

Key Native Ecosystem Plan for Ōtaki Coast

2015-2018



greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao



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1. The Key Native Ecosystem programme

The Wellington region’s native biodiversity has declined since people arrived and the ecosystems that support it face ongoing threats and pressures. 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).

Greater Wellington Regional Council’s (GWRC) Biodiversity Strategy (2016)¹ sets a framework that guides how GWRC protects and manages biodiversity in the Wellington region to work towards the vision below.

GWRC’s vision for biodiversity
Healthy ecosystems thrive in the Wellington region and provide habitat for native biodiversity

The Strategy provides a common focus across the council’s departments and guides activities relating to biodiversity under this overarching vision, which is underpinned by four operating principles and three strategic goals. Goal One drives the delivery of the Key Native Ecosystem (KNE) programme.

Goal One
Areas of high biodiversity value are protected or restored

The KNE programme is a non-regulatory voluntary programme that 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 publically owned land. However, land managed by the Department of Conservation (DOC) is generally excluded from this programme.

KNE sites are managed in accordance with three-year KNE plans, such as this one, prepared by the GWRC's Biodiversity department in collaboration with the landowners and other stakeholders. These plans outline the ecological values, threats, and management objectives for sites and describe operational activities such as ecological weed and pest animal control. KNE plans are reviewed regularly to ensure the activities undertaken to protect and restore the KNE site are informed by experience and improved knowledge about the site.

2. Ōtaki Coast Key Native Ecosystem site

The Ōtaki Coast KNE site (119ha) contains a number of interconnected coastal ecosystems extending along the coastline on the Kāpiti Coast from 500m south of the Mangaone Stream estuary (at Te Horo Beach settlement) to 500m north of the Ōtaki River mouth lagoon (see Appendix 1, Map 1).

The KNE site contains dynamic coastal and wetland ecosystems that are heavily influenced and shaped by complex geological and hydrological processes. These ecosystems include 5km of gravel/stony beaches, the lower reaches of the Ōtaki River braided river system and estuary, the Ōtaki river mouth lagoon and associated wetlands, the Mangaone Stream estuary, and the Katihiku and Ngātoko (also known as Rangiuru) freshwater wetlands.

The ecosystems present are strongly influenced by frequent disturbance from ocean currents, tides and storms, and the impacts from flooding events. Furthermore, the Ōtaki River estuary and Ōtaki River mouth lagoon are collectively described as a hapua (see Appendix 1, Map 1), which is a distinct geological feature or landform unique to braided rivers and coarse sediment coastlines. The estuary and associated habitats are more strongly influenced by freshwater rather than salt water typical of tidal estuaries. This affects the vegetation composition of the ecosystems surrounding the Ōtaki River estuary.

The KNE site forms part of an important ecological corridor along the Kāpiti coastline in conjunction with several other wetland and coastal sites. This includes KNE sites such as Waitohu Coast, Te Hapua Wetland Complex and Peka Peka Coast.

3. Landowners, management partners and stakeholders

GWRC works in collaboration with landowners, management partners and stakeholders where appropriate to achieve shared objectives for the site. GWRC also recognizes that effective working relationships are critical for achieving the management objectives for each KNE site. In preparing this plan GWRC has sought input from landowners, management partners and relevant stakeholders, and will continue to involve them as the plan is implemented.

3.1. Landowners

The Ōtaki Coast KNE site has both private and public landowners:

- GWRC own a total of 49ha of the KNE site that includes the Ōtaki River and estuary, parts of the Rangiuru Stream and the river mouth lagoon. GWRC's Flood Protection department manages these areas for flood protection purposes. In addition, 12ha of untitled coastal land are also managed by GWRC.
- Katihiku X Trust (who represent the Katihiku hapū), own 42ha within the KNE site comprising the Katihiku wetlands and surrounds (which includes the Whakapawaewae, eastern and backwater wetlands), parts of the Ōtaki River, and most of the gravel and stony beaches south of Ōtaki River (known as the Ngakaroro 5B block). This property is leased to 'Stirling Dairy Farm' (Peter Wilson) who farms this property adjacent to the KNE site as winter dairy support.
- Kāpiti Coast District Council (KCDC) own 2ha of the gravel beach within the KNE site at Te Horo Beach Settlement including the Mangaone stream estuary. They also manage an additional 10ha of untitled coastal margins and the Ngakaroro 5B Block land at Te Horo gravel beaches.
- John Best, a private landowner, owns the Ngātoko wetland (1.5ha).
- Far Fetched Ltd, (c/o Iain and Caitlin Cassels) own 2.5ha of Te Horo gravel beach and stony ridge south of the Ōtaki estuary.

Property boundaries are indicated in Appendix 1, Map 2.

3.2. Management partners

Management partners are those that fund the implementation of the KNE plan or the management of the site. The management partners are GWRC, KCDC the Katihiku X Trust and the private landowners.

Within GWRC, the management partners are the Biodiversity, Biosecurity, Land Management and Flood Protection departments. The Biodiversity department is the overarching lead department for GWRC on the coordination of biodiversity management activities and advice within the KNE site. The Biosecurity department coordinates and carries out pest control activities. The Land Management department promotes sustainable farming by providing Farm Environment Plans to farmers on land adjacent to the KNE site. The Flood Protection department works to the Environmental Strategy for Otaki River² which is an outcome of the Otaki Floodplain Management

Plan. This strategy seeks to co-ordinate opportunities for environmental enhancement and its vision is consistent with this KNE Plan. The Flood Protection department manages areas owned by GWRC including the bed of the Ōtaki River and associated flood control structures. They also do works to support biodiversity around the Ōtaki estuary.

KCDC fund the management of parts of the KNE site as an Ecological Site of Significance (K027 Ōtaki River Mouth) in accordance with the Kāpiti Coast District Plan³. KCDC also manage 17ha of the Katihiku X Trust iwi-owned Ngakaroro 5B block for biodiversity. This encompasses the raised stony ridges between Mangaone estuary and Ōtaki estuary.

The Katihiku X Trust manages the Katihiku wetlands in accordance with the recommendations outlined in the Restoration Plan for Katihiku⁴. The Katihiku hapū (represented by the Katihiku X Trust) are Ngāti Raukawa ki Te Tonga (and part of the wider representative iwi group Ngā hapū o Ōtaki) and have mana whenua over the area. They have identified the Ōtaki River, estuary and gravel beach areas as having high cultural and spiritual significance for iwi⁵. The cultural values to iwi and their tupuna (ancestors) include a former pā site (Pākātu) by the Ōtaki River, sites for cleaning (Wāhi Whakarite/ whakawātea), sites for cultural practice such as karanga and karakia, and other values relating to Mana and Te Mahi kai.

3.3. Stakeholders

The following organisations are considered stakeholders as they have an active role in implementation of this KNE plan. The primary interest in the KNE site for each organisation is indicated below:

The Friends of the Ōtaki River (FOTOR) community restoration group undertakes ecological restoration activities within the KNE site and are supported by the Flood Protection department. FOTOR previously undertook activities in and around the northern part of the Ōtaki River estuary in accordance with the Restoration and Pest Plant Plan for Ōtaki Estuary 2008-13⁶. They have since scaled down their planting activities in the Ōtaki River estuary with a focus around the lagoon edges and gravel beach area.

The Mangaone Restoration Group undertakes restoration planting activities along the Mangaone Stream estuary and is supported by KCDC.

4. 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.

4.1. Ecological designations

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

Table 1: Designations at the Ōtaki Coast KNE site

Designation level	Type of designation
Regional	<p>Parts of the Ōtaki Coast KNE site are designated under GWRC's proposed Natural Resources Plan (PNRP) as Ecosystems and Habitats with Significant Indigenous Biodiversity Values:</p> <ul style="list-style-type: none"> • River with Significant Indigenous Ecosystems – high macroinvertebrate community health (Schedule F1): The Ōtaki River and all tributaries • River with Significant Indigenous Ecosystems - habitat for threatened and at risk fish species (Schedule F1): The Ōtaki River and all tributaries and, the Mangaone Stream and all tributaries • River with Significant Indigenous Ecosystems - habitat for six or more migratory fish species (Schedule F1): The Ōtaki River and all tributaries and, the Mangaone Stream and all tributaries • Known river and parts of the coastal marine area with inanga spawning habitat (Schedule F1b): Ōtaki River, the Mangaone Stream and the Mangahānene Stream • Significant habitat for indigenous birds in rivers (Schedule F2a): Ōtaki River • Significant habitat for indigenous birds in the coastal marine area (Schedule F2c): Ōtaki River Mouth • Significant natural wetland (Schedule F3); Ōtaki River Mouth Lagoon & Rangiuuru (Ngātoko) wetland and the Ōtaki River Mouth South (Katihiku) wetland • Sites with significant indigenous biodiversity values in the coastal marine area (Schedule F4): Ōtaki River Mouth/Estuary
District	<p>Parts of the Ōtaki Coast KNE site are scheduled under KCDC District Plan as an:</p> <ul style="list-style-type: none"> • Ecological Site of Significance (SES 24); The Ōtaki River mouth and surrounds
Other (non-ecological designations of relevance)	<p>Parts of the Ōtaki Coast KNE site are scheduled under GWRC's proposed Natural Resources Plan (PNRP) as:</p> <ul style="list-style-type: none"> • A site of Nga Taonga Nui a Kiwa (Schedule B): Ōtaki River and Ōtaki Beach • A site of significance to Nga hapu o Ōtaki (Schedule C): Ōtaki River, Mangahānene Stream and the Ngātoko Stream • A significant geological feature in the coastal marine area (Schedule J): The Ōtaki River mouth hapua/lagoon

4.2. Ecological significance

The Otaki 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
- It contains ecological features that are **rare or distinctive** in the region
- It contains high levels of ecosystem **diversity**, with several ecosystem types represented within the KNE site boundary, including several naturally uncommon ecosystems
- Its **ecological context** is valuable at the landscape scale as it contains a variety of inter-connected habitats and, provides core/seasonal habitat for threatened indigenous bird and fish species within the KNE site.

Representativeness

This KNE site is classified in the Threatened Environment Classification (LENZ) as Acutely Threatened (72ha), having less than 10% of its indigenous cover remaining nationally and, Chronically Threatened (46ha) having 10-20% indigenous cover remaining nationally⁷ (see Appendix 1, Map 2).

Wetlands are now considered an uncommon habitat type in the Wellington region with less than 3% remaining of their original extent⁸.

Rarity/distinctiveness

Several naturally uncommon ecosystem types are present within the KNE site. Coastal turfs are classified as Critically Endangered; shingle beaches, coastal lagoons, stony beach ridges and braided river systems are classified as Endangered, while estuaries are naturally uncommon ecosystem classified as Vulnerable^{9,10}.

The Ōtaki River mouth and lagoon are described as a geological feature known as a hapua. Hapua are recognised as a distinct landform feature to differentiate them from more conventional river mouth estuaries. These landform features are unique to braided gravel rivers and coarse sediment coasts and are internationally rare¹¹. A hapua is a type of river mouth lagoon common on mixed sand and gravel coasts and is characterised by the absence of regular saltwater flushing with the tides. Instead the estuary is dominated by outward flowing freshwater. The pNRP identifies the Ōtaki Coast hapua as being nationally significant as it is one of the few examples of a fluvially dominated river mouth lagoon and barrier spit system in the North Island.

New Zealand's national threat classification system¹² lists four At Risk plant species and four Threatened and five At Risk bird species. One Threatened and seven At Risk fish species have been recorded in the Ōtaki River and/or Mangaone Stream¹³. Nationally threatened species are listed in Appendix 2. See Appendix 3 for a list of five regionally threatened plant species present at the site.

Diversity

There are several ecosystem types at this KNE site including the hapua, gravel beaches, raised stony ridges, estuarine habitat, freshwater wetlands and regenerating coastal

forest. At the junction of these ecosystems are ecotones where the different plant communities meet. These areas provide a range of habitats for animal and plant species.

Ecological context

The Ōtaki Coast KNE site is important in the wider ecological landscape sitting within 3km of other wetland KNE sites, namely Peka Peka Coast, Te Hapua Wetland Complex, Waitohu Coast and Haruātai/Pareomatangae. It also forms part of the Ōtaki river corridor linking the coast with the Tararua mountain range through an otherwise agricultural or developed landscape.

The KNE site as a whole is considered an important seasonal breeding site for wetland and shorebirds, in particular pied stilts¹⁴, whilst the Ōtaki River and Mangaone Stream mouths are important habitat for migrating and spawning native fish, including threatened species.

4.3. Ecological features

Habitats

The coastal vegetation and animal species found at the KNE site are adapted to deal with the harsh coastal conditions. Exposure to the elements in this maritime environment where salt is delivered aerially from spume and spray-drift¹⁵ has a strong influence on native plant and animal communities. A variety of habitats are found in this exposed and frequently disturbed coastal area and within the KNE site.

Gravel beaches

The gravel beaches are located directly to the north and south of the Ōtaki River mouth. They are subject to strong coastal influences of tides and wind and support sparse associations of pīngao (*Ficinia spiralis*), sand sedge (*Carex pumila*) and knobby clubrush (*Ficinia nodosa*). Amongst the habitat provided by large driftwood piles deposited by onshore currents on the shore south of the Ōtaki River, the vegetation is characterised by native climbers such as pōhuehue (*Muelhenbeckia complexa*), New Zealand spinach/ kōkihi (*Tetragonia implexicoma*) and shore convolvulus (*Calystegia soldanella*).

Raised stony ridges

Raised stony ridges are typically located inland from the gravel beaches and are rarely subject to the same level of disturbance from the ocean as gravel beaches. They have larger sized stones on average and typically support native scrub vegetation communities. The native vegetation within the KNE site's raised stony ridges is characterised by knobby clubrush/wīwī (*Ficinia nodosa*) and isolated patches of flax (*Phormium tenax*), taupata (*Coprosma repens*) and sand coprosma (*Coprosma acerosa*).

Ōtaki Braided River

The lower reaches of the Ōtaki River is a fast-flowing braided river system. Vegetation communities within the river system itself are sparse, but the gravel bank islands provide habitat for native shorebirds¹⁶.

Coastal Turfs

The southern side of the Ōtaki River mouth where brackish influences are still evident are areas of coastal turfs comprising bachelor's button (*Cotula coronopifolia*), slender clubrush (*Isolepis cernua*), shore pimpernel (*Samolus repens*), remuremu (*Selliera radicans*), and mudwort (*Limosella lineata*). Small populations of ōioi (*Leptocarpus similis*) and sand sedge (*Carex litorosa*) are found on the estuarine margins in this area.

The estuary is constrained on either side of the river by flood protection stopbanks constructed in the 1970s.

River Mouth Lagoon, Ngātoko and Katihiku freshwater wetlands

The Ngātoko wetland occupies the area beside the Ngātoko Stream. The wetland is dominated by raupō (*Typha orientalis*) reedland, while the spring-fed stream supports a suite of native aquatic plants such as *Chara* and *Nitella* species.

The lagoon edges are dominated by freshwater wetland species such as wīwī (*Juncus edgariae*), lake club rush (*Schoenoplectus tabernaemontani*), raupo, *Isolepis prolifera* and rautahi (*Carex geminata*). The wetland was fenced off to prevent stock access in 2013.

The Katihiku wetland area has three distinct freshwater wetland areas; Whakapawaewae wetlands, the backwater wetlands and the eastern wetlands. The Whakapawaewae wetlands are dominated by flax, toetoe (*Austroderia toetoe*) and cabbage trees (*Cordyline australis*). The low statured eastern wetlands are dominated by flax, sedges and raupō. And the backwater wetlands are largely dominated by exotic woody species with some elements of regenerating coastal forest such as māhoe, karamū (*Coprosma robusta*) and the tree ferns mamaku (*Cyathea dealbata*) and whekī (*Dicksonia squarrosa*).

Mangaone Stream, estuary and wetland

The Mangaone stream is largely modified and degraded but, from the early 2000s its banks have been planted by the Mangaone Restoration group with native species such as mānuka (*Leptospermum scoparium*), taupata, koromiko (*Hebe stricta*), coastal tree daisy (*Olearia solandri*) and cabbage tree. A small artificially impounded wetland present to the south of the estuary is dominated by wīwī, ōioi and flax.

Species

Birds

The KNE site supports large breeding populations of native shore birds. It is recognised as an important breeding site for banded dotterel (*Charadrius bicinctus*) and supports the largest pied stilt (*Himantopus himantopus*) colony in the region¹⁷. Other bird species known to be present include variable oystercatcher (*Haematopus unicolor*), Caspian tern (*Hydropogone caspia*), red-billed gull (*Larus novaehollandiae*), black shag (*Phalacrocorax carbo*), pied shag (*Phalacrocorax varius*), royal spoonbill (*Platalea regia*) and white-fronted tern (*Sterna striata*).

Fish and koura

Ten native fish species have been recorded in the Ōtaki River and Mangaone Stream, most of which are migratory¹⁸. Species present are shortfin eel (*Anguilla australis*),

longfin eel (*Anguilla dieffenbachia*), torrentfish (*Cheimarrichthys fosteri*), banded kōkopu (*Galaxias argenteus*), kōaro (*G. brevipinnis*), inanga (*G. maculatus*), shortjaw kōkopu (*G. postvectis*), dwarf galaxid (*G. divergens*), redfin bully (*Gobiomorphus huttoni*) and lamprey (*Geotria australis*)¹⁹. Freshwater crayfish/ koura (*Paranephrops planifrons*) are also present.

5. 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.

5.1. Key threats

The main threats identified at the Ōtaki Coast KNE site are ecological weed species, pest animals, altered hydrology and off-road recreational driving.

Ecological weeds are widespread throughout the KNE site. They displace indigenous vegetation, affect the structure and composition of ecosystems and can alter hydrological conditions that sustain the wetland ecology. The estuary, freshwater wetlands and riparian edges are currently dominated by blackberry (*Rubus fruticosus* agg.), gorse (*Ulex europaeus*), Japanese honeysuckle (*Lonicera japonica*), willow species (*Salix* spp.), pampas grass (*Cortaderia* spp.) and brush wattle (*Paraserianthes lophantha*). The gravel beaches are impacted by ecological weeds such as iceplant (*Carpobrotus edulis*), gorse, spike rush (*Juncus acutus*) and the non-local native tree karo (*Pittosporum crassifolium*). These species are able to colonise the harsh coastal environment and outcompete and displace local native species.

Pest animals such as mustelids (*Mustela* spp.), cats (*Felis catus*), rats (*Rattus* spp.) and hedgehogs (*Erinaceus europaeus*) are the greatest threat to native nesting shorebirds and other native fauna such as lizards, invertebrates and fish. These pests are known to be present throughout the KNE site.

Off road vehicle use damages the gravel beach ecosystems causing erosion. Vehicles can introduce ecological weeds and disturb nesting birds. Much of the gravel beaches/stony ridge systems on either side of the Ōtaki River are regularly accessed by vehicles.

While the key threats discussed in this section are recognised as the most significant, a number of other threats to the KNE site's values have also been identified. Table 2 presents a summary of all known threats to the Ōtaki Coast 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 management activities.

The codes alongside each threat correspond to activities listed in the operational plan (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: Summary of all threats to ecological values present at the Ōtaki Coast KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
Ecological weeds		
EW-1	Climbing weeds smother and displace native vegetation often causing canopy collapse. They also inhibit native plant regeneration, and alter vegetation structure and composition. Key weed species include Japanese honeysuckle (<i>Lonicera japonica</i>), blackberry (<i>Rubus fruticosus</i> agg.), and German ivy (<i>Delairea odorata</i>) (see full list in Appendix 4)	Entire KNE site
EW-2	Ground covering ecological weeds smother and displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. Key weed species include the grasses; pampas (<i>Cortaderia</i> spp.), tall fescue (<i>Schoenodorus arundinacea</i>), kikuyu (<i>Pennistenum clandestinum</i>), buffalo grass (<i>Stenotaphrum secundatum</i>) and marram grass (<i>Ammophila arenaria</i>) and broadleaf species including periwinkle (<i>Vinca major</i>), arum lily (<i>Zantedeschia aethiopica</i>), iceplant (<i>Carpobretus edulis</i>), spike rush (<i>Juncus acutus</i>) and tradescantia (<i>Tradescantia fluminensis</i>) (see full list in Appendix 4)	Entire KNE site
EW-3	Woody weed species displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. Key weed species include willows (<i>Salix</i> spp.), poplars, (<i>Populus</i> spp.), brush wattle (<i>Paraserianthes lophantha</i>), boxthorn (<i>Lycium ferocissimum</i>), karo (<i>Pittosporum crassifolium</i>) and gorse (<i>Ulex europaeus</i>) (see full list in Appendix 4)	Entire KNE site
EW-4	Aquatic weeds out-compete native aquatic species and choke watercourses. Key weed species include parrots feather (<i>Myriophyllum aquaticum</i>), reed sweet grass (<i>Glyceria maxima</i>) and cape pond lily (<i>Aponogeton distachyos</i>) (see full list in Appendix 4)	C and G
Pest animals		
PA-1	Hedgehogs (<i>Erinaceus europaeus</i>) prey on native invertebrates ²⁰ , lizards ²¹ and the eggs ²² and chicks of ground-nesting birds ²³	Entire KNE site
PA-2*	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 ^{24,25}	Entire KNE site
PA-3	Possoms (<i>Trichosurus vulpecula</i>) browse palatable canopy vegetation until it can no longer recover ^{26,27} . This destroys the forest's structure, diversity and function. Possoms may also prey on native birds ²⁸ and invertebrates	Entire KNE site
PA-4	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 ^{29,30}	Entire KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
PA-5	Mustelids (stoats ^{31,32} (<i>Mustela erminea</i>), ferrets ^{33,34} (<i>M. furo</i>) and weasels ^{35,36} (<i>M. nivalis</i>)) prey on native birds, lizards and invertebrates, reducing their breeding success and potentially causing local extinctions	Entire KNE site
PA-6	Feral and domestic cats* (<i>Felis catus</i>) prey on native birds ³⁷ , lizards ³⁸ and invertebrates ³⁹ , reducing native fauna breeding success and potentially causing local extinctions ⁴⁰	Entire KNE site
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 ⁴¹ . Rabbits are particularly damaging in sand dune environments where they graze native binding plants and restoration plantings. In drier times hares especially, will penetrate into wetland forest areas browsing and reducing regenerating native seedlings	Entire KNE site
PA-8*	Wasps (<i>Vespula</i> spp.) adversely impact native invertebrates and birds through predation and competition for food resources. They also affect nutrient cycles in beech forests ⁴²	Entire KNE site
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 ⁴³	C
Human activities		
HA-1*	Garden waste dumping often leads to ecological weed invasions into natural areas. Common weed species introduced at this KNE site include periwinkle and tradescantia	A,C,D,F,G
HA-2*	Recreational vehicles such as 4WDs and motorbikes can cause damage to dune systems and disturbance of the native ecosystem	A,C,E,F,G
HA-3*	Recreational activities such as walking, dog walking, picnicking, and fishing can cause damage to habitats, native plants and invertebrates, disturb wildlife and can introduce/spread weed species	Entire KNE site
HA-4	Historic flood protection management including the installation of stopbanks and floodgates have altered the hydrological conditions of the estuaries. This has impacted on the long-term viability of some wetland habitats and restricted native fish passage	B,C,D,E,G
HA-5*	Encroachment of residential gardens into the KNE site from urban areas causes habitat loss and introduces ecological weeds	F,G
HA-6	Barriers to native fish passage are present in streams within the KNE site preventing migrating fish from completing their life-cycle	B,C,D,G
HA-7*	Land use activities that alter the local hydrology, such as development schemes and sub-divisions can affect the water levels that sustain wetland ecosystems	B,D,G

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
HA-8*	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	B,C,D,E,G
HA-9*	Freshwater activities such as boating, fishing, white baiting and duck shooting can introduce aquatic weed species to waterways.	B,C,E
HA-10*	Over-fishing, particularly of whitebait, may reduce fish stocks to non-sustainable levels	B,C,D
Other threats		
OT-1*	Edge effects affect regenerating forests by changing environmental conditions (eg, soil moisture or temperature levels), changing physical environment (eg, different plant assemblages compared to the interior) and changing species interactions (eg, increased predation by invasive species) ^{44,45}	Entire KNE site
OT-2*	Extreme environmental weather patterns or events such as sea level rise and storm surges can result in increased storm damage and/ or complete inundation of sea water into the KNE site dramatically affecting the condition of the vegetation communities and/or breeding succession of shorebirds within the KNE site	Entire KNE site

*Threats marked with an asterisk are not addressed by actions in the operational plan

6. Management objectives

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

The following objectives will guide the management activities at the Ōtaki Coast KNE site.

1. **To improve the structure* and function† of native plant communities**
2. **To improve the habitat for native birds**
3. **To improve the habitat for native freshwater fish**
4. **To improve the habitat for threatened native animals (coastal birds)**
5. **To protect threatened native plant associations (coastal turfs and gravel beach communities)**

* The living and non-living physical features of an ecosystem. This includes the size, shape, complexity, condition and the diversity of species and habitats within the ecosystem.

† The biological processes that occur in an ecosystem. This includes seed dispersal, natural regeneration and the provision of food and habitat for animals.

7. Management activities

Management activities are targeted to work towards the objectives (Section 6) by responding to the threats outlined in Section 5. The broad approach to management activities is described below, and specific actions, with budget figures attached, are set out in the operational plan (Table 3). It is important to note that not all threats identified in Section 5 can be adequately addressed. This can be for a number of reasons including financial, legal, or capacity restrictions.

The main management activity to be undertaken at the KNE site is ecological weed control, along with pest animal control and revegetation, to increase the distribution and regeneration of native plant species and maintain breeding populations of native shorebirds.

The KNE site has been divided into 8 operational areas; A-H. These are:

- A:** North estuary gravel beach (7.5ha)
- B:** Ngātoko wetland and stream edge (1.5ha)
- C:** River mouth lagoon and wetland (16ha)
- D:** Ōtaki River area (23ha)
- E:** Katihiku Wetlands and surrounds (35ha)
- F:** Te Horo Gravel Beach (Ōtaki Estuary to Mangaone Estuary 28.5ha)
- G:** Mangaone Stream and estuary, and Te Horo Gravel Beach south (7.5ha)

See Appendix 1, Map 4 for locations of operational areas.

In addition there are several key wetland habitats around the Otaki River mouth covering operational areas A-E. These are identified in Appendix 1, Map 5.

7.1. Ecological weed control

The objectives of weed control are to reduce the density of weeds in order to maintain native plant dominance and integrity of native plant communities, and to increase native plant regeneration. GWRC will undertake weed control annually throughout the KNE site that is targeted on the species that have the highest ecological impact (See Appendix 4, Table 9 for a full list of identified ecological weed species within the KNE site and their ecological impact rating).

Ongoing multi-species ecological weed control (prioritising gorse, karo, arum lily and Japanese honeysuckle) will be undertaken in operational areas A, and C. GWRCs Flood Protection department is currently funding this activity on a weekly or fortnightly basis with KCDC field staff assistance.

Control of willow species, arum lily, gorse and convolvulus (*Calystegia silvatica*) will be undertaken annually by GWRC in the Ngātoko wetland (operational Area B).

Within the Katihiku wetlands area (operational area E) control of blackberry, gorse, convolvulus and pampas will be undertaken annually by GWRC. This will be initially in the Whakapawaewae wetlands and if resources allow progress to the surrounding eastern wetland (see Appendix 1, Map 4).

On the northern side of the stopbank of operational area E, around the backwater wetlands (see Appendix 1, Map 4), GWRC will increase native plant dominance by strategically controlling weeds around associations of mature native trees. This approach will release mature native trees from the competitive pressure of willows, blackberry, gorse and brush wattle. This will provide small islands or nodes of native vegetation that can spread seed across the KNE site.

Annually GWRC will progressively control a range of ecological weeds in operational area F and G. Targeted species include: the climbers blackberry and Japanese honeysuckle; woody weeds such as boxthorn, gorse and karo and groundcovers such as iceplant and spike rush.

GWRC will control reed sweet grass (*Glyceria maxima*) around the Mangaone Stream (operational area F) annually from 2016/17. KCDC will also control gorse in this operational area annually.

7.2. Pest animal control

Pest animal control is undertaken to protect the native bird populations present within the KNE site. This includes nesting shorebirds on the gravel islands and wetland birds in the freshwater wetland areas within the Otaki river corridor.

A total of 35 DOC 250 kill-traps are located around the Ōtaki River mouth and surrounding areas; 18 traps on the northern side of the river around the lagoon, Ngātoko wetlands and river margins (operational area A, B, C and D) and 17 traps on the southern side (operational area E) of the Ōtaki estuary (see Appendix 1, Map 5). The Flood Protection department funds the servicing of the kill-traps on the northern side of the estuary and, the landowner will service the network at the Ngātoko wetlands (operational area C). The southern side of the estuary will be serviced by Katihiku hapū representative (operational area E). Pest control on both sides of the Ōtaki River will be serviced on a monthly basis.

Ten Timms kill-traps targeting feral cats have been sited around the southern side of the Ōtaki estuary south (operational area E) and one trap is located in the Ngātoko wetlands (operational area B). These will be maintained by landowners and bait provided by GWRC.

A total of 11 Pelifeed poison bait-stations are located around the Ōtaki river mouth; three at Ngātoko wetland (operational area B) and 10 around the Whakapawaewae wetlands (operational area E). These bait-stations will be serviced on a minimum three-monthly basis by the landowners with poison-bait provided by GWRC.

Six DOC 150 kill-traps are located on private property alongside operational area E. These are serviced by the landowners and not mapped in the pest animal network, although they will be reducing impacts of invading pests.

TBFree New Zealand⁴⁶ control possums within the wider Kāpiti Coast area with a low density poison bait-station network as part of their vector control programme that aims to eradicate bovine tuberculosis across the landscape. The KNE site lies within the programme's 'buffer zone' that aims to control possums to <5% Residual Trap Catch (RTC). This programme, although less intensive than that within the KNE site, will benefit the KNE site by reducing possum incursion.

7.3. Revegetation

Revegetation aims to increase native plant community dominance and provide a seed source to aid natural regeneration within the KNE site. Appendix 5 provides a master species list for plants to be used in all revegetation planting within the KNE site.

Revegetation has focused over the last six years within the Ōtaki River Estuary (operational area D) where over 6,000 native plants have been planted by FOTOR. The Flood Protection department is funding the maintenance of the 6,000 plants for 2016/17. Maintenance involves controlling ecological weeds around the plants on a weekly basis with an estimated one day per week in 2015/16. FOTOR assists with this maintenance work.

FOTOR have scaled down their revegetation planting in the Lagoon area to one large group planting of 300 plants annually (operational area C). New areas for planting will be identified by FOTOR in operational area C. The size and location of these planting sites have not been clarified but they will contribute to the objective of improving the native vegetation structure and function of the KNE site.

Additionally FOTOR will plant 200 native plants annually on the gravel beach, Lagoon edge and wetland buffer area within operational areas A and the western edge of C (see Appendix 1, Map 7). The gravel beach will have approximately 100 plants a year planted of mainly wīwī (*Ficinia nodosa*), pingao (*Ficinia spiralis*), and sand coprosma (*Coprosma acerosa*). The hapua edge will have approximately 25 plants planted annually comprising mainly of flax (*Phormium tenax*) and toe toe (*Austroderia toetoe*) and the Wetland buffer area will have 75 plants planted annually comprising mainly mingimingi (*Coprosma propinqua*), saltmarsh ribbonwood (*Plagianthus divaricatus*), tauhinu (*Ozothamnus leptophylla*), and taupata (*Coprosma repens*). KCDC provide 100 plants annually for gravel beach planting, with the remaining 100 plants sourced from the FOTOR nursery.

Private landowners Iain and Caitlin Cassels plant and maintain approximately 200 plants annually across the gravel beach areas between the estuary and the Sims Road entrance (operational area F). KCDC provide the plants for this activity.

Private landowner John Best is revegetating the riparian margin of the Ngātoko Stream adjacent to the Ngātoko wetland (operational area B) and will plant 100 native plants annually from 2015/16. KCDC will provide the plants for this activity.

From 2015/16 Katihiku X Trust volunteers will plant and maintain 300 native plants within the Whakapawaewae wetlands (operational area E). KCDC will provide the plants for this activity.

The Mangaone Restoration group will continue to maintain their previous plantings in operational area H annually to ensure their establishment.

Table 3: Summary of annual revegetation planting at the Ōtaki Coast KNE site

Operational area	Timing	Total number of plants	Plants provided by	Management requirements
A and C	May/ June	500 per annum	100 plants KCDC and 400 FOTOR	FOTOR planted and maintained
B	May/ June	100 per annum	KCDC	Planted and maintained by John Best
E	May/ June	300 per annum	KCDC	Planted and maintained by Katihiku X Trust
F	May/ June	200 per annum	KCDC	Planted and maintained by Iain and Caitlin Cassels

7.4. Management of Threatened/At Risk plant associations

Management for At Risk plant species will be required to maintain or increase existing populations. Due to their high value and sensitivity to herbicide, existing populations of rare and threatened plants require fine scale management. For example, hand weeding or use of selective herbicides is required to control weeds in their vicinity, as opposed to the less sensitive broad scale weed control methods used elsewhere in the KNE site.

KCDC fund weed control around the sand coprosma/knobby clubrush associations in operational area F, and in operational area E engage the contractor to release spray around the coastal turfs and the populations of sand sedge (*Carex litorosa*). Populations will be monitored after control works and if At Risk plants are in decline, plantings may be required to bolster populations.

7.5. Fish passage

During the process of developing this plan the Flood Protection department installed a fish friendly floodgate at the Katihiku stopbank in March 2016. This floodgate will allow greater access for fish to the wetland providing a greater amount of spawning habitat to migrating fish.

The new floodgate will also increase the amount of saline water in the wetlands to the east of the stopbank creating more estuarine habitat. This habitat will provide for greater spawning opportunities for inanga. Extra springs may be attached to the fish friendly floodgate to slow the rate of gate closure on the incoming tide, which will facilitate increased opportunities for fish passage through this structure.

8. Operational plan

The operational plan shows the actions planned to achieve the stated objectives for the Ōtaki Coast KNE site, and their timing and cost over the three-year period from 1 July 2015 to 30 June 2018. The budget for the 2016/17 and 2017/18 years are indicative only and subject to change. A map of operational areas can be found in Appendix 1 (see Map 3).

Table 4: Three-year operational plan for the Ōtaki Coast KNE site

Objective	Threat	Activity	Operational area	Delivery	Description/detail	Target	Timetable and resourcing		
							2015/16	2016/17	2017/18
1, 2	EW 3	Ecological weed control	G	Biosecurity department	Karo control and follow up control on 2014/15 works and staged removal of mature patches	Reduction in distribution and abundance of ecological weeds	\$2,400	\$2,400	\$2,400
1	EW-1, EW-2	Ecological weed control	B	Biosecurity department	Willows, gorse and convolvulus control	Reduction in distribution and abundance of ecological weeds	\$400	\$400	\$400
1, 2	EW- 1, EW- 3	Ecological weed control	G	Biosecurity department	Progressive control of iceplant and other broadleaf weeds including gorse, pig's ear and spike rush	Reduction in distribution and abundance of ecological weeds	\$2,000	\$2,000	\$2,000
1, 2	EW-1, EW-2	Ecological weed control	F	Biosecurity department	Gorse and other woody weed control including blackberry progressive control	Reduction in distribution and abundance of ecological weeds	\$1,500	\$1,500	\$1,500
1, 2	EW-1, EW-3, EW-4	Ecological weed control	E	Biosecurity department	Gorse, blackberry, pampas and convolvulus control	Reduction in distribution and abundance of ecological weeds	\$3,500	\$3,500	\$3,500

Objective	Threat	Activity	Operational area	Delivery	Description/detail	Target	Timetable and resourcing		
							2015/16	2016/17	2017/18
1, 2	EW-1, EW-2, EW-3	Ecological weed control	E	Biosecurity department	River strip ecological weeds such as brush wattle, willow and pampas in order to release natural regenerating native trees	Reduction in distribution and abundance of ecological weeds	\$200	\$200	\$200
1, 2	EW-1, EW-2, EW-3, EW-4	Ecological weed control	A, B and D	Flood Protection department	Multi-species weed control by contractor approximately 0.5 days/ week	Reduction in distribution and abundance of ecological weeds	To be determined	To be determined	To be determined
1, 2	EW-1, EW-2, EW-3, EW-4	Ecological weed control	A, B	KCDC staff	Multi-species weed control by contractor approximately 0.5 days/ week	Reduction in distribution and abundance of ecological weeds	Nil	Nil	Nil
5	EW-3, EW-4	Rare and threatened plant species protection	E and F	KCDC	Fine scale ecological weed control around threatened plant associations	Increase in distribution and abundance of threatened plants	\$500^	\$500^	\$500^
1, 2	EW-1, EW-2	Revegetation	B	Flood Protection department	Releasing and protecting 6,000 native plants	90% survival rate of planted species	\$17,000	Nil	Nil
1, 2	EW-2, EW-3, EW-4	Revegetation	B, E, F	Landowners	Planting of 600 eco-sourced native plants	Increase in area planted	\$1800^	\$1,800^	\$1800^
1,2	EW-1, EW-2, EW-4	Revegetation	A,C	FOTOR	Revegetation of three sites within the north estuary and north gravel beach by FOTOR. Approximately 200 plants/ year provided by KCDC and FOTOR	60% survival rate of planted species	\$300^	\$300^	\$300^

Objective	Threat	Activity	Operational area	Delivery	Description/detail	Target	Timetable and resourcing		
							2015/16	2016/17	2017/18
4	PA-1, PA-3, PA-4, PA-5, PA-6	Pest animal control	B,C, D and E	Biosecurity department, landowners, hapu and community	Service and maintenance of pest animal networks and bait provision	Possums <1% RTC * Rats < 10% TTI**	\$1,200	\$1,200	\$1,200
3	HA-4, HA-6	Installation of flap gate	D	Flood Protection department	Fish friendly floodgate purchase and installation	Successful installation of flap gate	\$7,680	Nil	Nil
Total							\$38,480	\$13,800	\$13,800

^subject to continued funding by KCDC through their coastal restoration fund

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

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

9. Funding contributions

9.1. Budget allocated by GWRC

The budget for the 2016/17 and 2017/18 years are indicative only and subject to change.

Table 5: GWRC allocated budget for the Ōtaki Coast KNE site

Management activity	Timetable and resourcing		
	2015/16	2016/17	2017/18
Ecological weed control	\$5,000	\$5,000	\$5,000
Pest animal control	\$1,200	\$1,200	\$1,200
Revegetation	\$17,000+	\$13,000+	Nil
Fish friendly floodgate	\$7680+	Nil	Nil
Total	\$30,880	\$19,200	\$6,200

+ funding provided by Flood Protection

9.2. Budget allocated by KCDC

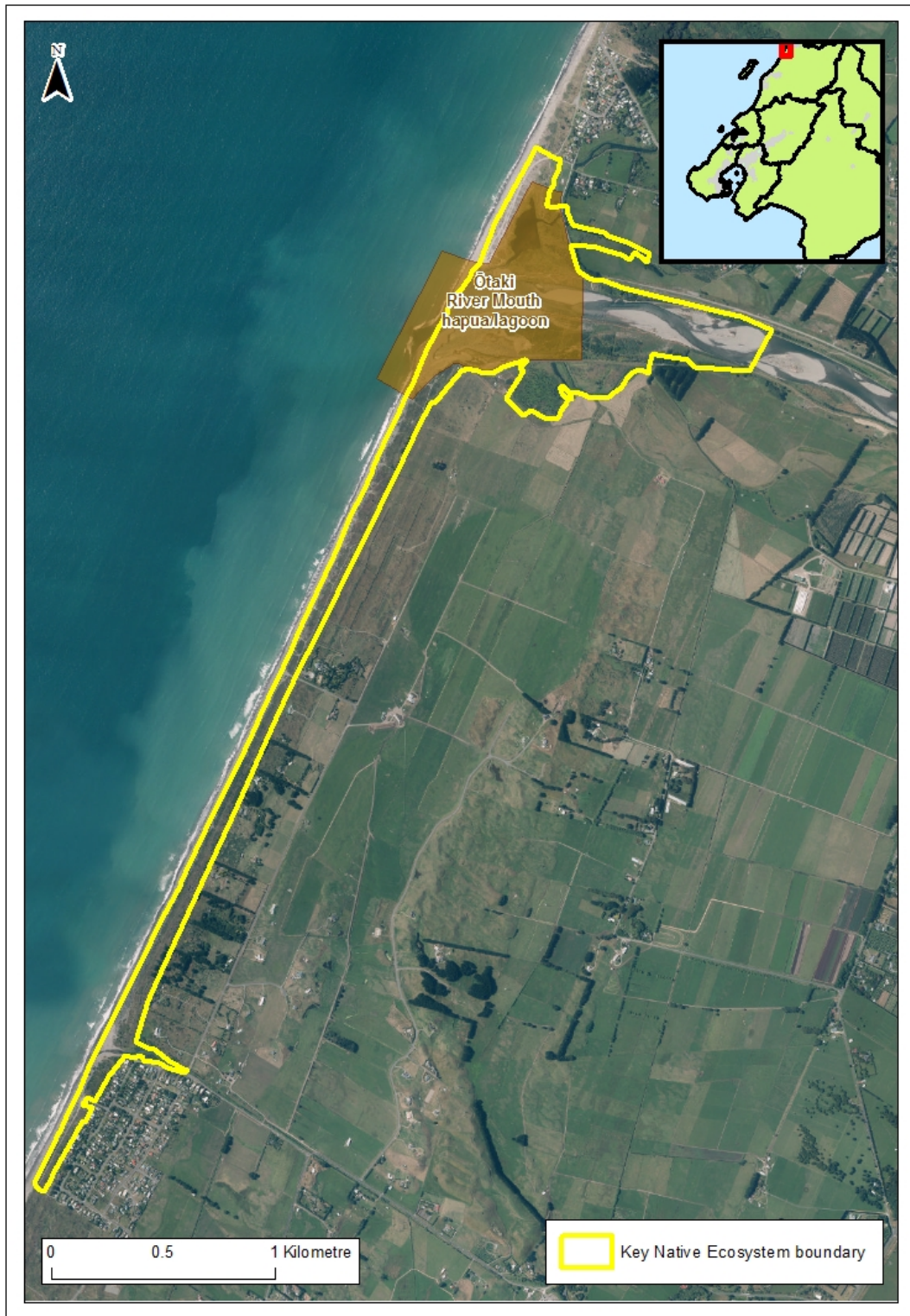
The budget for the 2016/17 and 2017/18 years are indicative only and subject to change.

Table 6: KCDC allocated budget for the Ōtaki Coast KNE site

Management activity	Timetable and resourcing		
	2015/16	2016/17	2017/18
Ecological weed control	\$5,000	\$5,000	\$5,000
Re-vegetation	\$2,100	\$2,100	\$2,100
Threatened species management	\$500^	\$500^	\$500^
Total	\$7,600	\$7,600	\$7,600

^ subject to continued funding by KCDC through their coastal restoration fund

Appendix 1: Site maps



Map 1: The Ōtaki Coast KNE site boundary and location of hapua



Map 2: Property ownership at Ōtaki Coast KNE site



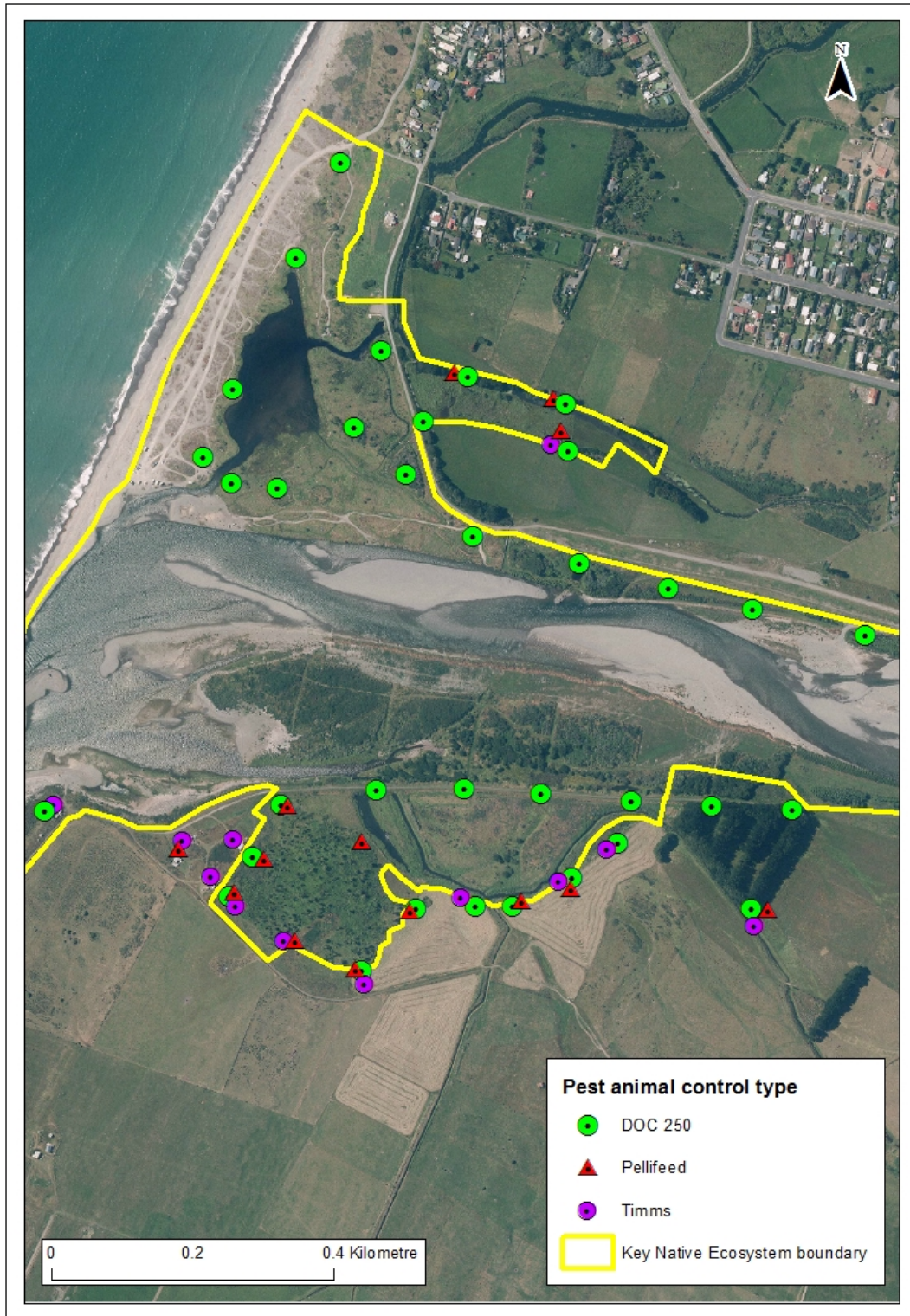
Map 3: Land Environment New Zealand threat classifications for the Ōtaki Coast KNE site



Map 4: Operational areas in the Ōtaki Coast KNE site



Map 5: Key wetland habitats located around the Ōtaki river mouth at Ōtaki Coast KNE site



Map 6: Pest animal control in the Ōtaki Coast KNE site



Map 7: Revegetation areas in the Ōtaki 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 three-year cycle⁴⁷, with the exception of birds which are assessed on a five-year cycle⁴⁸. 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 Ōtaki Coast KNE site.

Table 7: Threatened and At Risk species at the Ōtaki Coast KNE site

Scientific name	Common name	Threat status	Observation
Plants(vascular)⁴⁹			
<i>Carex litorosa</i>	Sea sedge	At Risk-Declining	Urlich and Carter 2013 ⁵⁰
<i>Coprosma acerosa</i>	Sand coprosma	At Risk-Declining	Rob Cross, KCDC, pers obs 2012
<i>Pimelea villosa</i>	Sand pimelea	At Risk-Declining	(as <i>Pimelea</i> aff. <i>arenaria</i>) Milne and Sawyer 2002 ⁵¹
<i>Tetragonia tetragonoides</i>	Kokihi, New Zealand spinach	At Risk-Naturally Uncommon	DOC description of Ōtaki River estuary
Birds⁵²			
<i>Charadrius bicinctus</i>	Banded dotterel	Threatened-Nationally Vulnerable	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Haematopus unicolor</i>	Variable oystercatcher	At Risk-Recovering	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Himantopus himantopus</i>	Pied stilt	At Risk-Declining	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Hydropogon caspia</i>	Caspian tern	Threatened-Nationally Vulnerable	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Larus novaehollandiae</i>	Red-billed gull	Threatened-Nationally Vulnerable	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Phalacrocorax carbo</i>	Black shag	At Risk-Naturally Uncommon	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Phalacrocorax varius</i>	Pied shag	Threatened-Nationally Vulnerable	http://ebird.org/content/newzealand/ (accessed 22/01/2014)

Scientific name	Common name	Threat status	Observation
<i>Platalea regia</i>	Royal spoonbill	At Risk-Naturally Uncommon	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Sterna striata</i>	White-fronted tern	At Risk-Declining	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
Freshwater fish⁵³			
<i>Anguilla dieffenbachii</i>	Longfin eel	At Risk-Declining	NZFFD 2015 Mangaone Stream and Ōtaki River
<i>Cheimarrichthys fosteri</i>	Torrentfish	At Risk-Declining	NZFFD 2015 Ōtaki River only
<i>Galaxias argenteus</i>	Giant kōkopu	At Risk-Declining	NZFFD 2015 Ōtaki River only
<i>Galaxias brevipinnis</i>	Kōaro	At Risk-Declining	NZFFD 2015 Mangaone Stream and Ōtaki River
<i>Galaxias divergens</i>	Dwarf galaxias	At Risk-Declining	NZFFD 2015 Ōtaki River only
<i>Galaxias maculatus</i>	Inanga	At Risk-Declining	NZFFD 2015 Mangaone Stream only
<i>Galaxias postvectis</i>	Shortjaw kōkopu	Threatened-Nationally Vulnerable	NZFFD 2015 Mangaone Stream and Ōtaki River
<i>Gobiomorphus huttoni</i>	Redfin bully	At Risk-Declining	NZFFD 2015 Mangaone Stream and Ōtaki River

Appendix 3: Regionally threatened plant species list

The following table lists regionally threatened species that have been recorded in the Ōtaki Coast KNE site. Native plant species have been identified in the Plant Conservation Strategy, Wellington Conservancy 2004-2010⁵⁴.

Table 8: Regionally threatened plant species recorded in the Ōtaki Coast KNE site

Scientific name	Common name	Threat status	Observation
Plants⁵⁵			
<i>Carex litorosa</i>	Sand sedge	Regionally critical	Mike Urlich, GWRC, pers obs 2013
<i>Coprosma acerosa</i>	Sand coprosma	Gradual decline	Rob Cross, KCDC, pers obs 2012
<i>Ficinia spiralis</i>	Pingao	Gradual decline	Planted by FOTOR 2006
<i>Plagianthus divaricatus</i>	Saltmarsh ribbonwood	Sparse	Planted by FOTOR 2006
<i>Tetragonia tetragonoides</i>	Kokihi, New Zealand spinach	Sparse	DOC description of Ōtaki River estuary

Appendix 4: Ecological weed species

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

Table 9: Ecological weed species recorded in the Ōtaki Coast KNE site

Scientific name	Common name	Weed type	Priority	Notes
<i>Acacia sophora</i>	Acacia	Woody weed	Moderate	Scattered and sparse
<i>Agapanthus praecox</i> subsp. <i>orientalis</i>	Agapanthus	Groundcover	High	Localised and sparse
<i>Agave americana</i>	Century plant	Groundcover	Low	Localised and sparse
<i>Allium triquetrum</i>	Onion weed	Groundcover	Moderate	Localised and abundant
<i>Ammophila arenaria</i>	Marram	Exotic grass	High	Scattered and abundant
<i>Apium nodiflorum</i>	Water celery	Marginal aquatic	Moderate	Localised and sparse
<i>Aponogeton distachys</i>	Cape pond lily	Aquatic	High	Localised and abundant
<i>Arctotis stoechadifolia</i>	Arctotis	Groundcover	Moderate	Scattered and sparse
<i>Artemisia</i> sp.	Artemisia	Woody weed	Moderate	Localised and sparse
<i>Banksia integrifolia</i>	Banksia	Woody weed	Moderate	Scattered and sparse
<i>Carpobrotus edulis</i>	Iceplant	Groundcover	Very high	Widespread and abundant
<i>Chamaecytisus palmensis</i>	Tree lucerne	Woody weed	Low	Localised and abundant
<i>Chrysanthemoides monilifera</i> subsp. <i>monilifera</i>	Boneseed	Woody weed	Very high	Localised and sparse
<i>Conyza canadensis</i>	Canadian fleabane	Groundcover	Low	Widespread and sparse
<i>Correa alba</i>	Correa	Woody weed	High	Scattered and sparse
<i>Cortaderia</i> spp.	Pampas	Exotic grass	Very high	Widespread and abundant
<i>Cotyledon orbiculata</i>	Pig's ear	Groundcover	Moderate	Localised and abundant
<i>Crocasmia</i> × <i>crocosmiiflora</i>	Montbretia	Groundcover	High	Localised and abundant
<i>Cupressus macrocarpa</i>	Macrocarpa	Woody weed	Low	Localised and sparse
<i>Delairea odorata</i>	German ivy	Climber	Moderate	Scattered and sparse
<i>Galega officinalis</i>	Goat's rue	Groundcover	Low	Localised and sparse
<i>Gazania rigens</i>	Gazania	Groundcover	Moderate	Scattered and sparse
<i>Genista monspessulana</i>	Montpellier broom	Woody weed	Moderate	Localised and abundant
<i>Glyceria maxima</i>	sweet grass	Marginal aquatic	High	Localised and abundant
<i>Juncus acutus</i>	Sharp rush	Marginal aquatic	High	Localised and abundant
<i>Lathyrus latifolius</i>	Everlasting pea	Climber	Moderate	Scattered and sparse
<i>Lonicera japonica</i>	Japanese honeysuckle	Climber	High	Widespread and sparse
<i>Lupinus arboreus</i>	Lupin	Woody weed	High	Localised and abundant
<i>Lycium ferocissimum</i>	Boxthorn	Woody weed	Very high	Scattered and abundant

Scientific name	Common name	Weed type	Priority	Notes
<i>Malva arborea</i>	Tree mallow	Groundcover	Low	Localised and sparse
<i>Orobanche minor</i>	Broomrape	Groundcover	Low	Localised and sparse
<i>Paraserianthes lophantha</i>	Brush wattle	Woody weed	Very high	Scattered and abundant
<i>Pennisetum clandestinum</i>	Kikuyu	Exotic grass	High	Scattered and abundant
<i>Pinus radiata</i>	Radiata pine	Woody weed	Low	Scattered and abundant
* <i>Pittosporum crassifolium</i>	Karo	Woody weed	Very high	Localised and abundant
<i>Rhamnus alaternus</i>	Evergreen buckthorn	Woody weed	Very high	Localised and sparse
<i>Rubus fruticosus</i> agg.	Blackberry	Climber	High	Localised and sparse
<i>Rumex sagittatus</i>	Climbing dock	Climber	Low	Scattered and sparse
<i>Salix cinerea</i>	Grey willow	Woody weed	Very high	Localised and abundant
<i>Salix fragilis</i>	Crack willow	Woody weed	High	Localised and abundant
<i>Schedonorus arundinaceus</i>	Tall fescue	Exotic grass	Moderate	Widespread and abundant
<i>Senecio elegans</i>	Purple groundsel	Groundcover	Low	Scattered and sparse
<i>Tropaeolum majus</i>	Nasturtium	Climber	Low	Localised and sparse
<i>Ulex europaeus</i>	Gorse	Woody weed	High	Widespread and abundant
<i>Vinca major</i>	Periwinkle	Groundcover	High	Scattered and abundant
<i>Yucca</i> sp.	Yucca	Groundcover	Low	Scattered and sparse

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

Appendix 5: Revegetation plant list

Plants from the following table will be used in any revegetation planting.

Table 10: Revegetation plant list for use within the Ōtaki Coast KNE site

Scientific name	Common name	Operational area
<i>Austroderia toetoe</i>	Toe toe	B
<i>Coprosma acerosa</i>	Sand coprosma	A
<i>Coprosma propinqua</i>	Mingimingi	B, E
<i>Coprosma repens</i>	Taupata	B, E
<i>Cordyline australis</i>	Cabbage tree/ Ti kouka	E
<i>Dacrycarpus dacrydioides</i>	Kahikatea	C
<i>Ficinia nodosa</i>	Wīwī	A, F
<i>Ficinia spiralis</i>	Pingao	A
<i>Hebe stricta</i>	Koromiko	C
<i>Melicytus ramiflorus</i>	Mahoe	C
<i>Muelhenbeckia complexa</i>	Pohuehue	A, F
<i>Myoporum laetum</i>	Ngaio	C
<i>Olearia paniculata</i>	Akiraho	C
<i>Olearia solandri</i>	Coastal tree daisy	C
<i>Ozothamnus leptophylla</i>	Tauhinau	A, F
<i>Phormium tenax</i>	Harekeke	A, B, C, E, F
<i>Pittosporum tenuifolium</i>	Kohuhu	C
<i>Plagianthus divaricatus</i>	Saltmarsh ribbonwood	C
<i>Syzigium maire</i>	Swamp maire	C

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- ¹ Greater Wellington Regional Council. 2016. Biodiversity Strategy 2015-25. 25 p.
- ² Greater Wellington Regional Council. 1999. Otaki River Environmental Strategy. Opportunities to Enhance the Otaki river Environment.
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