Key Native Ecosystem Operational Plan for Riversdale Coast

2019-2024

greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

Contents

1. Purpose

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

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

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

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

2. Policy Context

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

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

Greater Wellington Long Term Plan

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

Proposed Natural Resources Plan

The Proposed Natural Resources Plan (PNRP) provides the high level strategic framework which sets out how Greater Wellington, Mana whenua partners and the community work together and includes:

- Guiding Principles that underpin the overall management approach of the plan (eg, Kaitiakitanga)
- Sites with significant indigenous biodiversity values
- Sites of significance to mana whenua (refer Schedules B, C, Schedule D)

Greater Wellington Biodiversity Strategy

The Greater Wellington Biodiversity Strategy[3] (the Strategy) is an internal document that sets a framework that guides how Greater Wellington protects and manages biodiversity in the Wellington region to work towards the Vision.

Vision

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

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

Goal One

Areas of high biodiversity value are protected or restored

3. The Key Native Ecosystem Programme

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

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

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

A site must be identified as ecologically significant using the above criteria and be considered "sustainable" for management in order to be considered for inclusion in

the KNE Programme. “Sustainable” for the purposes of the KNE Programme is defined as: a site where the key ecological processes remain intact or continue to influence the site and resilience of the ecosystem is likely under some realistic level of management.

KNE sites can be located on private or publicly owned land. However, land managed by the Department of Conservation (DOC) is generally excluded from this programme.

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

4. Riversdale Coast Key Native Ecosystem site

The Riversdale Coast KNE site (60.8 ha) comprises a variety of coastal ecosystems including sand dunes, the lower reaches of the Motuwaireka Stream and estuary, and salt marsh at Riversdale Beach on the eastern Wairarapa coast (See Appendix 1, Map 1).

The KNE site is important for a wide range of coastal and wetland bird species[4] and is the only known breeding site for New Zealand dotterel (*Charadrius obscurus*) in the Wellington region[5]. The southern end of the KNE site is adjacent to the Homewood Coast KNE site. These KNE sites combined form an important habitat network for native flora and fauna.

5. Parties involved

5.1. Landowner(s)/Land Managers

The KNE site is predominantly public land administered by Masterton District Council (MDC). The Crown also has legal ownership over several small areas of marginal strip.

The Riversdale Recreation Reserve (38.4 ha) is managed by MDC under the Riversdale Recreation Reserve Management Plan and Development Concept Report. This document was compiled in 1996[6] and is currently under review. Another 18.4 ha which is a mixture of marginal strip, esplanade and local purpose reserve land is included in the KNE site and managed under MDC’s District Plan and the Reserves Act 1977.

The Department of Conservation (DOC) manages 4 ha of Crown marginal strip land at the Riversdale Recreation Reserve and Motuwaireka Stream mouth within the KNE site.

5.2. Operational delivery

Management partners are those that fund or have an active role in the implementation of the KNE plan or the management of the site. The management partners at this KNE site are Greater Wellington, MDC, DOC, the Wairarapa branch of the Royal Forest and Bird Protection Society of New Zealand (F&B), the Riversdale Beach Dune Management Committee and the Riversdale Beach Ratepayers Association.

Within Greater Wellington, the Biodiversity, Biosecurity and Land Management departments are responsible for delivering the KNE operational plan. The Biodiversity department is the overarching lead department for Greater Wellington on the coordination of biodiversity management activities and advice within the KNE site. The Biosecurity department carries out pest control activities. The Land Management department plans and advises on sustainable land use, soil conservation and water quality, they also have active Farm Environment Plans on several adjacent farms.

MDC funds and supports community-based dune restoration carried out with the Riversdale Beach Dune Management Committee. The partnership is subject to a Memorandum of Understanding and the Committee works under terms of reference drawn up in 2013[7]. MDC also funds and carries out reserve management work in the Riversdale Recreation Reserve.

DOC manages land on behalf of the Crown and is part of the Riversdale Beach Dune Management Committee.

F&B work in partnership with Greater Wellington Biodiversity department and assists with managing the shorebird nesting habitat in the northern Riversdale dunes. They maintain the semi-permanent fencing built to protect this habitat, erect temporary fencing with materials supplied by Greater Wellington during the nesting season outside this area if required, and actively work to improve nesting success, particularly of New Zealand dotterels. They also provide information about the nesting birds to residents and visitors to the area to educate and raise awareness.

5.3. Mana Whenua partners

Rangitane o Wairarapa and Ngāti Kahungunu ki Wairarapa iwi have identified the lower reaches of the Motuwaireka Stream as being of significance for mahinga kai and wāhi tapu values[8].

6. Ecological values

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

6.1. Ecological designations

Table 1: Designations at the Riversdale Coast KNE site

Designation level	Type of designation
Regional	Parts of the KNE site are scheduled under Greater Wellington's proposed Natural Resources Plan (PNRP) as: • A river with significant indigenous biodiversity values for threatened or at risk fish species: Whareama River and all tributaries (Schedule F1) • A river with significant indigenous biodiversity values as migratory fish habitat: Whareama River and all tributaries (Schedule F1c) • Inanga spawning habitat: Motuwaireka Stream (schedule F1b) • Significant indigenous bird habitat: Riversdale beach and Motuwaireka Stream mouth (Schedule F2) • Significant indigenous biodiversity on the coast: Motuwaireka Stream mouth/estuary (schedule F4) • Significant natural wetlands: Riversdale South Dunes (Schedule F3)
District	Most of the KNE site is listed in DOC's Eastern Wairarapa Ecological District Recommended Areas for Protection: • Riversdaleand Rorokoko Gorge Bush (RAP16)[9]

6.2. Ecological significance

The Riversdale Coast KNE site is considered to be of regional importance because:

- It contains highly **representative** ecosystems that were once typical or commonplace in the region, and are highly **connected**
- It contains native species and ecological features that are **rare** and **distinctive** in the region and nationally
- It contains a high level of species and 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 provides important seasonal or core habitat for several coastal and wetland bird populations in the region

Representativeness

The entire Riversdale Coast KNE site is classified as Acutely Threatened having less than 10% of the original cover of indigenous vegetation remaining[10]. The sand dune, estuary, lagoon and backdune habitats are well connected and form a regionally important range of typical and valuable coastal habitats.

Rarity/distinctiveness

There are three plant species with a national threat status and four with a regional threat status. Twenty bird, three freshwater fish and one invertebrate species with national risk status have been recorded at the KNE site. Nationally threatened species are listed in Appendix 2 and regionally threatened plant species in Appendix 3.

Diversity

Several rare ecosystem types are found here, including active and stable sand dunes, dune slacks, lagoons (Nationally Endangered) and estuaries (Nationally Vulnerable)[11].

Ecological context

The KNE site is considered valuable at the landscape scale as it provides important seasonal or core habitat for several coastal and wetland bird populations in the region

6.3. Ecological features

The KNE site has been divided into three operational areas for management (Appendix 1, Map 2). These are:

A. Northern Riversdale dunes and wetlands (15.6ha)

B. Riversdale Beach dunes (6.8ha)

C. Riversdale Recreation Reserve (38.4ha)

Habitats and vegetation

Sand dune systems

Sand dune ecosystems are a significant part of the KNE site, encompassing the northern Riversdale dunes, Riversdale Beach dunes and Riversdale Recreation Reserve foredunes.

Most of the northern Riversdale dunes (located immediately north of the Motuwaireka stream estuary) are now well vegetated with native plants. The foredunes contain spinifex (*Spinifex sericeus*) and scattered pīngao (*Ficinia spiralis*) the mid dune contain extensive low-growing mats of Sand carex (*Carex pumila*).

The Riversdale Beach dunes are within a narrow strip immediately off the beach and contain spinifex and scattered pīngao in the northern quarter (due to ongoing restoration efforts between MDC, Greater Wellington, DOC and the community), with marram (*Ammophila arenaria*) dominant in the remainder. Spinifex is still present along the front toe in this area in the wave splash zone where marram does not persist.

The foredunes in the Riversdale Recreational Reserve contain mainly spinifex and some planted pīngao, with marram more dominant southwards). Landward of the spinifex area, pīngao and wīwī (knobby club rush, *Ficinia nodosa*) are common.

The back dunes in the Riversdale Recreational Reserve, which are 250 m wide in places[12], extend up to the base of a steeper escarpment and contain a mix of wīwī, taupata (*Coprosma repens*), bracken fern (*Pteridium esculentum*), rank pastural grass, pōhuehue (*Muehlenbeckia complexa*) and sand coprosma (*Coprosma acerosa*). Towards the base of the escarpment, a few matagouri (*Discaria toumatou*) plants are

present[13]. The escarpment itself is primarily grassland with plantation pine trees (*Pinus radiata*) and some regenerating native plant species such as māhoe (*Melicytus ramiflorus*), taupata, karamū (*Coprosma robusta*) and ngaio (*Myoporum laetum*).

At the southern boundary of the KNE site the sand has accumulated to form steep dunes vegetated by marram and spinifex. Areas of sand coprosma, sand daphne (*Pimelea arenaria*) and wīwī are present.

Freshwater wetland systems

At the southern end of the KNE site is a large wetland (2 ha) listed as significant under the proposed Natural Resources Plan (pNRP)[14]. This wetland is vegetated with raupō (*Typha orientalis*), harakeke, toetoe, giant umbrella sedge (*Cyperus ustulatus*) and cabbage trees. A survey of this wetland in 2013 recorded the nationally-threatened (At Risk) spotless crake (*Porzana tabuensis*)[15].

A dune swale (a lower-lying, often damp dune depression) containing raupō, harakeke, and wīwī runs behind the entire length of the Riversdale Recreation Reserve and connects into the wetland area at the southern KNE site boundary.

Estuarine systems

The Motuwaireka Stream estuary, comprising of the lower reaches of the Motuwaireka Stream, areas of saltmarsh, and ephemeral lagoon, has significant biodiversity values[16]. In the tidal reaches three-square (*Schoenoplectus tabernaemontani*) lines the tidal banks, along with pūrua (*Bolboschoenus caldwellii*) and small areas of remuremu (*Selliera radicans*) coastal turf. The upper reaches of the estuary are more freshwater-dominated and contain mainly raupō.

The Motuwaireka Stream flows out over the beach following various routes depending on water level but often flows north to form an ephemeral lagoon[17,18]. Very high tides, storms and seepage contribute water to the lagoon. A thick bed of horse's mane (*Ruppia polycarpa*) flourishes along the landward edge of the lagoon[19].

Species

Birds

The KNE site provides habitat for a wide range of common and threatened native shore and wetland birds. Notable threatened bird species include the New Zealand dotterel (*Charadrius obscurus*), banded dotterel (*Charadrius bicinctus*), black-billed gull (*Larus bulleri*), red-billed gull (*Larus novaehollandiae*), black-fronted tern (*Chlidonias albostriatus*), Caspian tern (*Hydroprogne caspia*), white-fronted tern (*Sterna striata*), New Zealand grebe (*Poliocephalus rufopectus*), spotless crake, wrybill (*Anarhynchus frontalis*), South Island oystercatcher (*Haematopus finschii*), pied stilt (*Himantopus himantopus*), New Zealand pipit *(Anthus novaeseelandiae*), eastern bar-tailed godwit (*Limosa lapponica*), fluttering shearwater (*Puffinus gavial*), royal spoonbill (*Platalea regia*), little black shag (*Phalacrocorax sulcirostris*), black shag (*Phalacrocorax carbo*) and northern little blue penguin (*Eudyptula minor*)[20].

Other more common species include variable oystercatcher (*Haemotopus unicolor*), paradise shelduck (*Tadorna vareigata*), southern black-backed gull (*Larus domincanus*) and white-faced heron (*Egretta novaehollandiae*).

Fish and kōura

The Motuwaireka Stream estuary is known to support common bully (*Gobiomorphus cotidianus*), shortfin eel (*Anguilla australis*), common smelt (*Retropinna retropinna*) and kōura (*Paranephrops* spp.)[21]. The estuary is also suitable habitat for spawning īnanga (*Galaxias maculatus*)[22].

Longfin eel (*Anguilla dieffenbachii*), shortfin eel, and redfin bully (*Gobiomorphus huttoni*) have been recorded from further upstream[23]. All these species are diadromous, meaning they migrate between salt and fresh water during their lifetime, and will pass through the estuary during their lifecycle.

Invertebrates

Katipō spiders (*Latrodectus katipo*) have been recorded at the dunes on the southern edge of the KNE site[24].

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

Ecological weeds are widespread throughout the KNE site. As a result they are considered the primary threat to the ecological values here. Ecological weeds displace native plant species such as pīngao and spinifex. These native species perform an important function in dune ecosystems, binding sand together, thereby providing stability for the whole dune ecosystem.

Marram grass is the most dominant ecological weed present within the KNE site. Marram's growth habit alters sand dune structure and function, creating higher and steeper dune systems that are more unstable than would naturally occur in a pīngao and spinifex-dominated dunes system. Compared to marram dunes native dune ecosystems are able to recover and repair faster following storm events, and a more tolerant of saltwater inundation.

Other ecological weeds found in the KNE site include typical coastal exotics such as gazania (*Gazania* spp.), arctotis (*Arctotis stoechadifolia*), cape weed (*Arctotheca calendula*), wilding pine (*Pinus radiata*), pampas (*Cortaderia selloana*) and lupin (*Lupinus arboreus*).

Pest animal species are present within the KNE site and predate on nesting birds species and browse native vegetation. The main predatory pest animal threats are mustelids (*Mustela* spp.), hedgehogs (*Erinaceus europeaeus*) and feral cats (*Felis catus*). Rabbits (*Oryctolagus cuniculus*) are also present in high numbers and by grazing native dune plant species prevent the establishment newly planted areas[25,26].

Recreation activities and access within the KNE site can damage the sand dunes and disturb wildlife, including nesting native birds. Both informal and managed track

creation in the Riversdale Recreation Reserve has affected native vegetation, including some revegetation plots. Beach access tracks from individual properties across the main Riversdale dunes can increase erosion, while green waste dumping and garden escapes have caused the spread of weeds. Uncontrolled dogs can disturb breeding birds and their chicks affecting breeding success.

While the key threats discussed in this section are recognised as the most significant, a number of other threats to the KNE site have also been identified. Table 2 below presents a summary of all known threats to the KNE site (including those discussed above), detailing which operational areas they affect, how the threat impacts on ecological values, and whether they will be addressed by the proposed management activities.

The codes alongside each threat correspond to activities listed in the operational delivery schedule (Table 3), and are used to ensure that actions taken are targeted to specific threats. A map of operational areas can be found in Appendix 1 (see Map 3).

Table 2: Threats to ecological values present at the RiversdaleCoast KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
Ecological weeds		
EW-1	Marram grass outcompetes and often excludes native dune species such as spinifex and pīngao. Marram is widespread and extending its range into the shorebird nesting habitat reducing the nesting habitat available	Entire KNE site
EW-2	Woody ecological weeds (exotic and non-local native) displace native species and inhibit natural regeneration altering ecosystem structure and function. Key species include wilding pines (*Pinus radiata*), gorse (*Ulex europaeus*), coastal wattle (*Acacia sophorae*), tree lucerne (*Chamaecytisus palmensis*), karo (*Pittosporum crassifolium*), banksia (*Banksia intregrifolia*), lupin (*Lupinus arboreus*), lavender (*Lavandula* spp.), evergreen buckthorn (*Rhamnus alaternus*), poplar (*Populus* spp.) and broom (*Cytisus scoparius*)	Entire KNE site
EW-3	Ground covering weeds such as tall fescue (*Schedonorus phoenix*), gazania (*Gazania* spp.), purple groundsel (*Senecio elegans*), pampas (*Cortaderia selloana*), kikuyu grass (*Pennisetum clandestinum*), Cape weed (*Arctotheca calendula*) and creeping bent (*Agrostis stolonifera*) outcompete and prevent natural regeneration of native plant species	Entire KNE site
Pest animals		
PA-1	Mustelids (stoats (*Mustela erminea*), ferrets (*M. furo*) and weasels (*M. nivalis*)) prey on native birds, lizards and invertebrates, reducing their breeding success and potentially causing local extinctions[27,28,29]. Ground-nesting shore birds are especially vulnerable to mustelids	Entire KNE site
PA-2	Hedgehogs (*Erinaceus europaeus*) prey on native invertebrates, lizards and the eggs and chicks of ground-nesting birds[30,31]	Entire KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
PA-3*	Cats (*Felis catus*) prey on native birds, lizards and invertebrates, reducing native fauna breeding success and potentially causing local extinctions[32,33,34]	Entire KNE site
PA-4*	Rats (*Rattus* 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[35,36,37]	Entire KNE site
PA-5*	House mice (*Mus musculus*) 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 birds' eggs and nestlings[38,39]	Entire KNE site
PA-6*	Rabbits (*Oryctolagus cuniculus*) and hares (*Lepus europaeus*) over-browse native vegetation suppressing natural regeneration. Rabbits also disturb the ground through burrowing. Both species can have a large impact on recently-planted revegetated areas	Entire KNE site
Human activities		
HA-1	Track creation can cause habitat loss and wildlife disturbance. Pest animals such as stoats are also thought to use track networks when colonizing new areas[40]. Mowing vehicles can spread weed species seeds and plant fragments	Area C
HA-2	People and vehicles accessing the site (for recreation, work, or research purposes) can damage native vegetation, disturb native fauna, introduce the seeds of ecological weeds and increase erosion	Entire KNE site
HA-3	Uncontrolled dogs can disturb nesting birds and kill chicks and eggs of ground nesting birds	Entire KNE site
HA-4	Exotic species incidentally introduced from residential gardens and intentionally planted exotic species can out-compete indigenous species. Weeds include agapanthus (*Agapanthus praecox*), gazania (*Gazania rigens*), gorse (*Ulex europaeus*), pampas (*Cortaderia selloana*), blackberry (*Rubus fruticosus*), cape ivy (*Senecio angulatus*) and alyssum (*Lobularia maritima*)	Entire KNE site
HA-5*	Stock access from neighbouring farms (southern wetland and dune areas) impact native ecosystems by trampling and browsing plant species	Area C
Other threats		
OT-1	Climate change induced storm surges and sea level rise can lead to coastal erosion and habitat loss. Ecosystem functionalitiy can be adversely affected and populations of threatened species can be lost.	Entire KNE site
OT-2*	Fire can destroy species composition and allow weed species to invade the site	Entire KNE site

*Threats marked with an asterisk are not addressed by actions in the Operational Plan.

8. Vision and objectives

8.1. Vision

All ecosystems within the KNE site are under effective and sustained biodiversity management that is enhancing their value and resilience to the effects of climate change.

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 Riversdale Coast KNE site.

1. **The ecological integrity of the Riversdale Recreation Reserve is maintained allowing natural regeneration**
2. **The dune systems across the KNE site are resilient to coastal erosion and climate change**
3. **The values of the estuary and wetlands are improved**
4. **To protect wetland and shore birds**

9. Operational activities

Operational activities are targeted to work towards the objectives above (Section 8) by responding to the threats outlined in Section 7. The broad approach to operational activities is described briefly below, and specific actions, with budget figures attached, are set out in the operational delivery schedule (Table 3).

It is important to note that not all threats identified in Section 7 can be adequately addressed. This can be for a number of reasons including financial, legal, or capacity restrictions.

9.1. Ecological weed control

Control of ecological weeds will be undertaken across the KNE site by Greater Wellington (Biosecurity and Land Management departments) to reduce the density and distribution of pest plants to improve the structure and function of native plant communities. Each operational area has slightly varying requirements for weed control, though a similar strategy will be used for weed control in dunes. These are broadly discussed below.

Northern dunes and lagoon (Operational area A)

Marram will be progressively controlled annually and replaced with spinifex and pīngao (see Revegetation section and Appendix 5 for more details). Previous marram control will be followed up. A weed sweep (search and control of targeted weed

species) through the backdune and wetland area will be done annually targeting lupin, wilding pine, poplar, pampas and bamboo.

Riversdale Dunes (Operational area B)

Marram will be progressively controlled working in a southerly direction on an annual basis. Marram control areas will be revegetated with planted spinifex and pīngao (see Revegetation section and Appendix 5 for more details). Previous marram control work will be followed up.

A multi-species weed sweep will be undertaken targeting coastal broad-leaved weeds and isolated patches of kikuyu grass annually.

Riversdale Recreation Reserve (Operational area C)

A weed sweep for various exotic species on the escarpment and backdunes will be undertaken annually.

On the foredunes marram will be progressively controlled annually and replaced with spinifex and pīngao (see section 7.3 and Appendix 5 for more details). Previous marram control will be followed up.

MDC will control cape weed on the mown area and along the tracks annually.

9.2. Pest animal control

Predator control is undertaken in operational areas A and C to protect native shore and wetland birds, primarily New Zealand and banded dotterels and spotless crake, from predation by mustelids. See Appendix 1, Map 3 for trap locations.

Twenty DOC250 kill-traps spaced at 50 m intervals are present in operational area A (the main shorebird area). These traps are serviced on a weekly basis during the nesting season (September to February) by the Greater Wellington Biosecurity department and F&B volunteers, who alternate service checks each week and monthly thereafter.

Four DOC 250 kill-traps are located in operational area C primarily to protect spotless crake. These traps are serviced by the Greater Wellington Biosecurity department on a fortnightly basis during the breeding season (September to February) and monthly thereafter.

9.3. Revegetation

Revegetation is required within the KNE site to ensure the stability and function of the sand dune ecosystems especially following weed control activities, and to improve and enrich habitat for native fauna.

Native plant species have been selected based on the species currently present on-site such as spinifex or pīngao, or from species likely to have been more widespread such as sand daphne (*Pimelea arenaria*) and sand tussock (*Poa bilardieri*). These will help stabilize sand dunes, improve and enrich habitats, provide an ongoing seed source and improve genetic diversity. Foredune and backdune planting will be done annually by Greater Wellington Biosecurity department in operational areas A and C. Plants used in revegetation will be eco-sourced from the Eastern Wairarapa Ecological District.

The Greater Wellington Land Management department will continue a programme of restoration planting following weed control in the Riversdale Beach dunes (operational area B). Spinifex and pīngao will be planted in the foredunes and suitable backdune plants such as *Pimelea arenaria*, wīwī, *Coprosma acerosa* and sand tussock planted further back.

Greater Wellington will improve habitat along the Motuwaireka Stream and the stream at the northern end of the Riversdale Recreation Reserve by planting suitable species such as coastal tree daisy (*Olearia solandri*), toetoe, harakeke (*Phormium tenax*), saltmarsh ribbonwood (*Plagianthus divaricatus*) and *Carex germinata*. Planting will be undertaken annually by the Biosecurity department.

9.4. Habitat protection

Areas where nesting shorebirds, especially banded dotterel, New Zealand dotterel, pied stilt and variable oystercatcher, are known to breed in the northern dune and lagoon areas of operational area A have been fenced off and signage installed to try and keep vehicles and dogs away from these areas. These fences will continue to be maintained by F&B volunteers with materials previously supplied by the Biodiversity department. F&B volunteers also erect temporary fencing where new nesting sites outside of the main breeding area are located.

MDC is working on a fencing cost-share arrangement with the neighboring landowner to prevent stock access to the southern end of the Riversdale Recreation Reserve (operational area C). This area contains a wetland listed as Significant under the proposed Natural Resources Plan (PNRP)[41]. The Land Management and Biodiversity departments are also working with this landowner on fencing and stock access in other parts of the property under rules in the PNRP.

9.5. Recreation Reserve management

MDC works with the Riversdale Dune Management Committee to build and maintain sand ladders, bollards to protect plantings, and to install signage in and around the Riversdale Beach dunes (operational area B). This work is largely focussed on asset protection but is also valuable in managing human access, use of the beach and dunes and helping protect existing dunes and new restoration plantings.

The Riversdale Recreation Reserve (operational area C) is a valuable asset for MDC and the Riversdale community for recreation and accessible green space and the MDC will continue to manage this area for these values. This management will continue with a programme of boardwalk construction to improve the track network and mitigate the effects of track building construction and associated drainage works. This work is funded from a MDC maintenance budget for the reserve (separate from the work in operational area B) and will vary from year to year.

10. Operational delivery schedule

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

Table 3: Operational plan for Riversdale Coast KNE site

Objective	Threat	Activity	Operational area	Delivery	Description/detail	Target	Annual resourcing
2, 3, 4	EW-1	Ecological weed control	A	GWRC Biosecurity department	Progressive control of marram in foredunes and backdunes and wetland targeting wilding pine, bamboo, poplar, alder, pampas and gorse	Reduction in abundance of target weed species	$1,900
2, 4	EW-1 EW-2 EW-3	Ecological weed control	B	GWRC Land Management department	Progressive control of marram from Motuwaireka Stream mouth south Weed sweep for other exotic coastal species mainly in the backdunes	Reduction in abundance of target weed species	$3,500
1, 2, 3, 4	EW-1	Ecological weed control	C	GWRC Biosecurity department	Progressive control of marram in foredunes in southerly direction	Reduction in abundance of target weed species	$950
1, 2, 3, 4	EW-2, 3 HA-4	Ecological weed control	C	GWRC Biosecurity department	Weed sweep for woody and groundcover weeds throughout back-dunes	Reduction in abundance of target weed species	$2,750
1, 3	PA-1, 2	Pest animals	A & C	GWRC Biosecurity department F&B	Service DOC250 kill-traps weekly in nesting season: alternating service checks with F&B volunteers; monthly outside this period	Mustelids <2% TTI*	$3,950

Objective	Threat	Activity	Operational area	Delivery	Description/detail	Target	Annual resourcing
1, 2	EW-1, 2, 3 HA-4	Revegetation	A	GWRC Biosecurity department	Progressively plant and net spinifex on foredunes	70% plant survival	$1,500
1, 2	EW-1, 2, 3 HA-4	Revegetation	B	GWRC Land Management department GWRC Biodiversity department	Supply, progressively plant and net spinifex in foredunes and threatened dunes species in backdunes each year	70% plant survival	$4,500
1, 2, 3, 4	EW-1, 2, 3 HA-4	Revegetation	C	GWRC Biosecurity department	Progressively plant and net foredune plants each year	70% plant survival	$2,600
2, 3	HA-2 and 3	Habitat protection	A	F&B GWRC Biodiversity department	Protection of ground-nesting native birds	Main fence is maintained, nests outside area temporarily protected if found Adequate materials provided	$500**
2, 4	HA-1 and 2	Recreation Reserve Management	B	MDC Riversdale Beach Dune Management Committee	Protect restoration plantings and manage human impacts via sand ladders, bollards and rope and signage	Ongoing work to formalize and maintain access points and protect ecological restoration work	$2,500
						Total	$28,300

*TTI = Tracking Tunnel Index. The control regime has been created designed to control rats and mustelids to this level. Experience in the use of this control method indicates this target will be met.

**Fencing materials provided by Greater Wellington; labour by Forest & Bird volunteers.

11. Funding contributions

11.1. Budget allocated by Greater Wellington

The budgets are indicative only and may be subject to change.

Table 4: Greater Wellington allocated budget for the Riversdale Coast KNE site

Management activity	Annual resourcing	
	1 July 2019 to 30 June 2021	1 July 2021 to 30 June 2024
Ecological weed control*	$9,100*	$5,600
Pest animal control	$3,950	$3,950
Revegetation**	$9,500*	$5,000
Fencing	$500	$500
TOTAL	**$ 23,050**	**$15,050**

* Costs shared between Greater Wellington Biodiversity ($5,600) and Land Management ($3,500) departments in Area B

** Greater Wellington Land Management department ($4,500) in Area B only; Greater Wellington Biodiversity ($5,000) department across the KNE site

11.2. Masterton District Council budget

The budget is subject to confirmation through the Masterton District Council long term planning process, and is allocated in partnership with the Riversdale Dune Management Committee.

Table 5: Additional allocated budget for the Riversdale Coast KNE site from MDC

Management activity	Annual resourcing
Area B - sand ladders, bollards and rope and signage	$2,500

12. Future opportunities

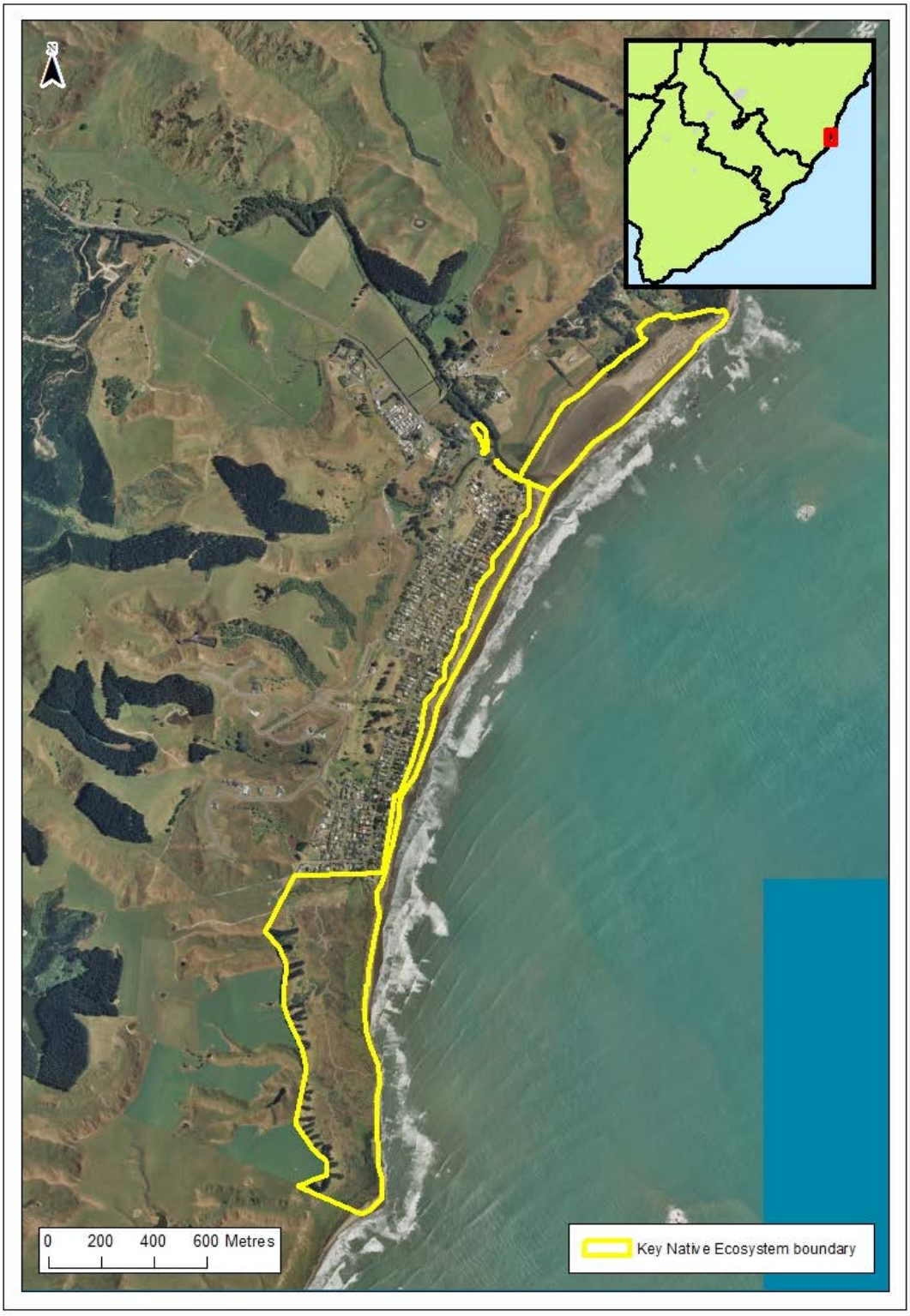
12.1. Community group or volunteer opportunities

There are numerous opportunities for the Riversdale community to be more involved biodiversity management activities. Historically this has been mainly dune planting in area B for asset protection, but this has evolved to include the biodiversity values of this area. Increased involvement and engagement in the need for healthy functioning dunes remains a high priority, and there is significant scope for more dune restoration work to be done and more rapidly than the current rate.

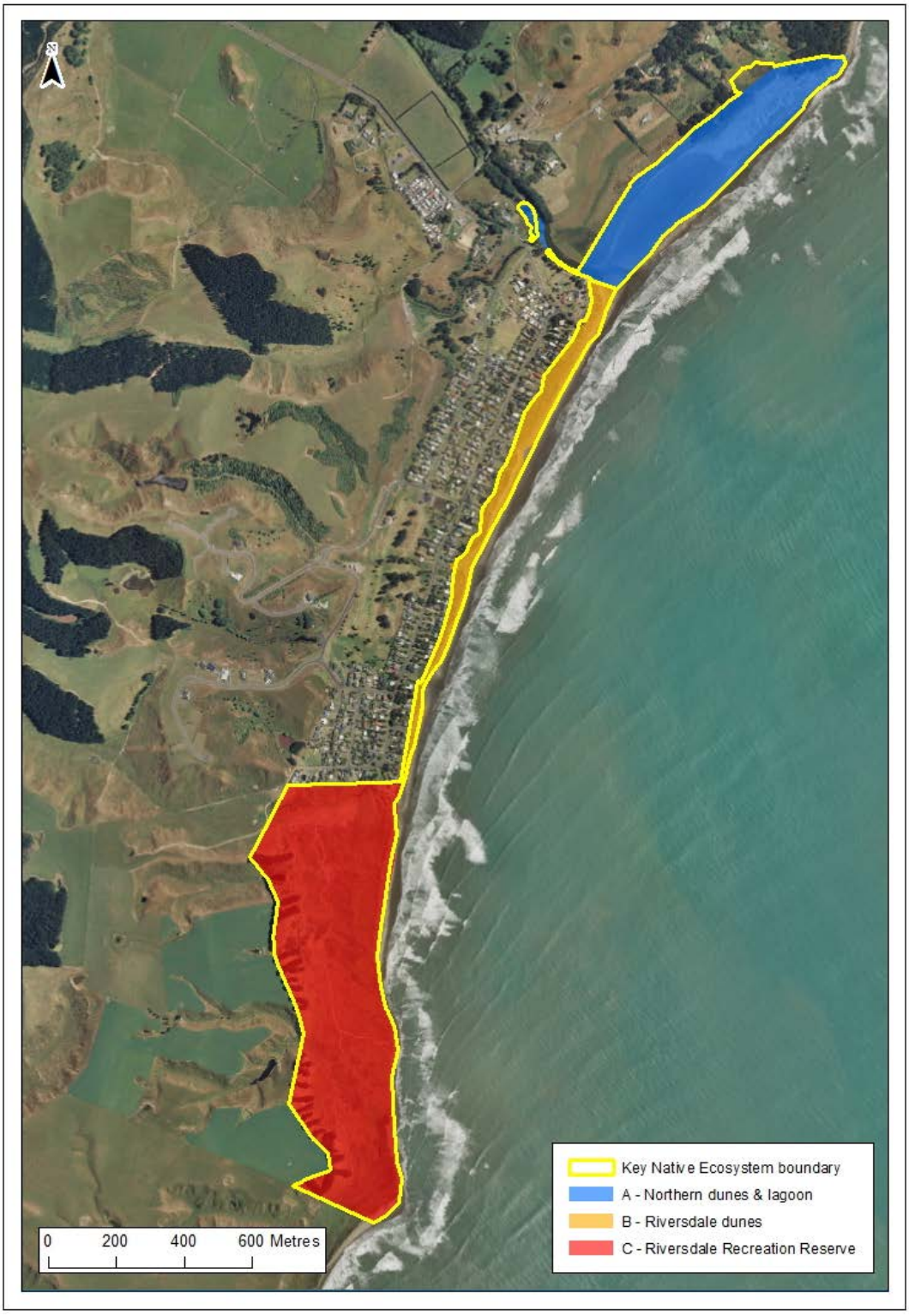
Advocacy and protection of the Motuwaireka estuary and its rare shorebirds is important, both at a local level with residents and visitors, and to highlight the regional and national importance of the estuary.

Rabbit control has been attempted in the past by Greater Wellington but met with resistance from residents and was unable to be done effectively. If the community could be mobilised, reduced rabbit numbers would benefit dune plantings, as well as vegetation in gardens and reserves in Riversdale.

Appendix 1: Site maps



Map 1: The Riversdale Coast KNE site boundary



Map 2: Operational areas in the Riversdale Coast KNE site

Map 3: Pest animal control network at Riversdale Coast 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[42]. 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 RiversdaleKNE site.

Table 6: Threatened and At Risk species at the Riversdale Coast KNE site

Scientific name	Common name	Threat status	Observation
Plants (vascular)[43]			
Coprosma acerosa	Sand coprosma	At Risk – Declining	Eastern Wairarapa Ecological District report[44]
Ficinia spiralis	Pīngao	At Risk – Declining	Eastern Wairarapa Ecological District report
Pimelea arenaria	Sand daphne	At Risk – Declining	Eastern Wairarapa Ecological District report
Birds[45]			
Anarhynchus frontalis	Wrybill	Threatened – Nationally Vulnerable	eBird records[46]
Anthus novaeseelandiae	New Zealand pipit	At Risk – Declining	eBird records
Charadrius bicinctus bicinctus	Banded dotterel	Threatened – Nationally Vulnerable	eBird records
Charadrius obscurus	New Zealand dotterel	Threatened – Nationally Vulnerable	R. Smith, GWRC, pers. obs. 2012 eBird records
Chlidonias albostriatus	Black-fronted tern	Threatened – Nationally Endangered	eBird records
Haematopus finschi	South Island oystercatcher	At Risk – Declining	eBird records
Haematopus unicolor	Variable oystercatcher	At Risk – Recovering	eBird records
Himantopus himantopus leucocephalus	Pied stilt	At Risk – Declining	eBird records
Hydroprogne caspia	Caspian tern	Threatened – Nationally Vulnerable	eBird records
Larus bulleri	Black-billed gull	Threatened – Nationally Critical	eBird records

Scientific name	Common name	Threat status	Observation
Larus novaehollandiae scopulinus	Red-billed gull	Threatened - Nationally Vulnerable	eBird records
Limosa lapponica baueri	Eastern bar-tailed godwit	At Risk – Declining	eBird records
Phalacrocorax carbo novaehollandiae	Black shag	At Risk – Naturally Uncommon	eBird records
Phalacrocorax sulcirostris	Little black shag	At Risk – Naturally Uncommon	eBird records
Phalacrocorax varius varius	Pied shag	Threatened – Nationally Vulnerable	eBird records
Platalea regia	Royal spoonbill	At Risk – Naturally Uncommon	eBird records
Porzana tabuensis	Spotless crake	At Risk – Relict	Cheyne J. 2013[47]
Poliocephalus rufopectus	New Zealand grebe	Threatened – Nationally Vulnerable	eBird records
Puffinus gavia	Fluttering Shearwater	At Risk – Relict	eBird records
Sterna striata striata	White-fronted tern	At Risk - Declining	eBird records
Freshwater fish[48]			
Anguilla dieffenbachia	Longfin eel	At Risk – Declining	NIWA freshwater fish database[49]
Galaxias maculatus	Inanga	At Risk – Declining	NIWA freshwater fish database
Gobiomorphus huttoni	Redfin bully	At Risk – Declining	NIWA freshwater fish database
Invertebrates (Araneae – spiders)[50]			
Latrodectus katipo	Katipō spider	At Risk – Declining	B. Patrick, 2002[51]

Appendix 3: Regionally threatened plant species list

The following table lists regionally threatened species that have been recorded in the Riversdale KNE site. Native plant species have been identified in the Plant Conservation Strategy, Wellington Conservancy 2004-2010[52].

Table 7: Regionally threatened plant species recorded in Riversdale Coast KNE site

Scientific name	Common name	Threat status	Source
Plants[53]			
Coprosma acerosa	Sand coprosma	Gradual decline	Eastern Wairarapa Ecological District report[54]
Discaria toumatou	Matagouri	Serious decline	Eastern Wairarapa Ecological District report
Ficinia spiralis	Pīngao	Gradual decline	Eastern Wairarapa Ecological District report
Plagianthus divaricatus	Saltmarsh ribbonwood	Sparse	Eastern Wairarapa Ecological District report

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