areas to help protect the wetlands from exotic plant incursions and to enhance the existing biodiversity value and function of the wetland systems. This is largely funded by FOBHT utilising the Environmental Restoration Budget.

### **9.6. Wainuiomata River enhancement**

In the course of the last operational plan, a river restoration recommendation report was commissioned by FOBHT to provide recommendations on the best and most practical options for enhancing the functionality of the lower reaches of the Wainuiomata River for native freshwater fish species.

During the course of this operational plan, Greater Wellington and FOBHT will develop and implement the following recommendations from this report:

- Diversify restoration plantings along river corridor for shade and commence plantings on the Takarangi block of species such as tree fuchsia, kowhai, titoki, kahikatea puketea and mamuku.

- Allow the tributary located by the car park bridge to input gravel into the Wainuiomata River that is currently being prevented by a stock fence. This will provide habitat for fish spawning and encourage natural river behavior.
- Provide large wood debris into the river to improve invertebrate habitat and fish food sources.
- Manage the aquatic weeds by reducing their biomass to facilitate native species establishment and growth within the river.

## 9.7. Coastal invertebrate habitat enhancement

In 2019 katipō spider were confirmed to still be present on the southern coastal platform<sup>21</sup>. Given this result and the known historical records of the Wellington coastal moth species, NZ red admiral butterfly and Myers' cicada at the site, FOBHT are undertaking an annual programme of improvements to the coastal platform habitat for invertebrates which will involve creating habitat piles from driftwood in the grassed/vegetated areas.

Keeping vehicles off the beach areas at Fitzroy Bay, in particular, is another threat to address. FOBHT and Greater Wellington are currently exploring management options to protect potential katipō habitat (and other invertebrate habitat). This may involve the use of bollards or large driftwood features to discourage vehicle access to sensitive areas.

## 9.8. Monitoring

### Small mammal monitoring

Greater Wellington undertakes small mammal monitoring (quarterly for rodents and six-monthly for mustelids/hedgehogs) across the KNE site. Tracking Tunnel Index (TTI) method is used to monitor the presence of small mammal species.

The results will provide an indication of the effectiveness of the pest animal control network at Baring Head/Ōrua-pouanui KNE site and more broadly across similar habitat.

### Regional Lizard monitoring

The Wellington Regional Lizard Strategy<sup>22</sup> identified Baring Head/Ōrua-pouanui KNE site as one of a number of sites of importance in the region for lizards as it contains both common and nationally At Risk species. As a result, Greater Wellington established regional monitoring programme to survey for changes in lizard occupancy, distribution and abundance over time in the region. Baring Head/Ōrua-pouanui is one site where these surveys are undertaken. Surveys are conducted for three years in a row to even out inter-annual variation followed by a three year break. The next surveys are to be completed from December 2022.

### **Katipō spider monitoring**

In the course of the last operational plan katipō spider were confirmed present at the KNE site. These surveys were undertaken in coordination with FOBHT by volunteer group Sustainable Wairarapa.

Monitoring of the katipō spider population will be undertaken during the timeframe of this operational plan. However, it is recommended that these surveys should be undertaken relatively infrequently so animals aren't disturbed too often. Monitoring is likely to be undertaken in years 3-5 of this operational plan.

## 10. Volunteer/Student opportunities

FOBHT have identified a number of projects or topics suitable for volunteers or university students to undertake.

These are:

- Banded Dotterel monitoring
- Developing a GIS-based project management tool
- Drone surveys/monitoring to help inform and monitor restoration activities to support FOBHT by setting up online restoration mapping tool and drone footage
- Assessing the relationship between river turf plant populations and grazing
- Assessing the value of oxygen weed management
- recording the development and revegetation of river islands

The discuss any of the above or other site-based opportunities please contact the Chair of FOBHT.

## 11. Operational delivery schedule

The operational delivery schedule shows the actions planned to achieve the stated objectives for the Baring Head/Ōrua-pouanui KNE site, and their timing and cost over the five-year period from 1 July 2021 to 30 June 2026. The budget for years 2022/23 to 2025/26 are indicative only and subject to change. A map of operational areas can be found in Appendix 1 (see Map 3).

**Table 3: Five-year operational plan for the Baring Head/Ōrua-pouanui KNE site**

Objective	Activity	Operational area	Intended outcome	Implementing party	Timetable and resourcing where allocated				
					2021/22	2022/23	2023/24	2024/25	2025/26
2, 4	Service kill-traps monthly  Bait/lure provided by Greater Wellington – see below	Site-wide	Greater dotterel nesting success  Enhanced regeneration across the KNE site Possums: < 5% RTC* Rats: < 10% TTI** Mustelids <2% TTI**	FOBHT	✓	✓	✓	✓	✓
2, 5	Extra trapping support (8 services) in dotterel season between July - February	Coastal platform	Greater dotterel nesting success  Support to ensure traps are serviced twice monthly	Greater Wellington	✓ \$4,000	✓ \$4,000	✓ \$4,000	✓ \$4,000	✓ \$4,000
2, 5	Trap network audit, and annual trapper's catch up	Site-wide	Annual safety and maintenance audit of bait station and trap network to ensure safe and effective operation.	Greater Wellington	✓ \$1,000	✓ \$1,000	✓ \$1,000	✓ \$1,000	✓ \$1,000
2, 5	Bait/lure provision and trap maintenance materials	Site-wide	Ensure pest control network effectiveness is maximized with provision of fresh bait/lure.	Greater Wellington	✓ \$1,600	✓ \$1,600	✓ \$1,600	✓ \$1,600	✓ \$1,600



Objective	Activity	Operational area	Intended outcome	Implementing party	Timetable and resourcing where allocated				
					2021/22	2022/23	2023/24	2024/25	2025/26
2, 4	Monthly night shooting between July - February targeting feral cats and hedgehogs	Site-wide	Greater dotterel nesting success	Greater Wellington	✓ Staff training opportunity	✓ Staff training opportunity	✓ Staff training opportunity	✓ Staff training opportunity	✓ Staff training opportunity
2	Lizard project area bait station servicing – six times per year	River Escarpment - Lizard project area	Improved habitat for lizards on the river escarpment and protection against key threats	Greater Wellington	✓ \$6,000	✓ \$6,000	✓ \$6,000	✓ \$6,000	✓ \$6,000
2	Lizard project area chew card monitor twice per year	River Escarpment	Monitor target species in November and April annually	Greater Wellington	✓ #	✓ #	✓ #	✓ #	✓ #
2, 3, 4	Lupin, boxthorn, gorse control	Coastal platform	Suppression of target weed species to allow existing native stock to expand range in operational area.	Greater Wellington	✓ \$ 15,000	✓ \$ 15,000	✓ \$ 15,000	✓ \$ 15,000	✓ \$ 15,000
2, 3, 4	Marram control	Coastal platform	Suppression of target weed species to allow existing native stock to expand range in operational area.	Greater Wellington			✓ \$3,000		

Objective	Activity	Operational area	Intended outcome	Implementing party	Timetable and resourcing where allocated				
					2021/22	2022/23	2023/24	2024/25	2025/26
1, 2, 4	Control other known weed infestations and maintain surveillance against new incursions	Site-wide	Prevention establishment of weeds in new areas Assist natural regeneration across the KNE site Prevent new invasive species incursions	Greater Wellington	✓ \$3,000	✓ \$3,000		✓ \$3,000	✓ \$3,000
2	Horned poppy and juvenile lupin control during working bees	Coastal platform	Suppression of target weed species to allow existing native stock to expand range in operational area.	FOBHT	✓	✓	✓	✓	✓
3	Rare plant seed collection, propagation and replanting	Site-wide	Plant missing and under-represented threatened native plant species.	Greater Wellington / contractor	✓ \$3,000	✓ \$3,000	✓ \$3,000	✓ \$3,000	✓ \$3,000
2, 4, 5	Small Mammal Monitoring four times per year	Site-wide	Report on the effectiveness of the pest animal control regime	Greater Wellington	✓ \$13,500	✓ \$13,500	✓ \$13,500	✓ \$13,500	✓ \$13,500
2	Site-wide Lizard surveys as part of regional surveying	Site-wide	Monitor for changes in lizard occupancy, distribution and abundance	Greater Wellington		✓ #	✓ #	✓ #	

Objective	Activity	Operational area	Intended outcome	Implementing party	Timetable and resourcing where allocated				
					2021/22	2022/23	2023/24	2024/25	2025/26
1, 2,	FOBHT working bees – other activities	Site-wide	<ul style="list-style-type: none"> <li>- Aquatic weed control</li> <li>- Install and maintain dotterel fence annually</li> <li>- Improve coastal platform for invertebrates</li> <li>- Planting oxbow wetlands</li> <li>- Katipo and other invertebrate surveys</li> </ul>	Greater Wellington / FOBHT	✓ ¥	✓ ¥	✓ ¥	✓ ¥	✓ ¥
4	Wainuiomata River restoration plantings project	River Terrace	Plant native plants on the river terrace to enable natural regeneration and erosion control as per annual planting plan.	Greater Wellington /FOBHT/CVNZ /Million Meters	✓ ##	✓ ##	✓ ##	✓ ##	✓ ##
1, 5	Plan and implement river restoration report actions	River Terrace	Improved habitat for native freshwater fish	Greater Wellington / FOBHT	✓ ¥	✓ ¥	✓ ¥	✓ ¥	✓ ¥

\*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.

# = funded by Greater Wellington's Terrestrial Science team via regional programmes. Cost breakdown by site cannot be provided at this time.

## = funded through Million Meters crowd sourcing and determined annually.

¥ = funding support via the Parks environmental restoration budget and determined annually.

## 12. Funding contributions

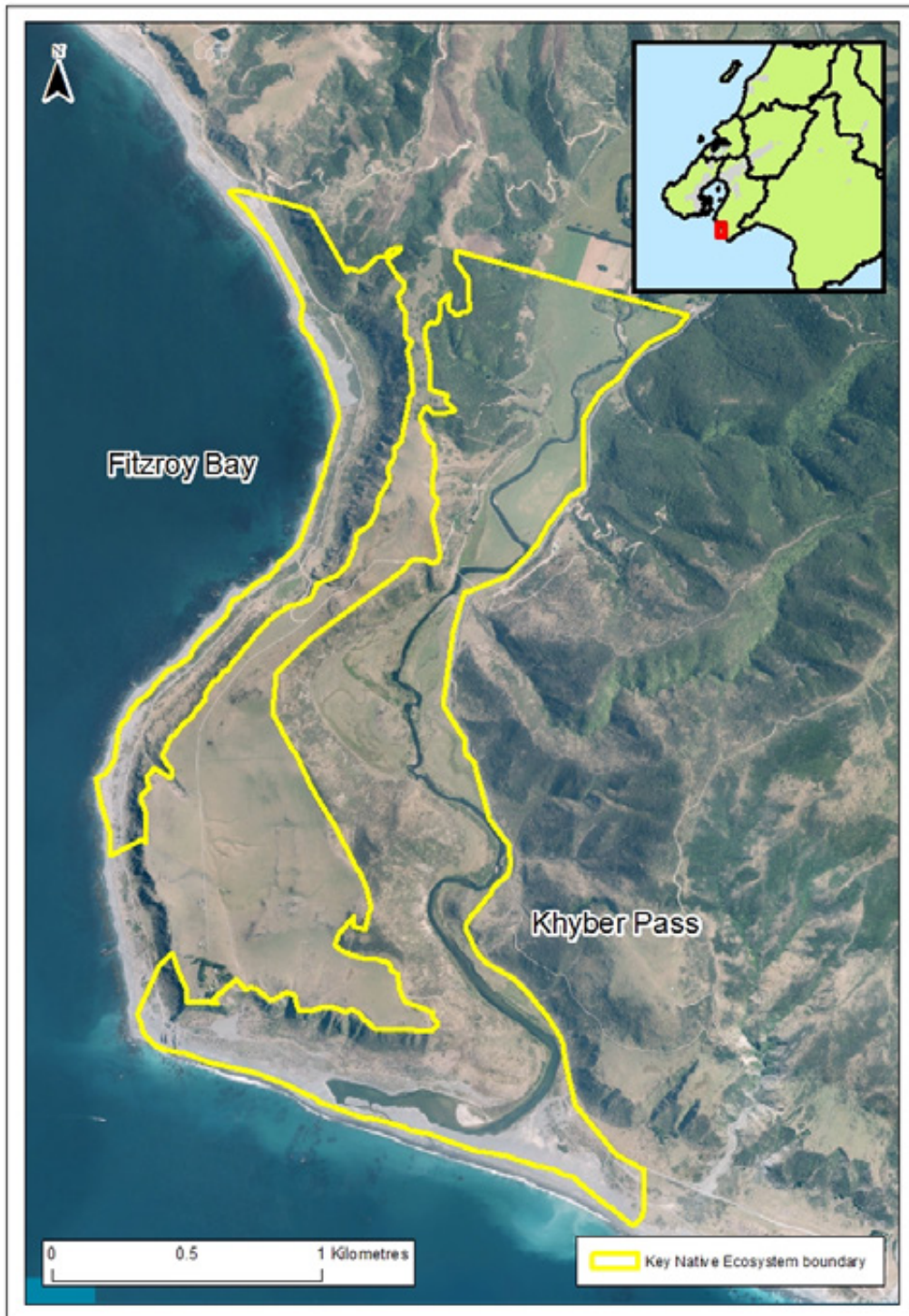
### 12.1. Budget allocated by Greater Wellington

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

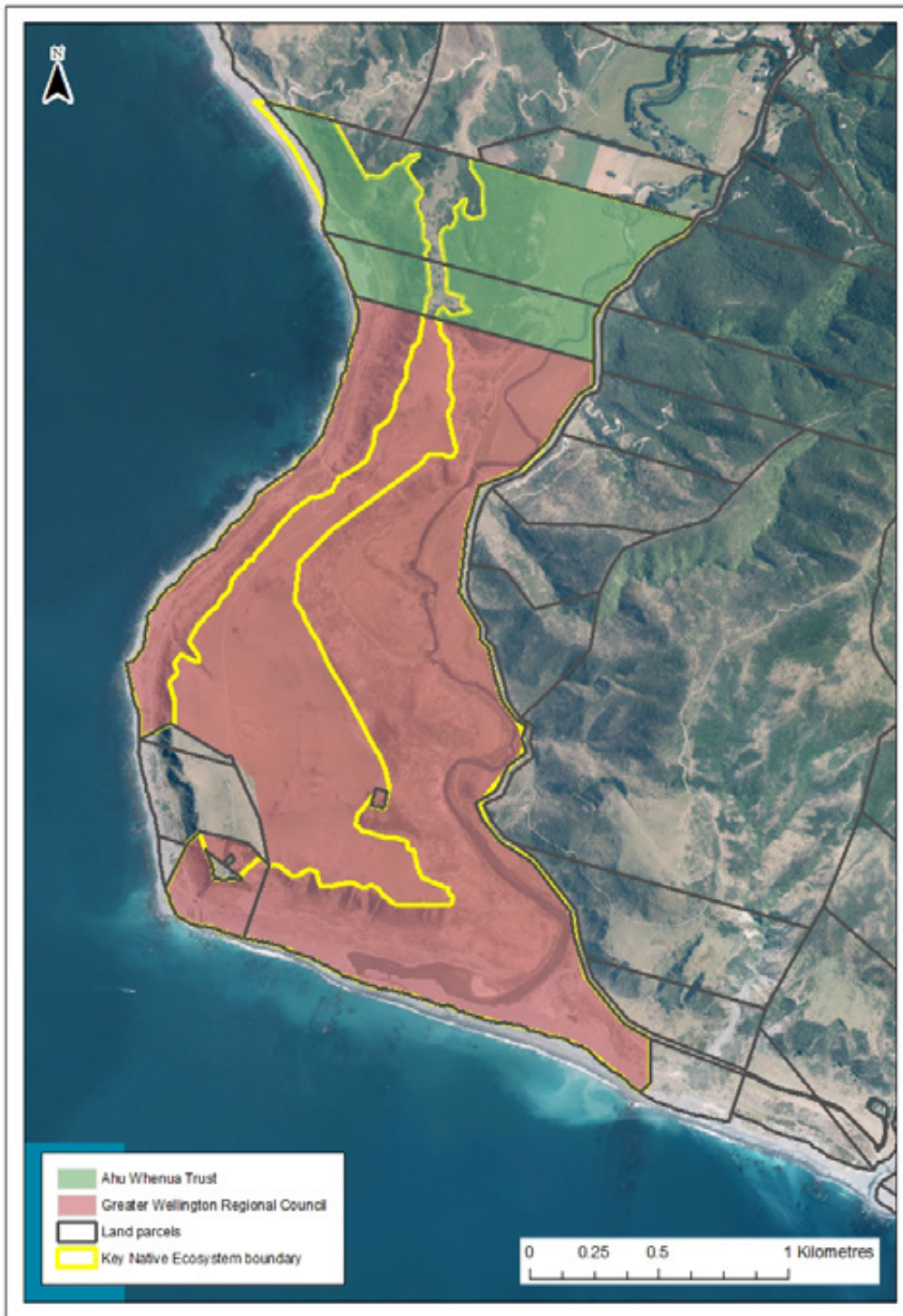
**Table 4: Greater Wellington allocated budget for the Baring Head/Ōrua-pouanui KNE site**

Management activity	Timetable and resourcing				
	2021/22	2022/23	2023/24	2024/25	2025/26
Ecological weed control	18,000	18,000	18,000	18,000	18,000
Pest animal control	12,600	12,600	12,600	12,600	12,600
Revegetation	3,000	3,000	3,000	3,000	3,000
Monitoring	13,500	13,500	13,500	13,500	13,500
Environmental Restoration Budget	7,000	7,000	7,000	7,000	7,000
<b>Total</b>	<b>\$54,100</b>	<b>\$54,100</b>	<b>\$54,100</b>	<b>\$54,100</b>	<b>\$54,100</b>

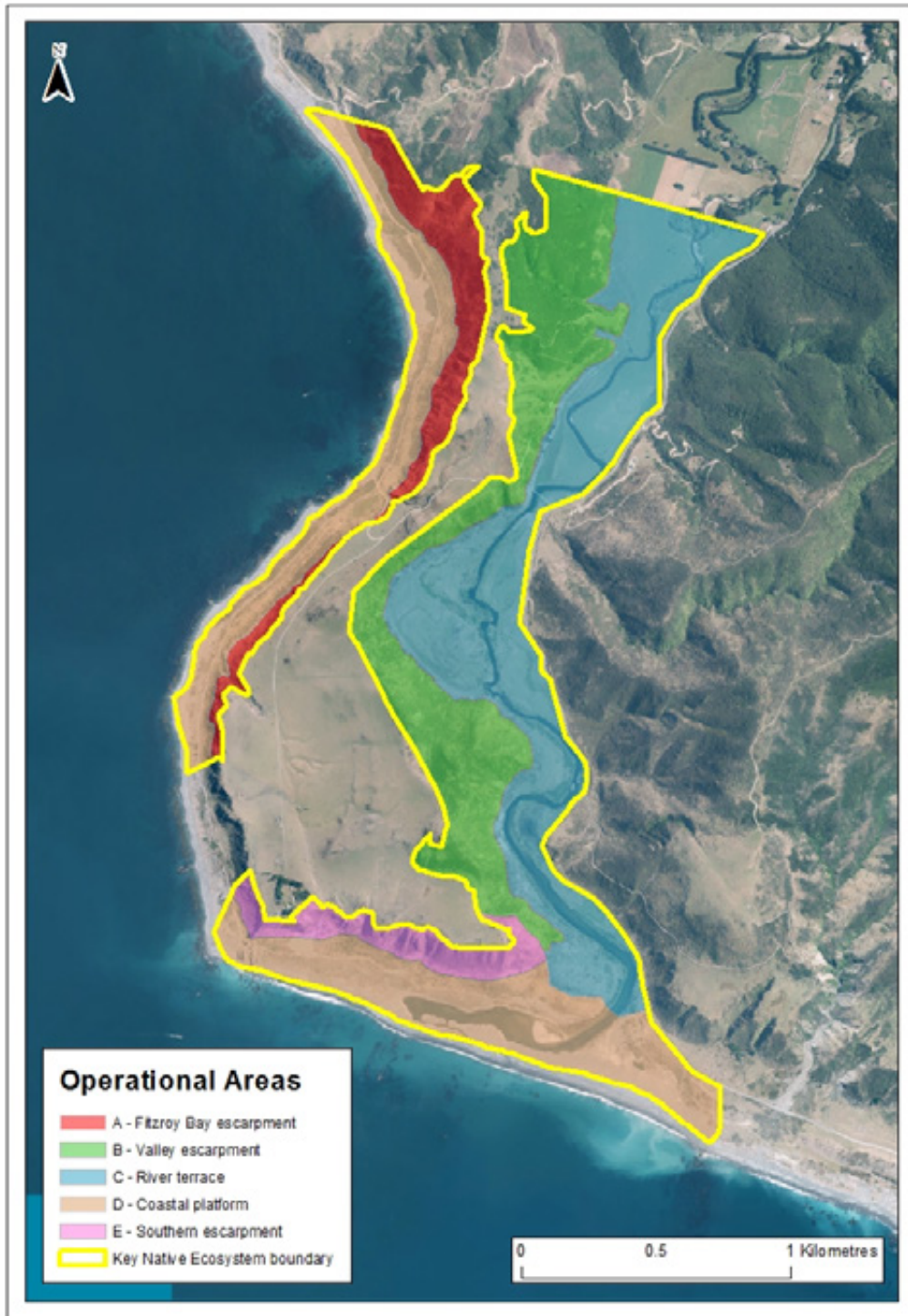
## Appendix 1: Site maps



Map 1: The Baring Head/Ōrua-pouanui KNE site boundary



Map 2: Land ownership parcels for the Baring Head/Ōrua-pouanui KNE site

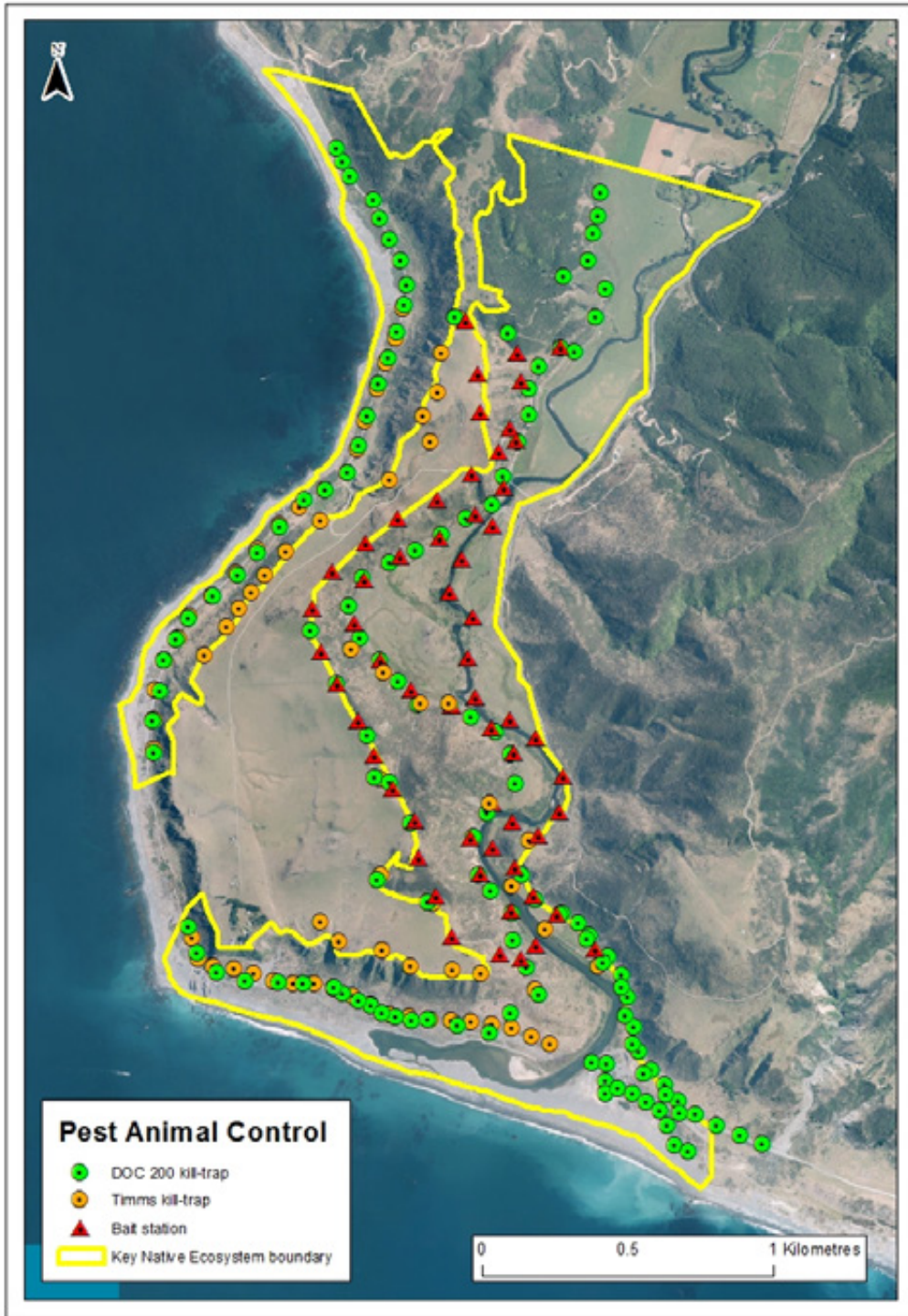


Map 3: Operational areas in the Baring Head/Ōrua-pouanui KNE site



Map 4: Key ecological features in the Baring Head/Ōrua-pouanui KNE site





Map 5: Pest animal control in the Baring Head/Ōrua-pouanui KNE site



Map 6: Lizard habitat project area in Baring Head/Ōrua-pouanui 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 cycle<sup>23</sup>. Species are regarded as Threatened if they are classified as Nationally Critical, Nationally Endangered or Nationally Vulnerable. They are regarded as At Risk if they are classified as Declining, Recovering, Relict or Naturally Uncommon. The following table lists Threatened and At Risk species that are resident in, or regular visitors to, the Baring Head/Ōrua-pouanui KNE site.

**Table 5: Threatened and At Risk species at the Baring Head/Ōrua-pouanui KNE site**

Scientific name	Common name	Threat status	Source
Plants(vascular) <sup>24</sup>			
<i>Aciphylla squarrosa</i> var. <i>squarrosa</i>	Speargrass	At Risk – Declining	Hopkins et al 2010 <sup>25</sup>
<i>Brachyglottis greyi</i>		Naturally Uncommon	Hopkins et al 2010
<i>Crassula kirkii</i>	Kirk’s crassula	Naturally Uncommon	Hopkins et al 2010
<i>Crassula mataikona</i>		Naturally Uncommon	Hopkins et al 2010
<i>Discaria toumatou</i>	matagouri	At Risk - Declining	Hopkins et al 2010
<i>Ficinia spiralis</i>	Pīngao	At Risk - Declining	Hopkins et al 2010
<i>Geranium</i> aff. <i>microphyllum</i>		Naturally Uncommon	Hopkins et al 2010
<i>Isolepis basilaris</i>	Pygmy clubrush	Naturally Vulnerable	Hopkins et al 2010
<i>Leptinella tenella</i>		At Risk - Declining	Hopkins et al 2010
<i>Muehlenbeckia astonii</i>	Tororaro	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>	Thick-leaved māhoe	At Risk – Declining	Hopkins et al 2010
<i>Metrosideros perforata</i>	Akatea	Nationally vulnerable	Hopkins et al 2010
<i>Pimelea prostrata</i> subsp. <i>prostrata</i>	NZ daphne	At Risk – Declining	Hopkins et al 2010
<i>Poa billardierei</i>	Sand tussock	At Risk – Declining	Hopkins et al 2010
<i>Roulia</i> aff. <i>Hookeri</i>		At Risk – Declining	Hopkins et al 2010
<i>Sophora molloyi</i>	Cook Strait Kōwhai	At Risk – Naturally Uncommon	Matt Ward, pers obs. 2020

Scientific name	Common name	Threat status	Source
<i>Trisetum antarcticum</i>		At Risk – Declining	Hopkins et al 2010
Birds <sup>26</sup>			
<i>Anas superciliosa</i>	Grey duck	Nationally Critical	MacArthur 2021 <sup>27</sup>
<i>Anthus novaeseelandiae</i>	NZ pipit	At Risk – Declining	MacArthur 2021
<i>Charadrius bicinctus</i>	Banded dotterel	Nationally Vulnerable	MacArthur 2021
<i>Eudyptula minor</i>	Little penguin	At Risk – Declining	MacArthur 2021
<i>Haematopus unicolor</i>	Variable oystercatcher	At Risk – Recovering	MacArthur 2021
<i>Himantopus himantopus</i>	Pied stilt	At Risk – Declining	MacArthur 2021
<i>Hydroprogne caspia</i>	Caspian tern	Nationally Vulnerable	MacArthur 2021
<i>Larus novaehollandiae scropulinus</i>	Tarāpunga, red billed gull	Nationally Vulnerable	MacArthur 2021
<i>Phalacrocorax varius varius</i>	Pied Shag	Nationally Vulnerable	MacArthur 2021
<i>Sterna striata striata</i>	Tara, white fronted tern	At Risk – Declining	MacArthur 2021
Reptiles <sup>28</sup>			
<i>Oligosoma kokowai</i>	Northern spotted skink	At Risk – Relict	Romijn 2021 <sup>29</sup>
Freshwater fish <sup>30</sup>			
<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>	Īnanga	At Risk – Declining	New Zealand Freshwater Fish Database (accessed 2013)
<i>Galaxias postvectis</i>	Shortjaw kōkopu	Nationally Vulnerable	New Zealand Freshwater Fish Database (accessed 2013)
<i>Geotria australis</i>	Lamprey	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)

Scientific name	Common name	Threat status	Source
(Araneae – spiders) <sup>31</sup> (Lepidoptera – butterflies and moths) <sup>32</sup> (Hemiptera – true bugs) <sup>33</sup>			
<i>Ericodesma aerodana</i>	Moth	Nationally Endangered	Patrick 2004 <sup>34</sup>
<i>Latrodectus katipo</i>	Katipō spider	Nationally Endangered	Crisp 2011 <sup>35</sup>
<i>Maoricicada myersi</i>	Orongorongo black cicada/ Myer's cicada	Nationally Threatened	Borger 1997 <sup>36</sup>
<i>Notoreas perornata</i> (Wellington)	Coastal moth	Nationally Critical	Patrick 2004

### Appendix 3: Regionally threatened plant species list

The following table lists regionally threatened vascular plant, lizard and bird species that have been recorded in the Baring Head/Ōrua-pouanui KNE site. The following table lists Threatened and At Risk species that are resident in, or regular visitors to, the Baring Head/Ōrua-pouanui KNE site.

**Table 6: Regionally threatened species recorded in the Baring Head/Ōrua-pouanui KNE site**

Scientific name	Common name	Regional Threat status	Observation
Plants <sup>37</sup>			
<i>Aciphylla squarrosa</i> <i>var. squarrosa</i>	Speargrass	Vulnerable	Hopkins et al 2010 <sup>38</sup>
<i>Brachyglottis greyii</i>		Endangered	Hopkins et al 2010
<i>Clematis afoliata</i>	Leafless clematis	At Risk – Naturally Uncommon	Hopkins et al 2010
<i>Crassula kirkii</i>	Kirk's crassula	At Risk – Naturally Uncommon	Hopkins et al 2010
<i>Crassula mataikona</i>		At Risk – Naturally Uncommon	Hopkins et al 2010
<i>Discaria toumatou</i>	Matagouri	Endangered	Hopkins et al 2010
<i>Ficinia spiralis</i>	Pīngao	Vulnerable	Hopkins et al 2010
<i>Isolepis basilaris</i>	Pygmy clubrush	Critical	Hopkins et al 2010
<i>Korthalsella lindsayi</i>	Leafless mistletoe	At Risk – Naturally Uncommon	Hopkins et al 2010
<i>Leptinella tenella</i>		Endangered	Hopkins et al 2010
<i>Melicytus crassifolius</i>	Thick-leaved māhoe	At Risk – Declining	Hopkins et al 2010
<i>Muehlenbeckia astonii</i>	Tororaro	Critical	Hopkins et al 2010
<i>Muehlenbeckia ephedroides</i>	Leafless pōhuehue, dead stick plant	Critical	Hopkins et al 2010
<i>Poa billardiarei</i>	Sand tussock	At Risk – Declining	Hopkins et al 2010
<i>Roulia aff. Hookeri</i>		At Risk – Declining	Hopkins et al 2010
<i>Sophora molloyi</i>	Cook Strait Kōwhai	Critical	Hopkins et al 2010
<i>Trisetum antarcticum</i>		At Risk – Declining	Hopkins et al 2010
Lizards <sup>39</sup>			
<i>Oligosoma aeneum</i>	Copper Skink	Critical	Romijn 2021 <sup>40</sup>
<i>Oligosoma kokowai</i>	Northern spotted skink	At Risk – Recovering	Romijn 2021
Birds <sup>41</sup>			
<i>Anas gracilis</i>	Grey teal	At Risk – Recovering	MacArthur 2021 <sup>42</sup>
<i>Anthus novaeseelandiae</i>	NZ pipit	Vulnerable	MacArthur 2021

Scientific name	Common name	Regional Threat status	Observation
<i>Charadrius bicinctus</i>	Banded dotterel	Vulnerable	MacArthur 2021
<i>Charadrius obscurus</i>	NZ Dotterel	Critical	MacArthur 2021
<i>Falco novaeseelandiae</i>	NZ Falcon	Critical	MacArthur 2021
<i>Haematopus finschi</i>	South Island pied Oystercatcher	Migrant	MacArthur 2021
<i>Haematopus unicolour</i>	Variable oystercatcher	Vulnerable	MacArthur 2021
<i>Himantopus himantopus</i>	Pied stilt	Vulnerable	MacArthur 2021
<i>Hydroprogne caspia</i>	Caspian tern	Critical	MacArthur 2021
<i>Larus novaehollandiae scropulinus</i>	Red billed gull	Vulnerable	MacArthur 2021
<i>Limosa lapponica</i>	Bar-tailed godwit	Critical	MacArthur 2021
<i>Phalacrocorax melanoleucos</i>	Little shag	Vulnerable	MacArthur 2021
<i>Phalacrocorax sulcirostris</i>	Black shag	Critical	MacArthur 2021
<i>Phalacrocorax varius varius</i>	Pied shag	Vulnerable	MacArthur 2021
<i>Sterna striata striata</i>	White-fronted tern	Endangered	MacArthur 2021

## Appendix 4: Threat table

Table 7: Threat table for Baring Head/Ōrua-pouanui KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area
Ecological weeds		
EW-1	Ground covering ecological weeds smother and displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. Key ground covering ecological weed species for control include marram grass ( <i>Ammophila arenaria</i> ) and tradescantia ( <i>Tradescantia fluminensis</i> ).	C, D
EW-2	Woody weed species displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. Key woody ecological weed species include boxthorn ( <i>Lycium ferocissimum</i> ), lupin ( <i>Lupinus arboreus</i> ), gorse ( <i>Ulex europaeus</i> ), karo ( <i>Pittosporum crassifolium</i> ) and willow sp. ( <i>Salix</i> sp.).	A-E
EW-3	Climbing weeds smother and displace native vegetation often causing canopy collapse, inhibit indigenous regeneration, and alter vegetation structure and composition. Key climbing ecological weed species include old man's beard ( <i>Clematis vitalba</i> ).	B
EW-4	Aquatic weeds out-compete native aquatic species and choke watercourses. Key weed species include Cape pondweed ( <i>Aponogeton distachyos</i> ) and Egeria ( <i>Egeria densa</i> ).	C
Pest animals		
PA-1	Possums ( <i>Trichosurus vulpecula</i> ) browse palatable canopy vegetation until it can no longer recover <sup>43,44</sup> . This destroys the forest's structure, diversity and function. Possums may also prey on native birds and invertebrates <sup>45</sup> .	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 <sup>46,47</sup> .	A-E
PA-3	Mustelids (stoats <sup>48,49</sup> ( <i>Mustela erminea</i> ), ferrets <sup>50,51</sup> ( <i>M. furo</i> ) and weasels <sup>52,53</sup> ( <i>M. nivalis</i> )) prey on native birds, lizards and invertebrates, reducing their breeding success and potentially causing local extinctions.	A-E
PA-4	Hedgehogs ( <i>Erinaceus europaeus</i> ) prey on native invertebrates <sup>54</sup> , lizards <sup>55</sup> and the eggs <sup>56</sup> and chicks of ground-nesting birds <sup>57</sup> .	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 <sup>58,59</sup> .	A-E



Threat code	Threat and impact on biodiversity in the KNE site	Operational area
PA-6	Pest and domestic cats ( <i>Felis catus</i> ) prey on native birds <sup>60</sup> , lizards <sup>61</sup> and invertebrates <sup>62</sup> , reducing native fauna breeding success and potentially causing local extinctions <sup>63</sup> .	A-E
PA-7	Rabbits ( <i>Oryctolagus cuniculus</i> ) and hares ( <i>Lepus europaeus</i> ) graze on palatable native vegetation and prevent natural regeneration in some environments <sup>64</sup> .	A-E
PA-8	Feral goats ( <i>Capra hircus</i> ) browsing affects the composition and biomass of native vegetation in the understory tiers of forest habitats, preventing regeneration of the most palatable understory species and reducing species diversity <sup>65</sup> .	A-E
PA-9*	Brown trout ( <i>Salmo trutta</i> ) and rainbow trout ( <i>Oncorhynchus mykiss</i> ) prey on native fish and compete with them for food resources <sup>66</sup> .	A-E
<b>Human activities</b>		
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 <sup>67</sup>	A-E
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	A-E
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 <sup>68</sup>	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	A-E
<b>Other threats</b>		
OT-1*	Wild fires can be destructive to native flora and fauna. The river valley escarpment is particularly vulnerable to this threat.	B, C

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

## Appendix 5: Priority ecological weed species

The following table lists key ecological weed species that have been recorded in the Baring Head/Ōrua-pouanui KNE site.

The distribution and density of individual species within each operational area is recorded. Three levels of distribution (localised, patchy and widespread) and density (sparse, abundant and dense) are used to describe these aspects of infestations of each species.

**Table 8: Ecological weed species in the Baring Head/Ōrua-pouanui KNE site**

Scientific name	Common name	Operational area	Level of distribution	Management aim
<i>Allium triquetum</i>	Onion weed	C	Localised and sparse	Eradication
<i>Aloe</i> sp.	Aloe sp.	E	Localised and sparse	Eradication
<i>Ammophila arenaria</i>	Marram grass	D	Widespread and sparse	Eradication
<i>Aponogeton distachyos</i>	Cape pondweed	C	Widespread and dense	Suppression
<i>Chrysanthemoides monilifera</i> subsp. <i>monilifera</i>	Boneseed	N/A	Not yet present	Surveillance and removal if present
<i>Clematis vitalba</i>	Old man's beard	B	Localised and sparse	Eradication
<i>Crocasmia x crocosmiiflora</i>	Montbretia	C	Localised and sparse	Eradication
<i>Egeria densa</i>	Egeria	C	Widespread and abundant	Suppression
<i>Elodea canadensis</i>	Canadian pondweed	C	Widespread and abundant	Suppression
<i>Erica lusitanica</i>	Spanish Heath	KNE site boundary	Localised and sparse	Surveillance and removal if present
<i>Erythranthe guttata</i>	Monkey musk	C	Localised and sparse	Eradication
<i>Glaucium flavum</i>	Horned poppy	D	Widespread and abundant	Eradication
<i>Lagorsiphon major</i>	Lagarosiphon	C	Widespread and abundant	Suppression
<i>Lupinus arboreus</i>	lupin	A, D, E	Widespread and dense	Suppression
<i>Lycium ferocissimum</i>	boxthorn	A, D, E	Widespread and sparse	Eradication
<i>Pittosporum crassifolium</i> *	Karo*	E	Patchy and abundant	Eradication
<i>Potamogeton crispus</i>	Curly pondweed	C	Widespread and abundant	None at present

Scientific name	Common name	Operational area	Level of distribution	Management aim
<i>Ranunculus trichophyllus</i>	Water buttercup	C	Widespread and abundant	None at present
<i>Rosa rubiginosa</i>	Briar rose	D	Localised and sparse	Eradication
<i>Salix sp.</i>	Willow species	C	Localised and sparse	Eradication
<i>Tradescantia fluminensis</i>	Tradescantia	C	Localised and sparse	Suppression
<i>Ulex europaeus</i>	Gorse		Patchy and sparse	Suppression
<i>Zantedeschia aethiopica</i>	Arum lily	C	Localised and sparse	Suppression

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

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