

Key Native Ecosystem Plan for Baring Head/Ōrua-pouanui

2014-17



greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao



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1. Key Native Ecosystem plans

New Zealand's indigenous biodiversity continues to decline nationally, and in the Wellington region. Major reasons for the decline are that native species are preyed on or outcompeted by invasive species and ecosystems and habitats are lost or degraded through human resource use and development. Active management to control threats is required to protect indigenous biodiversity. Regional councils have responsibility to maintain indigenous biodiversity, as well as to protect significant vegetation and habitats of threatened species, under the Resource Management Act 1991 (RMA).

Greater Wellington Regional Council's (GWRC's) vision for biodiversity is:

“The Wellington region contains a full range of naturally occurring habitats and ecosystems that are in a healthy functioning state and supporting indigenous biodiversity”

GWRC's Biodiversity Strategy 2011-2021¹ provides a common focus across the council's departments, and guides activities relating to biodiversity. One of its goals is: High value biodiversity areas are protected.

In order to achieve this vision and goal, the Key Native Ecosystem (KNE) programme seeks to protect some of the best examples of ecosystem types in the Wellington region by managing, reducing, or removing threats to their values. Sites with the highest biodiversity values have been identified and then prioritised for management. Active management of KNEs can involve control of ecological weeds and pest animals, fencing to exclude stock, restoration planting and helping landowners to legally protect these areas.

KNEs are managed in accordance with three-year KNE plans, such as this one, prepared for each area by the GWRC's Biodiversity department in collaboration with the landowners and other stakeholders. These plans outline the ecological values and threats specific to each KNE, set out objectives for biodiversity management, and prescribe the operational actions and budget required to work towards achieving the objectives.

Much of the work planned in KNEs will be carried out by GWRC staff or contractors engaged by GWRC. For example, the Biosecurity department carries out ecological weed and pest animal control to achieve the objectives set out in KNE plans.

GWRC also recognizes that working relationships between the management partners are critical for achieving the objectives for the KNE. Under the KNE programme, GWRC staff also work with landowners and volunteer community groups involved in protection or restoration work within KNEs.

KNE plans are reviewed regularly to ensure the activities undertaken to protect and restore the KNE are informed by experience and improved knowledge about the site.

2. Baring Head/Ōrua-pouanui Key Native Ecosystem

Baring Head/Ōrua-pouanui KNE (256 ha) is located on the coast south of Wainuiomata, between Palliser Bay and Wellington Harbour (see Appendix 1, Map 1). The KNE 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 climate².

Landowner and stakeholders

GWRC takes a collaborative approach to managing Key Native Ecosystems. 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 GWRC has sought input from landowners and relevant stakeholders, and will continue to involve them as the plan is implemented.

Landowner

The majority of the Baring Head/Ōrua-pouanui KNE is owned by GWRC (197 ha) and is part of the larger East Harbour Regional Park (see Appendix 1, Map 2). Management of East Harbour Regional Park as a whole is guided by the GWRC Parks Network Plan³. This 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 Baring Head/Ōrua-pouanui KNE are consistent and efficient.

The land within the KNE not owned by GWRC (59 ha) is owned by the Tupoki Takarangi Trust. GWRC works collaboratively with the Tupoki Takarangi Trust to plan and implement activities on the Trust's land.

Management partners and key stakeholders

The primary management partners within GWRC 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 Trust 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. The Trust is working with corporate groups on horned poppy control, small mammal monitoring and planting days. They are also recruiting a team of volunteers to check predator control traps over the whole of the site.

Other key stakeholders include the Taranaki Whānui ki Te Upoko o Te Ika and the Wellington Natural Heritage Trust. The mandated iwi fisheries organisation (MIO) - Te Atiawa ki to Upoko o te Ika a Maui Potiki Trust has an interest in the coastal marine area adjacent to Baring Head.

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 KNEs within the region.

The Baring Head/Ōrua-pouanui KNE is one of the top coastal ecosystem sites in the region⁴. It has uninterrupted sequences of different ecosystem types ranging from coastal and valley escarpments through to the coast. Although highly modified by historic and current farming practices, it retains many components of its former flora and fauna.

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

Ecological connections: The KNE 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 also contains the lower reaches of the Wainuiomata River, which is a natural connection to the inland catchments.

Naturally uncommon ecosystems: A number of naturally uncommon ecosystems are present at Baring Head/Ōrua-pouanui⁵. These are: coastal turf (Nationally Critical); stony beach ridges, shingle beaches, dune slacks, stable sand dunes, coastal lagoon (all Nationally Endangered), and estuary (Nationally Vulnerable)⁶.

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'⁷ (see Appendix 1, Map 6).

Threatened species: Within the KNE 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 contains a list of threatened species found within the KNE.

There are four major areas with different ecological values in the KNE. As threats and management requirements differ between them, each has been identified as a distinct Operational area in this plan (see Appendix 1, Map 3). A brief description of each follows.

Area A: Coastal escarpment

The coastal escarpments are steep and rise up to 100 metres in height. Prior to human settlement, the original vegetation type on the coast would have been: ngaio, taupata treeland/herbfield/rockland⁸.

The coastal scarp vegetation is mainly 'grey scrub', now a rare plant community of mainly low-growing, divaricate plants which are salt-tolerant and provide important lizard, invertebrate and small bird nesting habitat. Given the extreme coastal climate, vegetation cover on the escarpments are slow to grow and uniform in height. Mingimingi (*Coprosma propinqua*), thick-leaved māhoe (*Melicactus crassifolius*) and speargrass (*Aciphylla squarrosa* var. *squarrosa*) are important vegetation components on the escarpments.

Area B: Valley escarpment

The valley escarpments have similar vegetation to the coastal escarpment and are dominated by mingimingi. Coastal flax (*Phormium cookianum* subsp. *hookeri*), matagouri (*Discaria toumatou*), *Brachyglottis greyii*, leafless clematis (*Clematis afoliata*) and two species of mistletoe; leafless mistletoe (*Korthalsella lindsayi*) and green mistletoe (*Ileostylus micranthus*) are also present. The valley escarpment has the largest population of matagouri in the Wellington district.

Further inland, the scarps rise to 120 metres and the regenerating scrub includes some colonising forest species such as ngaio (*Myoporum laetum*), tītoki (*Alectryon excelsus* subsp. *excelsus*), mānuka (*Leptospermum scoparium*) and kaikōmako (*Pennantia corymbosa*).

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 predators⁹.

Area C: Wainuiomata River and river terraces

The lower reaches of the Wainuiomata River bisect the inland valley. Its upper catchment is forested and the river is recognised as a Water of National Importance (WONI)¹⁰. The adjacent river terraces are grazed and vegetation communities are substantially modified, however an area at Khyber Pass has recently been fenced off from stock. Prior to human settlement, vegetation types would have been:

- kahikatea/pukatea forest on the river valley flats, including kōwhai, ribbonwood, cabbage tree;
- oioi, knobby clubrush sedgeland at the river mouth; and

- coastal turf, herbfield at the river mouth¹¹.

Extensive areas of oxbow (wet areas that were previously the course of the river) between the valley escarpment and the Wainuiomata River are reverting to wetland plant species. However, following years of grazing, the vegetation is dominated by plant species that are unpalatable to livestock.

Two bushes of the nationally endangered shrubby tororaro (*Muehlenbeckia astonii*) are found in one small area on the lower river terraces known as Khyber Pass. On the banks, near the river mouth, naturally uncommon species such as *Crassula mataikona*, Kirk's crassula (*Crassula kirkii*) and teasel sedge (*Carex dipsacea*) are found¹².

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 a 'hāpua' coastal lagoon, an ecosystem classified as nationally endangered¹³, which breaks through the gravel barrier when river levels rise. 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 river¹⁴, nine of which are 'Threatened'.

Area D: Coastal platform

The coastal platform extends from the high water mark along the beach to the bottom of the coastal escarpment. Pre-human vegetation types would have been:

- scabweed gravelfield/stonefield;
- shorebind weed, clubrush gravelfield/stonefield on the more stable areas of the foreshore; and
- spinifex, pīngao sedge grassland/sedgeland on the more mobile beach areas.

The dune ecosystem here includes kōwhangatara (*Spinifex sericeus*), a native sand binding plant; two small remnants of pīngao (*Ficinia spiralis*); and a significant population of the threatened sand tussock (*Poa billardiarei*).

A *Raoulia australis*-dominated cushionfield occupies a large area of the foreshore. It provides habitat for native insects such as Wellington coastal moth (*Notoreas perornata*), katipō spider, (*Latrodectus katipo*), red admiral butterfly (*Vanessa gonerilla gonerilla*) and Myers' cicada (*Maoricicada myersi*)¹⁵. Lizards have been found in driftwood accumulated behind the beach¹⁶.

Near the mouth of the Wainuiomata River, 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*).

Deep back dunes, up to 100 metres in places, run from behind the foreshore to the base of the escarpment. A swale runs parallel to the beach at the northern end and is occupied by wetland species such as swamp flax (*Phormium tenax*) and coastal tree daisy (*Olearia solandri*). A number of wetlands are present at the bottom of the escarpment, fed by springs and seeps. Although native wetland species are present, they are grazed and degraded and palatable species have been largely eliminated.

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 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. On the coastal platform, marram and couch grass, gorse, boxthorn and lupin threaten native plant communities. The escarpments have a number of ecological weeds including gorse and some non-local native species such as karo 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 introduced predators and browsers are having an impact on the ecological values of the site. For example, high numbers of hedgehogs (78% TTI in November 2013¹⁷ and 83% TTI in November 2012¹⁸) 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 GWRC Parks department. Stock not only browse native vegetation, but camp under plants, trampling seedlings and opening up areas to weed invasion and excessive desiccation.

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 invasion¹⁹.

The table below (Table 1) shows the identified threats at the 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 Plan (Table 2), and are used to ensure that actions taken are targeted to specific threats. Operational areas are shown in Map 3 (Appendix 1).

Table 1: Key threats to ecological values present at Baring Head KNE.

Code	Impact on biodiversity in the KNE	Operational area
Ecological weeds		
EW-1	The woody weeds boxthorn, gorse, karo and lupin displace native plant species in stable back dunes, ephemeral wetlands and on the coastal escarpment.	A, B, C, D
EW-2	Marram grass and couch grass displace native foredune species.	D
EW-3	Horned poppy, couch grass and marram are invading the cushion fields.	D

Code	Impact on biodiversity in the KNE	Operational area
EW-4*	Although some karaka trees or groves are culturally important to local iwi, karaka does not occur naturally in the lower North Island. Seedlings dominate forest floors and displace local native plant species ²⁰ .	B
EW-5	Karo and hybrid <i>Pseudopanax</i> displace local native plant species.	A, B
EW-6	Gorse and boxthorn, present on the coastal platform displace native plant species.	C
EW-7	An increase in rank grass after cessation of grazing may result in grass invasion of lizard refuges impacting on the ability of lizards to avoid predation.	A, B, C, D
EW-8	Aquatic weeds, including the prolifically seeding Cape pondweed, dominate areas of the riverbed and have invaded the oxbows. Reinvasion from upstream during floods makes control difficult.	C
EW-9	Woody weeds such as lupin and gorse provide cover for predators around shore bird nesting sites.	C
EW-11*	New pest plant species can be accidentally introduced by mowers or vehicles or other sources from outside of the KNE.	A, B, C, D
Pest animals		
PA-1*	Sheep and cattle damage the health and composition of threatened plant communities by grazing and trampling on native vegetation. Cattle trampling can also destroy soil structure which will alter future restoration potential.	A, B, C, D
PA-2	Possoms browse preferred plant species continuously until they can no longer recover, then move on to their next favoured species.	A, B, C, D
PA-3	Rats and mice eat seeds, slowing regeneration of native plant species.	A, B, C, D
PA-4	Rabbits and hares browse low growing native plants, particularly seedlings and newly planted areas. Rabbit numbers may increase following mustelid control.	A, B
PA-5	Goats browse escarpment vegetation.	A, B
PA-6	Possoms, hedgehogs, rats, mice, mustelids and feral cats all prey on native lizards, insects, birds, chicks and eggs. Following control of predators, mice populations may increase substantially.	A, B, C, D
PA-7*	Wild pigs root up and disturb soil, eat roots and native plants and destroy habitats for native invertebrates.	A,B
PA-8	Pest animal species will continually reinvade from land outside the KNE.	A, B, C, D

Code	Impact on biodiversity in the KNE	Operational area
Human activities		
HA-1*	Recreational activities off-track such as vehicle use, biking, and walking can impact on plant communities by damaging or destroying vegetation and bird nesting and roosting areas by disturbing birds or crushing nests or chicks.	A, B, C, D
Other threats		
OT-1*	Natural regeneration of desirable native plant species can be limited by environmental factors such as environmental weed species, pest animals, lack of seed source, lack of pollinators, lack of soil microfauna and climate events.	A, B, C, D
OT-2*	Fire can be destructive to native flora and fauna and create conditions for ecological weed invasion.	A, B, C, D

*Threats marked with an asterisk are not addressed by actions in the Operational Plan. 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 as a whole, it is important to be aware of all threats to ecological values.

3. Objectives and management activities

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

Objectives

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

1. To protect native plant communities
2. To increase native plant dominance
3. To reintroduce plant species to the site
4. To reintroduce missing or threatened plants
5. To increase abundance of threatened plants
6. To protect native fauna habitat
7. To increase populations of threatened fauna
8. To increase populations of native aquatic species

Management activities

Management of biodiversity is achieved most effectively when it is coordinated across landscapes. The management activities set out in this Plan have been developed in the context of other biodiversity management activities being carried out in the wider ecological landscape. Relevant management plans are referred to under the individual

sections below. In implementing this Plan, the Biodiversity department will integrate activities that contribute to the objectives of other management plans where possible.

Management activities are targeted to work towards the objectives above by responding to the threats outlined in Table 1. The management activities are described briefly below, and specific actions, with budget figures attached, are set out in the Operational Plan (Table 2).

Ecological weed control

A large suite of ecological weeds are present in the KNE and will be controlled to enable existing native plant species to regenerate. Following best practice principles, outlying areas of weeds will be controlled first, followed by rolling back more densely infested areas over time. Regular follow-up is planned to avoid reinvasion from any untreated areas or subsequent seed germination. This strategy will be applied to gorse and boxthorn, which were previously sprayed on the escarpments in 2014 and the coastal platform in 2012 and 2013.

A progressive rollback of dense areas of gorse and lupin on the coastal platform will begin in 2014-15. Non-native species on the escarpment will be controlled and on the foreshore couch and marram grass will be gradually rolled back. Horned poppy is being manually removed by volunteers, however, follow-up spraying may be necessary to control seedlings.

Cape pondweed in the northern oxbow, an invasive aquatic weed, is being sprayed in 2014, and volunteers will hand pull remaining plants. If this strategy is successful, it can be repeated for aquatic weeds in the remaining oxbows.

Pest animal control

Landscape-wide control of pest animals will be undertaken to protect the native fauna present across the whole KNE (see Appendix 1, Map 4 & 5). Mustelids, rodents and hedgehogs that prey on native fauna will be controlled using DOC200 series traps. Pelifeed bait stations, targeting possum and rats, will be installed throughout the KNE in 2016/17. These will be immediately adjacent to DOC traps throughout the KNE except where DOC traps are spaced at 50m intervals. In these areas, bait stations will be spaced at 100 metre intervals.

An intensive trapping system will be installed in some areas to protect threatened native fauna. In 2014, an area behind the banded dotterel nesting area (east of the river) was trapped more intensively by volunteers using Timms traps and DOC 200 traps at 50 metre spacing. Intensive predator trapping will be extended to the west of the river behind the nesting area and a trapping network will be installed on the Trust land (see Appendix 1, Map 5).

Pulsed control, with increased frequency during spring and early summer when predator numbers are increasing, will allow predators to be controlled more effectively during the bird nesting season²¹. Volunteers will undertake extra servicing of traps during these periods. The frequency of servicing will be dependent on volunteer availability.

Revegetation

The aquatic and terrestrial ecosystems within the KNE have been modified by human activities. Future management aims to, not only protect the existing ecological values, but also to restore native plant species to enable healthy functioning ecosystems.

Natural regeneration and succession may not occur if plant species previously recorded in the KNE are no longer present or have a limited distribution within the KNE. While it is not possible or desirable to plant all areas, planting some riparian margins, wetlands and nodes in prioritised areas, will assist natural regeneration (see Appendix 4). Plant species favoured by native butterflies and other invertebrates, that also offer protection and a food source for lizards, have been included in the planting list for the valley and coastal escarpments and parts of the coastal platform.

Some native plant species have few individuals present (eg, *Muehlenbeckia astonii* and *Clematis afoliata*) and the lack of genetic variability may jeopardise their survival within the KNE. Species that are rare within the KNE, as well as nationally and regionally threatened species, have been prioritised for protection or re-introduction. These plants are listed in Appendices 2 and 3. Plants will be grown from locally sourced seed and translocated species will be sourced from the nearest eco-domain if not available locally.

Fencing

Exclusion of vehicles and stock from the KNE is necessary to protect existing native plant and animal species and to enable species to recolonise their natural range or suitable habitat. New fences installed on the southern and eastern boundaries of the Park have meant a significant reduction of vehicles on the coastal platform. There are, however, currently no fences to keep stock out of the KNE. The Parks department will implement the fencing plan which will remove stock in stages and allow regeneration and supplementary planting to occur. Temporary fencing may be erected annually during the shorebird breeding season and around planted areas on the coastal platform.

Community engagement

A project plan (not included here) has been developed for the Friends of Baring Head Trust which outlines biodiversity projects that could be undertaken with external funding. It involves management activities such as fencing, pest animal control, ecological weed control and restoration planting in addition to the actions outlined in this KNE plan.

Lizard habitat protection

Management techniques, including grass and predator control will need to be carefully planned and monitored for the benefit of lizard populations. Following the removal of grazing from the KNE, there may be an increase in the rank grass which will support a higher population of mice, which prey on lizard species. In turn cats and mustelids, which prey on both lizards and rodents, could increase in numbers due to the increase in rodents.

Rank grass could also invade rocky scree slopes, reducing refuges for lizards. A survey of the distribution and abundance of lizard species was carried out in 2013 and 2014. The results of these surveys will determine priority areas for intensive habitat protection and enhancement work.

4. Operational plan

The operational plan below shows the actions planned to achieve the stated objectives for Baring Head/Ōrua-pouanui. Their timing and cost are shown over the three year period from 1 July 2014 to 30 June 2017. The budget for the 2015/16 and 2016/17 years are indicative only and subject to change as a result of the 2015-25 Long Term Plan process. See Appendix 1, Map 4 for operational areas.

Table 2: Three-year operational plan for Baring Head/Ōrua-pouanui KNE

Objectives	Threat	Activity	Operational areas	Delivery	Description/detail	Target	Timetable and resourcing		
							2014/15	2015/16	2016/17
1 and 2	EW1	Ecological weed control	A, B	Biosecurity department	Follow up control of outlier gorse and boxthorn on coastal and valley scarps.	Reduction in distribution and abundance of weed species.	\$10,000	\$4,000	
1 and 2	EW-1	Ecological weed control	A, B, D	Biosecurity department	Follow up boxthorn control on coastal platform.	Reduction in distribution and abundance of weed species.	\$2,000	\$2,000	\$2,000
1 and 2	EW-6	Ecological weed control	D	Biosecurity department	Progressively reduce the extent of gorse and lupin on the coastal platform.	Reduction in distribution and abundance of weed species.	\$4,000	\$4,000	\$4,000
1 and 2	EW-5	Ecological weed control	A, B	Biosecurity department	Karo and hybrid <i>Pseudopanax</i> control on escarpment.	Reduction in distribution and abundance of weed species.		\$2,000	\$2,000
1 and 2	EW-2	Ecological weed control	D	Biosecurity department	Progressively reduce the extent of marram and couch grass in the cushion fields and adjacent to native foredune species.	Reduction in distribution and abundance of weed species. No non-target species to be affected.		\$2,000	\$2,000
1 and 2	EW-3	Ecological weed control	D	Biosecurity department	Progressively reduce the extent of horned poppy and broadleaved pest plants on the coastal platform.	Reduction in distribution and abundance of weed species. No non-target species to be affected.		\$2,000	\$2,000

Objectives	Threat	Activity	Operational areas	Delivery	Description/detail	Target	Timetable and resourcing		
							2014/15	2015/16	2016/17
1, 2, 6 and 7	EW-9	Ecological weed control	D	Biosecurity department	Progressively reduce the extent of woody weed around shorebird nesting sites.	Reduction in distribution and abundance of weed species.			\$4,000
6,7 and 8	PA-1	Pest animal control	C, D	Biosecurity department	Install 27 DOC200 traps.	Traps installed by September 2014.	\$2,500		
6 and 7	PA-6	Pest animal control	D	Biosecurity department	Install 20 Timms traps on the western side of the river.	Traps installed by September 2014.	\$2,000		
6, 7 and 8	PA-6	Pest animal control	A,B,C,D	Biosecurity department	Annual check to ensure traps are operating safely and effectively.	All traps checked and serviced by 30 June annually.	\$1,500	\$1,500	\$1,500
1, 2, 5, 6, 7 and 8	PA-2 PA-6	Pest animal control	A,B,C,D	Biosecurity department	Install 85 Pelifeed bait stations.	Traps installed by September 2015.		\$4,500	
1, 2, 5, 6, 7 and 8	PA-2 PA-6	Pest animal control	A,B,C,D	Biosecurity department	Service Pelifeed bait stations 3 times annually.	Possums <5% RTC* Rats <10%TTI**			\$4,500
1 and 6	HA-1	Fencing	C	Park ranger	Fence to protect revegetation sites or shore bird nesting sites.	Fences are installed as soon as practicable.	\$1,500	\$1,500	\$1,500
2, 3, 4, 5 and 7	OT-1	Revegetation	A,B,C,D	Park ranger	Plant revegetation, missing or threatened species.	Plants are planted by 31 July of each year according to planting plan.	\$3,000	\$3,000	\$3,000
							\$26,500	\$26,500	\$26,500

*Residual Trap Catch

**TTI = Tracking Tunnel Index

5. Funding summary

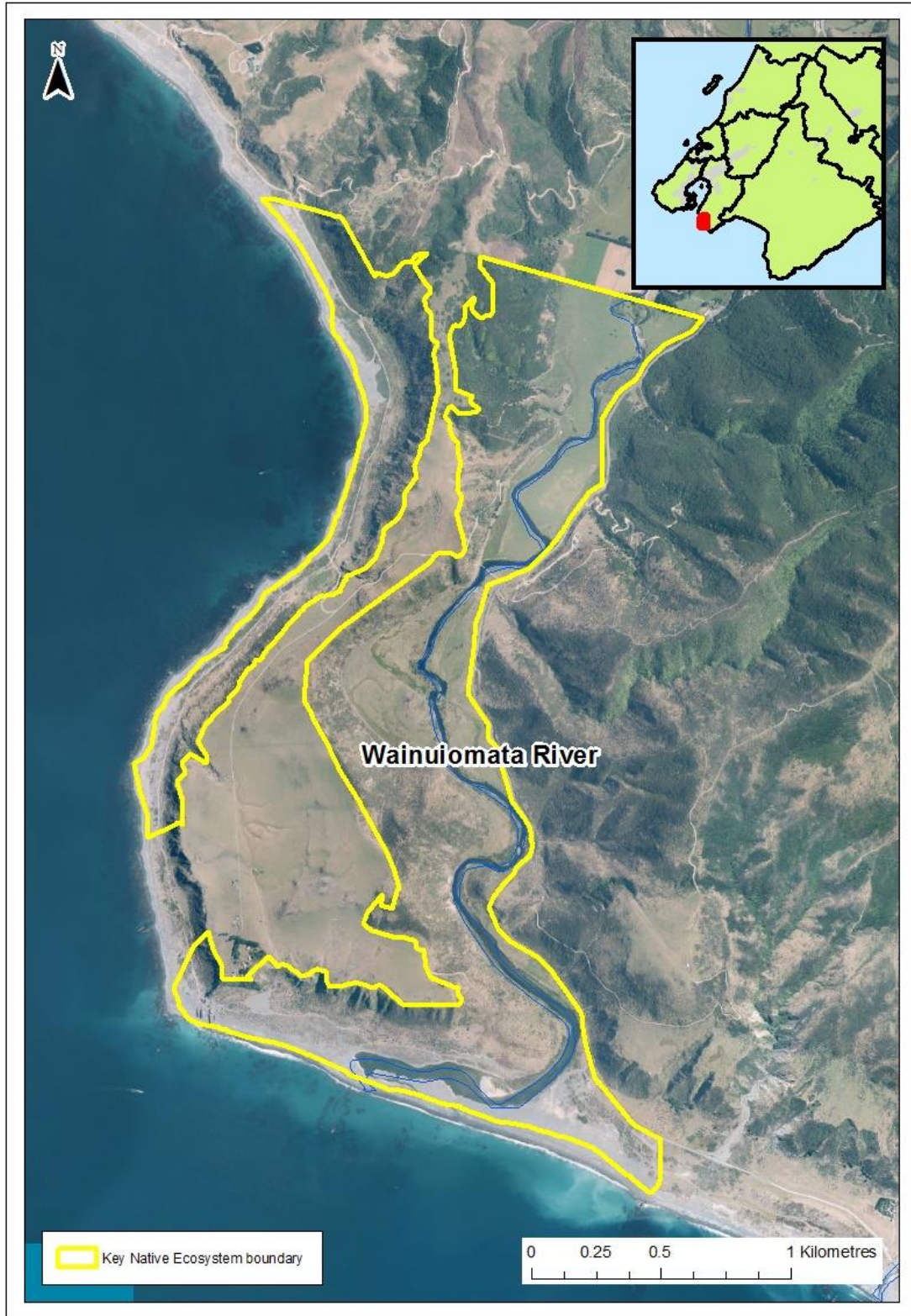
GWRC budget

The budget for the 2015/16 and 2016/17 years are indicative only and subject to change as a result of the 2015-25 Long term plan process.

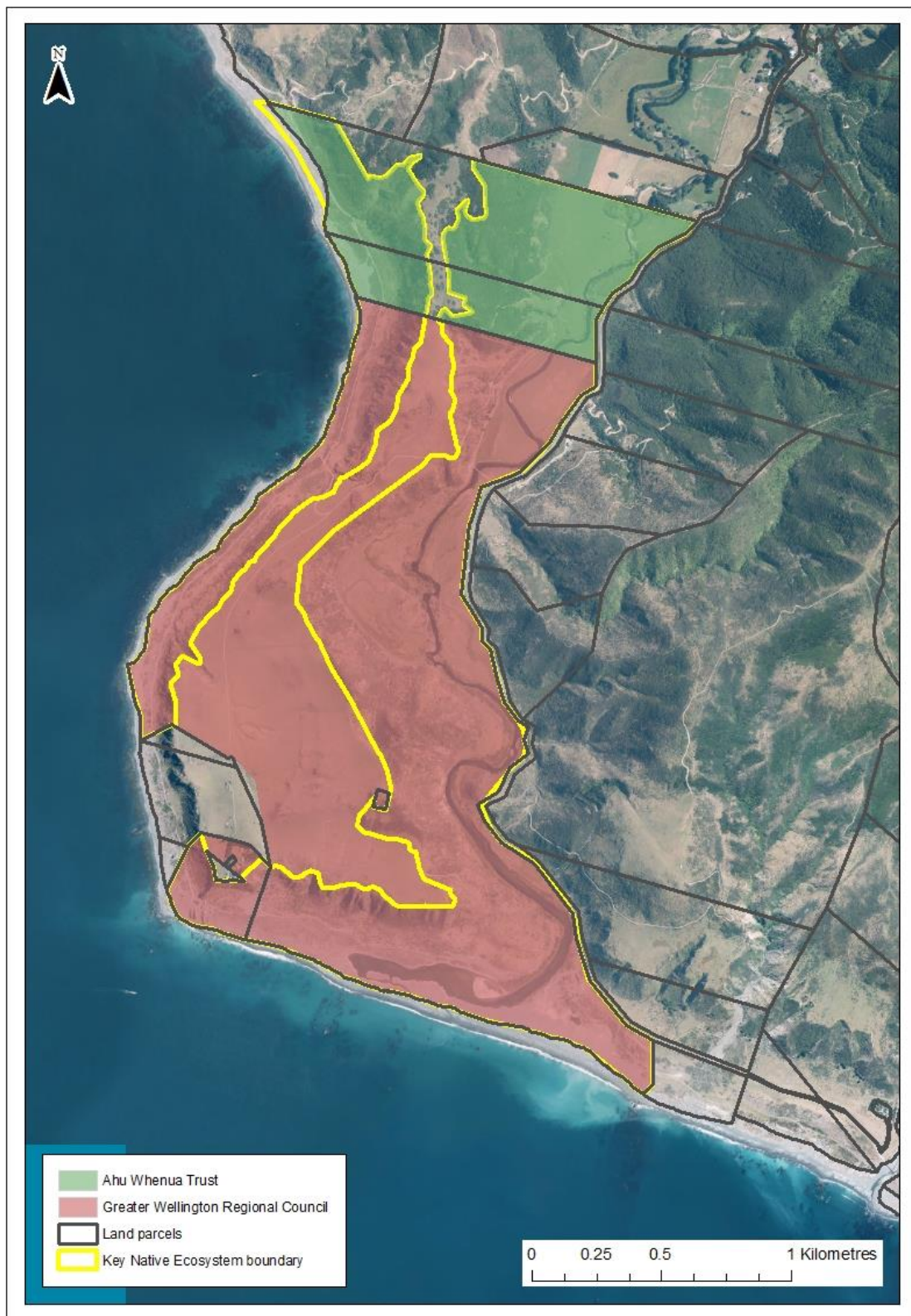
Table 3: GWRC allocated budget for Baring Head/Ōrua-pouanui KNE.

Management activity	Timetable and resourcing		
	2014/2015	2015/2016	2016/2017
Pest plant control	\$16,000	\$16,000	\$16,000
Pest animal control	\$6,000	\$6,000	\$6,000
Revegetation	\$3,000	\$3,000	\$3,000
Fencing	\$1,500	\$1,500	\$1,500
Total	\$26,500	\$26,500	\$26,500

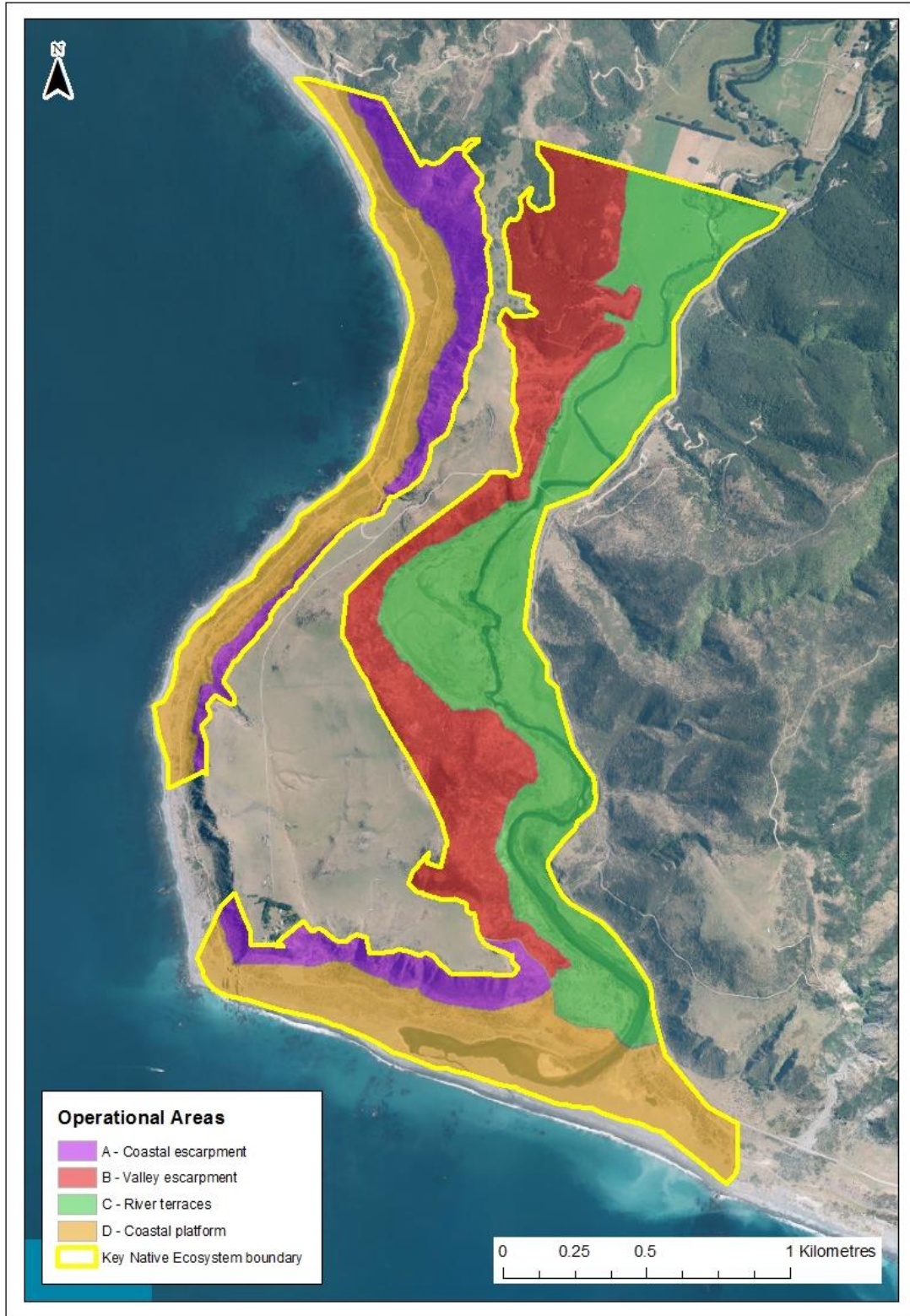
Appendix 1: Site maps



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



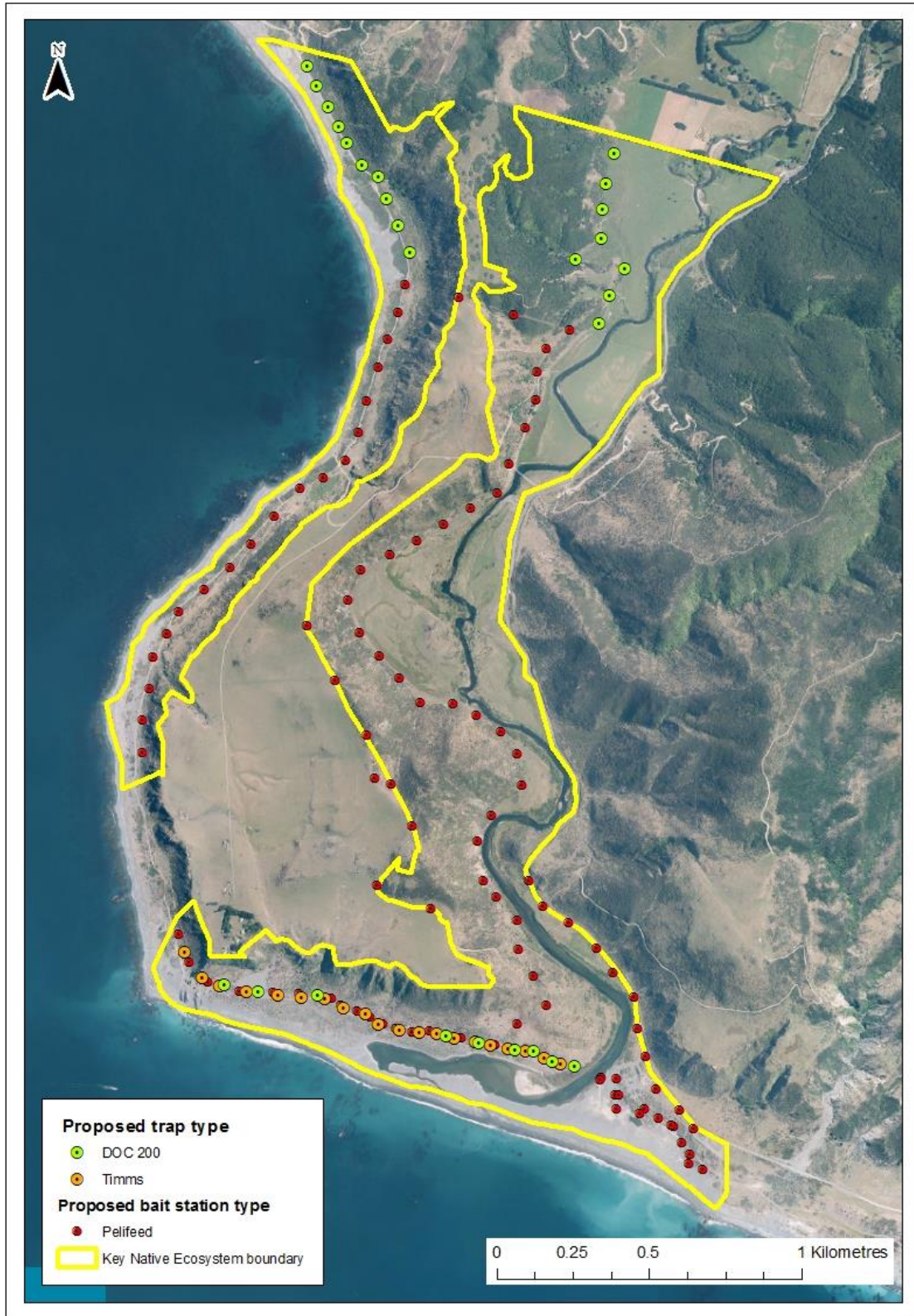
Map 2: Baring Head/Ōrua-pouanui property boundaries.



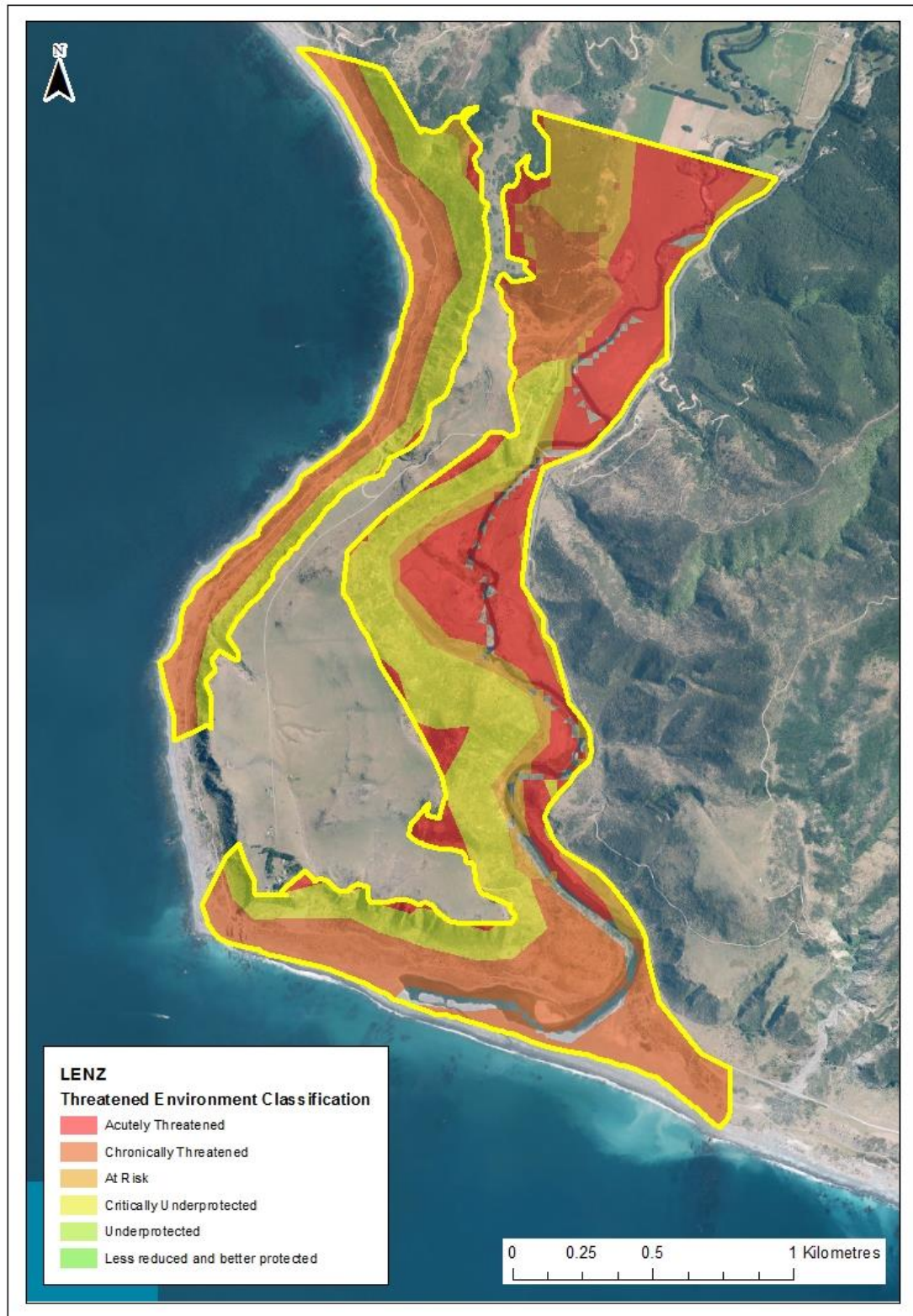
Map 3: Operational areas in Baring Head/Ōrua-pouanui KNE.



Map 4: Existing trap map in Baring Head/Ōrua-pouanui KNE.



Map 5: Proposed traps and bait stations map for Baring Head/Ōrua-pouanui KNE.



Map 6: Land Environment New Zealand classification map for Baring Head/Ōrua-pouanui KNE.

Appendix 2: Threatened species list

The New Zealand Threat Classification System lists extant species according to their threat of extinction. The status of each species group (birds, plants, reptiles, etc.) is assessed over a three-year cycle²². 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 species that are known to live within the KNE.

Table 4: Nationally threatened species at Baring Head/Ōrua-pouanui KNE

Scientific name	Common name	Threat status	Source
Plants(vascular)²³(lichens)²⁴(bryophytes)²⁵			
<i>Brachyglottis greyii</i>		Naturally Uncommon	Hopkins et al 2010 ²⁶
<i>Crassula kirkii</i>	Kirk's crassula	Naturally Uncommon	Hopkins et al 2010
<i>Crassula mataikona</i>		Naturally Uncommon	Hopkins et al 2010
<i>Ficinica spiralis</i>	Pīngao	Declining	Hopkins et al 2010
<i>Geranium aff. microphyllum</i>		Naturally Uncommon	Hopkins et al 2010
<i>Isolepis basilaris</i>	Pygmy clubrush	Naturally Vulnerable	Hopkins et al 2010
<i>Leptinella tenella</i>		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	Declining	Hopkins et al 2010
<i>Melicytus crassifolius</i>	Porcupine bush	Declining	Hopkins et al 2010
<i>Pimelea arenaria</i>	NZ daphne	Declining	Hopkins et al 2010
<i>Poa billardiarei</i> (syn <i>Austrofestuca littoralis</i>)	Sand tussock	Declining	Hopkins et al 2010
<i>Trisetum antarcticum</i>		Declining	Hopkins et al 2010

Scientific name	Common name	Threat status	Source
Birds²⁷			
<i>Anas superciliosa</i>	Grey duck	Nationally Critical	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Anthus novaeseelandiae</i>	NZ pipit	Declining	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Charadrius bicinctus</i>	Banded dotterel	Nationally Vulnerable	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Eudyptula minor</i>	Little penguin	Declining	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Haematopus unicolour</i>	Variable oystercatcher	Recovering	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Himantopus himantopus</i>	Pied stilt	Declining	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Hydroprogne caspia</i>	Caspian tern	Nationally Vulnerable	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Larus novaehollandiae scropulinus</i>	Tarāpunga, red billed gull	Nationally Vulnerable	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Phalacrocorax varius varius</i>	Pied Shag	Nationally Vulnerable	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Sterna striata striata</i>	Tara, white fronted tern	Declining	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
Reptiles²⁸			
<i>Oligosoma lineoocellatum</i>	Spotted skink	Relict	Romijn 2011 ²⁹
Freshwater fish³⁰			
<i>Anguilla dieffenbachii</i>	Longfin eel	Declining	New Zealand Freshwater Fish Database (accessed 2013)
<i>Anguilla australis</i>	Shortfin eel	Declining	New Zealand Freshwater Fish Database (accessed 2013)
<i>Galaxias argenteus</i>	Giant kōkopu	Declining	New Zealand Freshwater Fish Database (accessed 2013)
<i>Galaxias brevipinnis</i>	Kōaro	Declining	New Zealand Freshwater Fish Database (accessed 2013)
<i>Galaxias maculatus</i>	Inanga, whitebait	Declining	New Zealand Freshwater Fish Database (accessed 2013)
<i>Galaxias postvectus</i>	Shortjaw kōkopu	Declining	New Zealand Freshwater Fish Database (accessed 2013)
<i>Geotria australis</i>	Lamprey	Declining	New Zealand Freshwater Fish Database (accessed 2013)

Scientific name	Common name	Threat status	Source
<i>Gobiomorphus hubbsi</i>	Bluegill bully	Declining	New Zealand Freshwater Fish Database (accessed 2013)
<i>Gobiomorphus huttoni</i>	Redfin bully	Declining	New Zealand Freshwater Fish Database (accessed 2013)
(Araneae – spiders)³¹ (lepidoptera – butterflies and moths)³²(hemiptera – true bugs)³³			
<i>Ericodesma aerodana</i>	Moth	Nationally Endangered	Patrick 2004 ³⁴
<i>Latrodectus katipo</i>	Katipō spider	Nationally Endangered	Crisp 2011
<i>Maoricicada myersi</i>	Orongorongo black cicada	Nationally Threatened	Borger 1997
<i>Notoreas perornata</i> (Wellington)	Coastal moth	Nationally Critical	Patrick 2004

Appendix 3: Regionally threatened species list

The following table lists regionally threatened species that have been recorded in the KNE. Native plant species have been identified in the Plant Conservation Strategy, Wellington Conservancy 2004-2010 prepared by JWD Sawyer. 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>	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>		Serious Decline
Native Invertebrates		
<i>Austrocidaria lithurga</i>		Rare species of the Wellington coast
<i>Helastia siris</i>		Rare species of the Wellington coast

Appendix 4: Planting plan

Table 7 below shows the plant species and numbers of plants for revegetation areas within the KNE. The planting calendar (Table 8) identifies when site preparation, planting and maintenance activities will be completed in each planting site. Refer to Map 7, below, for planting sites.

Table 7. Planting plan for Baring Head/Ōrua-pouanui KNE.

Plant (Scientific name)	Grade	Spacing (m)	Cost per plant (\$)	2014/15		2015/16		2016/17	
				Number of Plants	Total	Number of Plants	Total	Number of Plants	Total
<i>Melicytus crassifolius</i>	RTH*	1	1.65	150	247.50				
<i>Phormium cookianum</i>	RTH	1	1.65	450	742.50				
<i>Discaria toumatou</i>	RTH	2	1.65	19	30.94				
<i>Coriaria arborea</i> var. <i>arborea</i>	RTH	3	1.65	8	13.75				
<i>Brachyglottis greyii</i>	RTH	2	1.65	38	61.88				
<i>Clematis afoliata</i>	RTH	2	1.65	19	30.94				
<i>Carmichaelia australis</i>	RTH	2	1.65	19	30.94				
<i>Scandia geniculata</i>	RTH	2	1.65	19	30.94				
<i>Kunzea ericoides</i>	RTH	2	1.65			38	61.88		
<i>Sophora microphylla</i>	RTH	5	1.65			2	3.96		

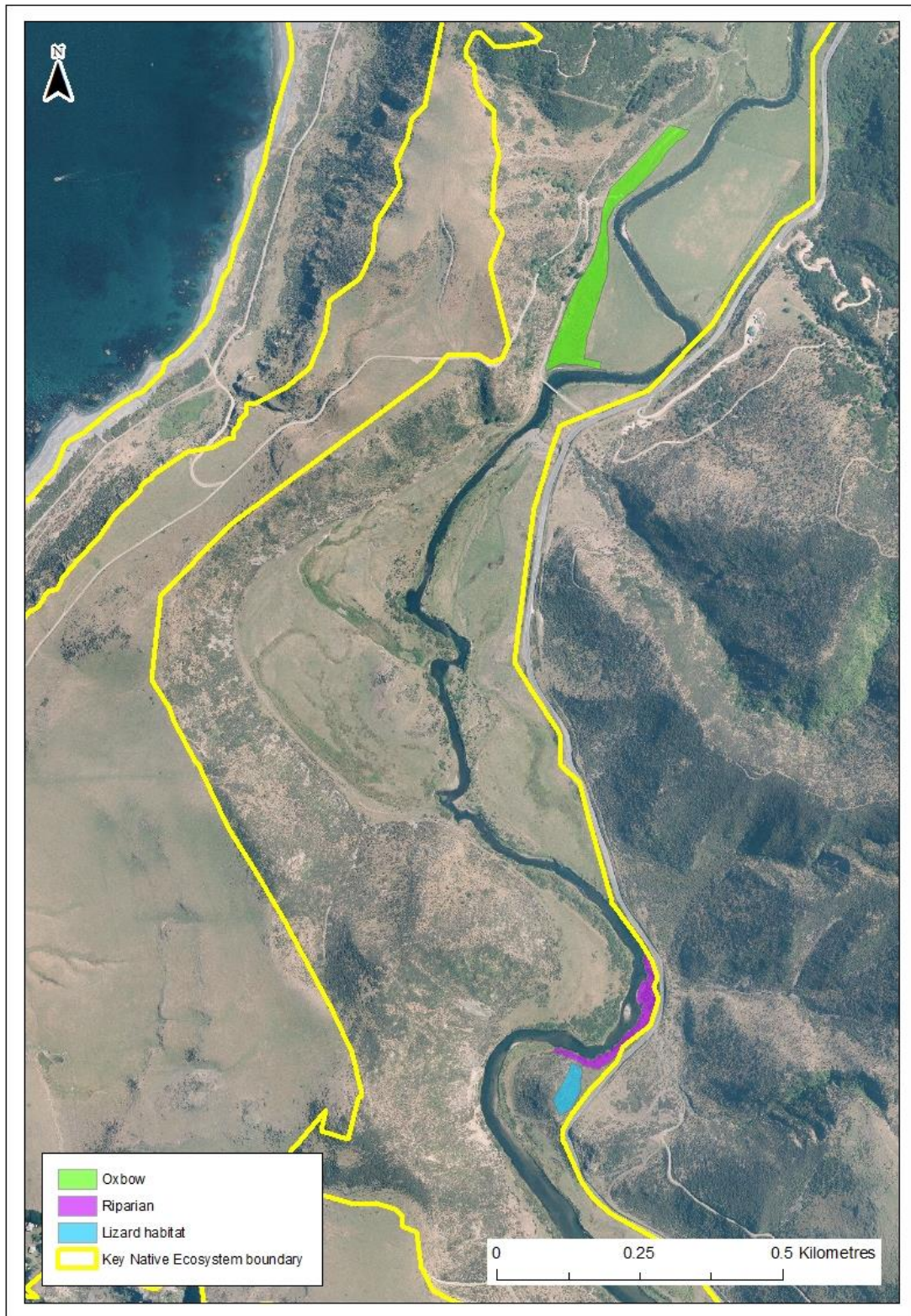
Plant (Scientific name)	Grade	Spacing (m)	Cost per plant (\$)	2014/15		2015/16		2016/17	
				Number of Plants	Total	Number of Plants	Total	Number of Plants	Total
<i>Coriaria arborea</i> var. <i>arborea</i>	RTH	3	1.65			10	16.50		
<i>Ficinia nodosa</i>	RTH	2	1.65			7	11.00		
<i>Austroderia fulvida</i>	RTH	3	1.65			7	11.00		
<i>Cordyline australis</i>	RTH	5	1.65			2	3.17		
<i>Coprosma robusta</i>	RTH	2	1.65			18	29.70		
<i>Pseudopanax arboreus</i>	RTH	3	1.65			7	11.00		
<i>Coprosma propinqua</i>	RTH	2	1.65					93	152.63
<i>Cyperus ustulatus</i>	RTH	2	1.65					46	76.31
<i>Kunzea ericoides</i>	RTH	2	1.65					62	101.75
<i>Olearia solandri</i>	RTH	3	1.65					41	67.83
<i>Pennatia corymbosa</i>	RTH	3	1.65					21	33.92
<i>Austroderia toetoe</i>	RTH	3	1.65					21	33.92
<i>Leptospermum scoparium</i>	RTH	3	1.65					139	228.94
<i>Phomium tenax</i>	RTH	2	1.65					82	135.67

Plant (Scientific name)	Grade	Spacing (m)	Cost per plant (\$)	2014/15		2015/16		2016/17	
				Number of Plants	Total	Number of Plants	Total	Number of Plants	Total
<i>Cordyline australis</i>	RTH	3	1.65					21	33.92
<i>Melycytus ramiflorus</i>	RTH	3	1.65					93	152.63
Plants and materials subtotal					1,189.39		148.20		1,017.50
Site preparation spray					900.00		1,100.00		1,000.00
Site prep for 2016-17					0		1,500.00		0
Planting labour					0		0		0
Maintenance spray					600.00		200.00		\$1,000.00
Total					\$2,689.00		\$2,948.20		\$3,017.50

*Hilson root trainer

Table 8. Revegetation calendar.

Planting site	2014/15		2015/16			2016/17		
	March – May 2015	May – June 2015	September – November 2015	March – May 2016	May – June 2016	September – November 2016	March – May 2017	May – June 2017
Lizard habitat	Spot spray for planting	Plant	1 st release spraying	2 nd release spray				
Riparian				Spot spray for planting	Plant	1 st release spraying	2 nd release spray	
Oxbow							Spot spray for planting	Plant



Map 7: Planting sites for Baring Head/Ōrua-pouanui KNE.

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