Key Native Ecosystem Operational Plan for Te Harakeke Wetland Complex

2024-2029

Contents

1. Purpose

The purpose of this five-year Key Native Ecosystem (KNE) operational plan for the Te Harakeke Wetland Complex KNE site is to:

- Identify the parties involved in preparing and delivering the operational plan
- Summarise the ecological values of the site and identify the threats to those values
- Outline the vision and objectives that guide management decision-making
- Describe the operational activities undertaken to improve ecological conditions (eg, ecological weed control), who will undertake the activities and the allocated budgets.

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 outlined in Section 2.

2. Policy context

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

Funding for the KNE programme is allocated under the Greater Wellington Long Term Plan (2021-2031)[2] and is managed in accordance with the Greater Wellington Biodiversity Strategy[3]. This sets a framework for how Greater Wellington protects and manages biodiversity in the Wellington region. Goal One of the Biodiversity Strategy - *Areas of high biodiversity value are protected or restored* - drives the delivery of the KNE programme.

Other important drivers for the KNE programme include the Natural Resources Plan for the Wellington Region (NRP)[4] and the Regional Pest Management Plan 2019-2039[5].

3. The Key Native Ecosystem programme

The KNE programme is a non-regulatory programme. The programme seeks to protect some of the best examples of original (pre-human) ecosystem types in the Wellington region. Greater Wellington has identified sites with the highest biodiversity values and prioritized them for management[6].

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

KNE sites can be located on private or publicly owned land. Any work undertaken on private land as part of this programme 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. Land managed by the Department of Conservation (DOC) is generally excluded from this programme.

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 commonplace	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 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.

4. Te Harakeke Wetland Complex Key Native Ecosystem site

The Te Harakeke Wetland Complex KNE site (49 ha) is located between Waikanae Beach and Peka Peka on the Kāpiti Coast, approximately 500 m inland from the coastline within the coastal dune belt of the Ngarara Stream catchment (see Appendix 1, Map 1). The KNE site occupies the northern half of the larger wetland complex known as Te Harakeke or Kawakahia wetlands.

This wetland complex is scheduled as an Outstanding Natural Wetland in Schedule A3 of the NRP[7] for its representativeness, diversity and rarity (see Appendix 1, Map 2). The wetland is recognised as a regionally significant wetland being the largest dune swale wetland remaining in a relatively natural state on the coastal plain of the Foxton Ecological District[8]. It is also considered the largest and one of the most intact remnants of 'The Great Swamp'[9], a large swamp network that once covered an area of over 9,200 ha along the Kāpiti Coast [10].

The KNE site contains a diverse mix of wetland habitat types which support a high concentration of indigenous fish, bird and plant species of conservation concern[11]. Included within the site are decommissioned oxidation ponds, which despite their artificial nature do provide important open water habitat for waterfowl. The KNE site is surrounded by drained farmland and urban development but provides an important corridor for bird movement in the wider landscape.

Parts of the KNE site are owned by QEII National Trust (QEII) and/or are legally protected as QEII open space covenants (see Appendix 1, Map 3) and most of the KNE site is designated by the Kāpiti Coast District Council (KCDC) as an Ecological Site of Significance (see Appendix 1, Map 4). The KNE site is a Department of Conservation (DOC) Designated Ecological Site for the following reasons: it is a Wetland of Ecological and Representative Importance[12] and as a moderate-high Site of Special Wildlife Interest[13].

The southern extent of the Te Harakeke wetland covering approximately 60 ha is privately owned and not currently included in the KNE site. The ecological values and threats outlined in sections 6 and 7 of this plan also generally apply to that part of the wetland. The bulk of this privately owned land is covered by two QEII covenants. A smaller section is owned by the Waikanae golf club and is uncovenanted.

5. Parties involved

There are several organisations, groups and individuals that play important roles in the care of the Te Harakeke Wetland Complex KNE site.

5.1. Landowners

The Te Harakeke Wetland Complex KNE site has both private and public landowners (see Appendix 1, Maps 1 and 5):

- Chris and Esmae Brown (Brown's) own 4.15 ha, comprising the northern-most portion
- Peka Peka Farms Limited owns the rest of the northern end of the KNE site (20.85 ha)
- Maswood Holdings Ltd owns 1.26 ha on the eastern side which is within a QEII covenant
- QEII National Trust (QEII) owns 6.93 ha located just north of the decommissioned Waikanae sewerage treatment ponds
- Kāpiti Coast District Council (KCDC) owns 19.5 ha of the KNE site including the decommissioned Waikanae sewerage treatment ponds and stream linkage 'Black drain' (hereafter referred to as the 'Black drain') contained within Pharazyn Reserve. The legal status of Pharazyn Reserve is expected to change within the duration of this plan from a sewage treatment gazette to a local purpose reserve/wildlife habitat.

5.2. Operational delivery

Within Greater Wellington, three teams are responsible for delivering the Te Harakeke Wetland Complex KNE operational plan.

- The Environment Restoration team leads the strategic planning, funding and coordination of biodiversity management activities and advice within the KNE site
- The Pest Plants and Pest Animals teams coordinate and implement ecological weed and pest animal control measures at the KNE site with funding from the Environment Restoration team's KNE programme budget.

KCDC fund and undertake management activities within the Pharazyn Reserve in accordance with two existing management/restoration plans: the Pharazyn Reserve Management Plan[14] and the Pharazyn Reserve Landscape and Ecological Restoration Plan[15]. These plans provide more detail on the restoration activities undertaken within these specific areas of the KNE site.

5.3. Mana whenua partners

Part of the Te Harakeke Wetland Complex KNE site area is significant to Te Ātiawa ki Whakarongotai, who are mana whenua partners with Greater Wellington.

The area has been identified under the NRP[16] as culturally important with particular reference to freshwater (wai Maori) recognising that these are areas where mana whenua lived and practiced mahinga kai (see table 1).

Greater Wellington is committed to identifying ways in which kaitiakitanga can be strengthened by exploring opportunities for mana whenua partners to participate in the development or delivery of KNE operational plans.

Table 1: Mana whenua sites of significance in Te Harakeke Wetland Complex KNE site[17]

Sites of significance	Mana whenua values
Te Manga o Waimeha (Waimeha Stream) (Schedule B: Ngā Taonga Nui a Kiwa)	Te mahi kai, te mana o te wai, te Mana o te tangata, te manawaroa o te wai, wāhi mahara, wāhi whakarite
Ngārara Stream - Kawakahia (Schedule C2)	Wai ora, mahinga kai, pā harakeke

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 2, below, lists ecological designations at all or part of the Te Harakeke Wetland Complex KNE site.

Table 2: Designations at the Te Harakeke Wetland Complex KNE site

Designation level	Type of designation
Regional	Te Harakeke Wetland Complex is scheduled under the NRP[18] as: • Wetland with outstanding indigenous biodiversity values: Te Harakeke Wetland (Schedule A3) • River with Significant Indigenous Ecosystems – Habitat for indigenous fish species of conservation interest: Waimeha Stream (Ngarara Stream) and all tributaries (Schedule F1)
District	Parts of the Te Harakeke Wetland Complex KNE site have been identified by KCDC as Ecological Sites of Significance[19]: • Te Harakeke Swamp: K066 (65.3 ha) • Pharazyn Reserve: K236 (41.6 ha) Parts of the Te Harakeke Wetland Complex KNE site have been identified by Department of Conservation (DOC) as Recommended Areas For Protection (RAPs)[20]: • Te Harakeke Swamp: 31.02 (96.1 ha) Parts of the Te Harakeke Wetland Complex KNE site have been identified by Department of Conservation (DOC) as a Designated Ecological Site[21,22] • Te Harakeke Swamp: 141 (105.3 ha)
Other	Parts of the Te Harakeke Wetland Complex KNE site are legally protected by QEII open space covenants: • Maswood Holdings land: 5-07-321 (1.2 ha) • QEII Trust owned land: 5-07-323 (6.9 ha)

6.2. Ecological significance

The Te Harakeke Wetland Complex 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
- Its **ecological context** is valuable at the landscape scale as it contains a variety of inter-connected habitats, and it is part of an ecological corridor and provides core/seasonal habitat for threatened indigenous bird species.

Representativeness

The Harakeke Wetland Complex is the largest dune swale wetland remaining in a relatively natural state on the coastal plain of the Foxton Ecological District[23]. It contains a significant portion of the region's remaining palustrine swamps which have been reduced to just 1% of their pre-1900 expanse [24].

Wetlands are considered a national priority for conservation as an ecosystem type that has become uncommon on a national scale primarily due to the impacts of human activity[25]. Wetlands are now considered an uncommon habitat type in the Wellington Region with approximately 2.3% of their original extent remaining[26].

The Threatened Environment Classification system defines ecosystem and habitat threat categories nationally, based on percentage of indigenous cover remaining[27]. This system indicates that the KNE site is considered Acutely Threatened with less than 10% indigenous cover remaining and that the habitat is under-protected on a national scale.

Rarity/distinctiveness

Several plant, bird, fish, lizard and invertebrate species found within the KNE site are classified as nationally 'Threatened' or 'At Risk' through New Zealand's national threat classification system. Similar numbers of species found within the KNE site are also classified as regionally 'Threatened'. Appendices 2 and 3 contain lists of the nationally and regionally threatened species found within the KNE site.

Diversity

The Singers and Rogers[28] classification of pre-human ecosystems in New Zealand indicates that a swamp mosaic ecosystem type of flaxland (WL18), raupō reedland (WL19), and coprosma-twiggy tree daisy scrub (WL20), was present within the KNE site along with a small area of tōtara-mataī broadleaved dune forest (WF6). See Appendix 1, Map 6.

Ecological context

The Te Harakeke Wetland Complex is located near several other KNE sites: the Peka Peka Coast (39 ha); Nga Manu Wetland Complex (38 ha); Te Hāpua Wetland Complex (61 ha) and Lower Waikanae Forest Remnants (6 ha) KNE sites. These KNE

sites along with the Te Harakeke Wetland Complex KNE site form an important network of habitat linkages, enabling wetland and forest birds to forage, breed and disperse throughout the local area.

6.3. Ecological features

The Te Harakeke Wetland Complex KNE site is located in the Foxton Ecological District[29] which is characterised by Holocene sand-dune country. The climate is warm with westerly to north-westerly winds prevailing with frequent gales and an annual rainfall ranging between 800-1,000 mm[30].

The wetland is situated within the coastal dune belt of the Ngarara Stream Catchment and is sustained by a complex of interactions between groundwater, rainfall and streamflow[31]. The KNE site covers approximately the northern half of the wetland. The Ngarara stream traverses the southern section of the wetland, south of the KNE site, from north to south-west and has three tributaries. Two of these tributaries converge before leaving the KNE site; the Black drain enters from the north past the decommissioned oxidation ponds, and the Kakariki stream enters from the east.

The Ngarara stream would have once been largely indistinguishable from the wetland, much as the waterway through Taupo Swamp is today, but has been artificially channelised through attempts at drainage. In the same way the Black drain and inflow of the Kakariki stream had been artificially entrenched and periodically cleared under the Local Council Paetawa Drainage Agreement to facilitate drainage. For many years these drainage channels were not maintained, which led to reduced drainage of the wetland and higher water level. It is expected that prior to channel clearing and dredging the Ngarara Stream would have frequently over-topped and flooded the wetland area[32].

Particularly high rainfall and groundwater levels on the Kapiti Coast in 2022 caused the water level in the wetland to rise to levels which saw its extent expand into neighbouring properties. This prompted KCDC to undertake emergency earthworks to reinstate the drainage channels leading into the Ngarara Stream and clear the stream itself. This had the effect of lowering the water level in the wetland by approximately 1.5m[33]. Average water levels continue to be significantly lower than in previous years. Maintaining its historical hydrological condition is likely no longer possible due to urbanisation of the surrounding area. This needs to be balanced with the wetland holding enough water to preserve its ecological integrity.

Flora

Despite clearance and modification from a history of farming, the KNE site contains an important representation of ecologically significant indigenous wetland vegetation and habitats, albeit in a recovering state.

Much of the core of the wetland contains a mix of raupō (*Typha orientalis*) reedland and purei (*Carex secta*) sedgeland with scattered harakeke (*Phormium tenax*). Other common species include rautahi (*Carex geminata*), pukio (*Carex virgata*), giant umbrella sedge (*Cyperus ustulatus*), *Isolepis prolifera*, and toetoe (*Austroderia toetoe*). Of note are a small number of kahikatea (*Dacrycarpus*

dacrydioides) found in the centre of the wetland and a patch of jointed twig rush (*Machaerina articulata*) inhabiting the QEII block.

Parts of the edge of the wetland support shrubland dominated by mingimingi (*Coprosma propinqua*) and manuka (*Leptospermum scoparium*). At the northern end of the KNE site on the Brown's property the shrubland has further developed to include māhoe (*Melicytus ramiflorus*), kanuka (*Kunzea robusta*), tī kōuka/cabbage tree (*Cordyline australis*), whauwhaupaku/fivefinger (*Pseudopanax arboreus*), red mapou (*Myrsine australis*), kātote (*Alsophila smithii*), and wheki (*Dicksonia squarossa*). Many trees and shrubs around the edge of the wetland died due to the exceptionally high water levels experienced in 2021-2022. Since then, much regeneration has occurred, especially of manuka.

The decommissioned oxidation ponds at the southern end of the KNE site contain two large areas of open water surrounded by planted shrubland including taupata (*Coprosma repens)*, karamu (*Coprosma robusta*), mingimingi (*Coprosma propinqua*), ngaio (*Myoporum laetum*), cabbage tree (*Cordyline australis*), lemonwood (*Pittosporum eugeniodes*) and mānuka (*Leptospermum scoparium*).

Fauna

Birds

Te Harakeke Wetland Complex (including parts of the larger complex not captured in the KNE site) provides significant habitat for a range of native wetland bird species including several Nationally Threatened species. These include pūweto/spotless crake (*Porzana tabuensis*; At Risk-Declining), matuku-hūrepo/Australasian bittern (*Botaurus poiciloptilus*; Nationally Critical), mātātā/North Island fernbird (*Bowdleria punctata* vealeae; At Risk-Declining), pārera/grey duck (*Anas superciliosa*; Nationally Vulnerable), weweia/New Zealand dabchick (*Poliocephalus rufopectus*; Threatened-Increasing), māpunga/black shag (*Phalacrocorax carbo*; At Risk- Relict), black-fronted dotterel (*Elseyornis melanops*; Naturally Uncommon)[34,35] and kōtuku ngutupapa/royal spoon-bill (*Platalea regia*; Naturally Uncommon)[36].

A comprehensive list of bird species recorded within the KNE site, including non-threatened indigenous species and introduced species, are listed in Appendix 6.

Reptiles

Reptile surveys have not been undertaken specifically within the KNE site. However, several species of lizard have been recorded in the vicinity and could be present within the KNE site. These are northern grass skink (*Oligosoma polychroma*; Not Threatened), ornate skink (*Oligosoma ornatum*; Gradual Decline), glossy brown skink (*Oligosoma zelandicum*; At Risk-Declining) and barking gecko (*Naultinus punctatus*; At Risk-Declining).

Fish

In 2017, a fish survey was undertaken within the KNE site at the northern end of the Black drain on the QEII Trust owned land[37]. This survey found shortfin eel (*Anguilla australis*; Not Threatened), common bully (*Gobiomorphus cortidianus*; Not Threatened) and inanga (*Galaxias maculatus*; At Risk-Declining) present at this

site. More recently eDNA sampling has confirmed the presence of brown mudfish (*Neochanna apoda;* At Risk-Declining).

The New Zealand Freshwater Fish database also contains records from the 1990's of longfin eel (*Anguilla* dieffenbachia; At Risk-Declining), shortfin eel, common bully and īnanga present in the southern portion of the Te Harakeke wetland complex that sits outside of the KNE site boundary.

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 key threats to the ecological values at each KNE site. Key threats to the Te Harakeke Wetland Complex KNE site are discussed below and Appendix 4 presents a summary of all known threats to the KNE site.

7.1. Key threats

The primary threats to the ecological values of the KNE site are from the impacts of ecological weeds and pest animals.

Ecological weeds

The presence of ecological weeds can negatively affect the ecological integrity of a site by outcompeting and displacing native plants, hindering regenerative processes, reducing the species diversity of a site and negatively impacting on the food and habitat resources available for native species.

Ecological weeds are widespread, particularly around the wetland margins. At the north end of the site a large mixed stand of Alder (*Alnus glutinosa*), crack willow (*Salix fragilis x S. euxina*), and grey willow (*Salix cinerea*) have almost been fully controlled however grey willow seedlings continue to invade the interior or the wetland. Blackberry (*Rubus fruticosus* agg.) is well established around the wetland edge and will require further control throughout the course of this plan. Pampas grass (*Cortaderia selloana/C. jubata*) is present in many of the properties neighbouring the wetland and with lower water levels have been able to rapidly invade the wetland interior. Constant vigilance is required to prevent the establishment of Manchurian wild rice (*Zizania latifolia*) within the KNE site from an infestation to the south.

Pest animals

Pest animals negatively affect native wetland species via a range of direct and indirect influences such as over-browsing native vegetation, competition for food and resources and predation. Mustelids, such as stoats (*Mustela erminea*), weasels (Mustela nivalis) and ferrets (*Mustela furo*) are the biggest pest animal threats to the ecological values of the KNE site. Mustelids compete for food resources and prey on invertebrates and wetland bird species, particularly nesting birds, chicks and eggs. Rabbits (*Oryctolagus cuniculus*) and hares (*Lepus europaeus*) are having a destructive effect on native wetland vegetation in the drier margins of the wetland.

Grass carp have been sighted in the wetland on the property of Maswood Holdings. This exotic fish is known to consume large amounts of native aquatic vegetation resulting in sediment disturbance and considerable modification of the habitat and community composition within the aquatic environment.

Additional pest animal threats include possums (*Trichosurus vulpecula*), rats (*Rattus rattus* and *R. norvegicus*), mice (*Mus musculus*), hedgehogs (*Erinaceus europaeus*) and feral, stray and domestic cats (*Felis catus*). These species are

known to impact native regeneration and food resource availability, and prey on native fauna.

Pest animals are likely to reinvade from outside the KNE site and are likely to be an enduring threat to the biodiversity values within the KNE site.

8. Vision and objectives

8.1. Vision

The Te Harakeke Wetland Complex KNE site is an intact and functioning inter-dune swamp and provides key habitat for indigenous wetland flora and fauna.

8.2. Objectives

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

The following objectives will guide the operational activities at the Te Harakeke Wetland Complex KNE site.

1. **To protect and enhance the native plant diversity present.**
2. **To protect and enhance habitat for threatened and regionally rare wetland bird species.**
3. **To support landowners to protect and enhance the wetland values on their properties.**

9. Operational activities

Operational activities are targeted to work towards the objectives listed above (Section 8). The broad approach to operational activities is described below, and specific actions, with budget figures attached, are set out in the operational delivery schedule in Section 11.

This section also describes management activities that support the KNE site's vision and objectives but are undertaken for different purposes or as part of other programmes.

For management purposes the KNE site has been divided into five operational areas (see Appendix 1, Map 5). The operational areas are:

- A: Chris and Esmae Brown wetland
- B: Peka Peka Farm Limited wetland
- C: Maswood Holdings wetland
- D: QEII Trust wetland
- E: Decommissioned oxidation ponds and Black drain within Pharazyn Reserve (owned and managed by KCDC).

9.1. Ecological weed control

The aim of weed control is to reduce the distribution and density of existing weed populations, prevent the incursion of new weed species, increase native plant dominance and facilitate natural regeneration of native plant species, in line with objectives 1 and 2 in Section 8.2.

The wetland complex contains numerous ecological weed species (listed in Appendix 5) with the largest known infestations typically occurring around the drier margins or the dune rises within the wetland interior. The main approach to weed control is to protect the regenerating native vegetation on the wetland margins to prevent ecological weed species invading the wetland interior. The ecological weeds designated as being high priority in Appendix 5 are the primary focus for control during the five-year period of this plan.

The GW Pest Plants team undertakes or manages the weed control work at the KNE site that is funded through the KNE programme. This work is undertaken on all the privately owned land and on the QEII owned land (operational areas A-D). The weed control uses methods such as knapsack spraying and cutting and pasting. At the beginning of each financial year, the Environment Restoration and Pest Plant teams assess the outcomes of the previous year's weed control work and then liaise with the landowners to confirm the weed control programme for the following financial year.

KCDC staff carry out regular weed control within the KCDC owned Pharazyn Reserve (operational area E) and are assisted by the GW Pest Plants team when required.

Landowners and/or suitably qualified weed control contractors (on behalf of landowners) may undertake additional weed control within the KNE site. Every effort will be made to ensure clear communication between GW, the landowners and any

contractor in the planning and implementation of weed control work each year to maximize the benefits of the control work and to minimize the risk of double treatment.

9.2. Pest animal control

The aim of pest animal control at the KNE site is to increase populations of native wetland birds through the control of mammalian predators, in line with objective 2 in Section 8.2.

Pest animal control is undertaken in all operational areas (see Appendix 1, Map 7) and includes 6 DOC 200 traps, 8 DOC 250 traps and 3 AT200 traps spread across areas A-D and serviced by GW Pest Animals staff. 10 DOC 200 traps in operational area E are serviced by a volunteer, Gavin Klee, on behalf of KCDC. Some traps in this grouping are located beyond the KNE site boundary, these traps provide a buffer of control to the KNE site and link control it to that of the neighbouring Peke Peka Coast KNE site.

The ongoing maintenance of the trap network is an important component of protecting the biodiversity values present. Therefore, an annual audit of the traps is carried out to check that they are regularly serviced and well maintained. Traps in operational areas A to D are audited by the GW Pest Animals team and KCDC ensures standards are maintained in operational area E.

KCDC funds rabbit control within Pharazyn Reserve. This usually involves several night-shoots spread through the year but can also require the use of poisoning. Greater Wellington started funding and undertaking rabbit control through other parts of the wetland margins in 2023-24, alongside operations undertaken on some surrounding private land. This was with the use of pindone treated carrot bait but could include night-shooting and burrow fumigation in future. The KNE programme has a non-site specific budget to contribute to rabbit control operations through the course of this plan.

Feral cats are present in the wider area and will be impacting native birds within the KNE site. However, due to the proximity to urban areas with domestic cats targeted control is difficult and because of this is not included in this operational plan.

9.3. Revegetation

KCDC currently funds annual native planting within the Pharazyn Reserve as part of a school planting programme. Greater Wellington works with landowners to plan and jointly fund revegetation planting. Further funding can also be applied for from KCDC's Natural Heritage or Riparian funds. Any planting stocks need to be eco-sourced and appropriate species selected for the site. During the course of this plan planting will focus on the dune ridges fringing the wetland.

9.4. Monitoring

The Te Harakeke Wetland Complex KNE site is part of GW's Wetland Health State of the Environment monitoring programme. As part of this programme, the health of the wetland is monitored on a five-yearly basis along with other key wetland sites across the region. The KNE site was first surveyed in 2017/2018 and scored 16.25 out of 25 for wetland condition[38]. The 2022/23 survey indicated a decrease to 13.67, likely due to the changes in hydrology explained in section 6.3. The KNE site will be surveyed again in 2026/27.

The wetland health monitoring includes assessments of vegetation composition, soil condition, plant nutrient status, wetland pressure index and wetland condition index. The Wetland Condition Index uses indicators of the following components of wetland health: hydrologic integrity, physiochemical parameters, ecosystem intactness, browsing/predation/harvesting and dominance of native plants.

Surveys of fish and wetland birds are also undertaken.

These monitoring activities are funded by programmes other than the KNE programme.

9.5. Fence maintenance

All landowners within the KNE site have permanent fences in place to exclude stock from the KNE site. The landowners monitor the condition of fences and undertake maintenance when required.

Under QEII covenant agreements, maintenance of stock-proof fences is the responsibility of the landowner and in accordance with Rule 98 of the NRP, all stock must be excluded from Te Harakeke Wetland as it is a scheduled Outstanding Natural Wetlands[39].

9.6. Hydrological management

Current maintenance of drainage networks through the wetland are reactive and can lead to large changes in water levels. This is unsustainable for the long-term ecological health of the wetland. If, due to surrounding urban pressure, allowing natural hydrological processes is deemed to be impractical then KCDC and GW will need to work collaboratively to manage water levels in a balanced way.

10. Future opportunities

Opportunities available within the KNE site for landowners, community/volunteer or other agencies to undertake targeted added value biodiversity management work include:

- Undertaking targeted revegetation planting within the wetland areas for habitat enhancement of threatened wetland bird species, particularly Australasian bittern and spotless crake
- Undertaking revegetation planting of rare wetland plant species in appropriate locations within the KNE site to increase biodiversity at the site and assist in the regeneration of declining plant species within the region
- Surveying the invertebrate and/or herpetofauna communities within the KNE site to identify what species are present and make consideration of what additional management could be beneficial to their persistence at the KNE site.

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11. Operational delivery schedule

The operational delivery schedule shows the actions planned to achieve the stated objectives for the Te Harakeke Wetland Complex KNE site, and their annual costs. The budgets are subject to change for the years 2025/26 to 2028/29. Operational areas (see Appendix 1, Map 5) are also subject to change according to operational needs over the course of the operational plan.

Table 3: Five-year operational plan for the Te Harakeke Wetland Complex KNE site

Objective	Activity	Operational area	Intended 5-year outcome	Implementing party	Annual resourcing
1, 2	Ecological Weed Control: Ground based control of high priority ecological weed species	A, B, C, D, E	Reduction in distribution and abundance of target species	GW Pest Plants	$13,000
1, 2	Ecological Weed Control: Ground based control of high priority ecological weed species	E	Reduction in distribution and abundance of target species	KCDC	KCDC budget
1, 2, 3	Pest animal control: Service traps 3 monthly Audit yearly	A, B, C, D	Increased wetland birdlife present The trap network remains safe and effective	GW Pest Animals	$3,500
1 ,2	Pest animal control: Service traps monthly within Pharazyn Reserve.	E	Increased wetland birdlife present		Work in kind
1, 3	Rabbit control: Control rabbits by night-shooting, poisoning, or burrow fumigation	A, B, C, D	Increased regeneration of wetland understory plants	GW Pest Animals	Funding available outside of core site funding
1	Rabbit control: Control rabbits by night-shooting, poisoning, or burrow fumigation	E	Increased regeneration of wetland understory plants	KCDC	KCDC budget

Objective	Activity	Operational area	Intended 5-year outcome	Implementing party	Annual resourcing
1,2	Revegetation: Plant wetland edge with eco-sourced native plants	A, B, C, D	Improved habitat for native fauna Reduced reinvasion of ecological weed species	GW Environment Restoration	$2,000 Contribution from landowners
1, 2	Revegetation: Plant with eco-sourced native plants areas in and around the two former oxidation ponds within the Pharazyn Reserve	E	Improved habitat for native fauna	School groups (supported by KCDC)	Work in kind
1, 2, 3	Monitoring: Wetland Health SOE monitoring of vegetation, birds, and fish	Entire KNE site	Data is collected to gauge wetland health at a regional level and indicate site specific changes	GW Land, Ecosystems and Air Monitoring team	Funded from separate programme
1, 2	Fence maintenance: Monitor wetland boundary fences and repair when necessary	A, B, C, D	Stock are excluded from the wetland	Private landowners and QEII trust	Work in kind

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12. Funding contributions

12.1. Budget allocated by Greater Wellington

The budget is subject to change.

Table 4: Greater Wellington allocated budget for the Te Harakeke Wetland Complex KNE site

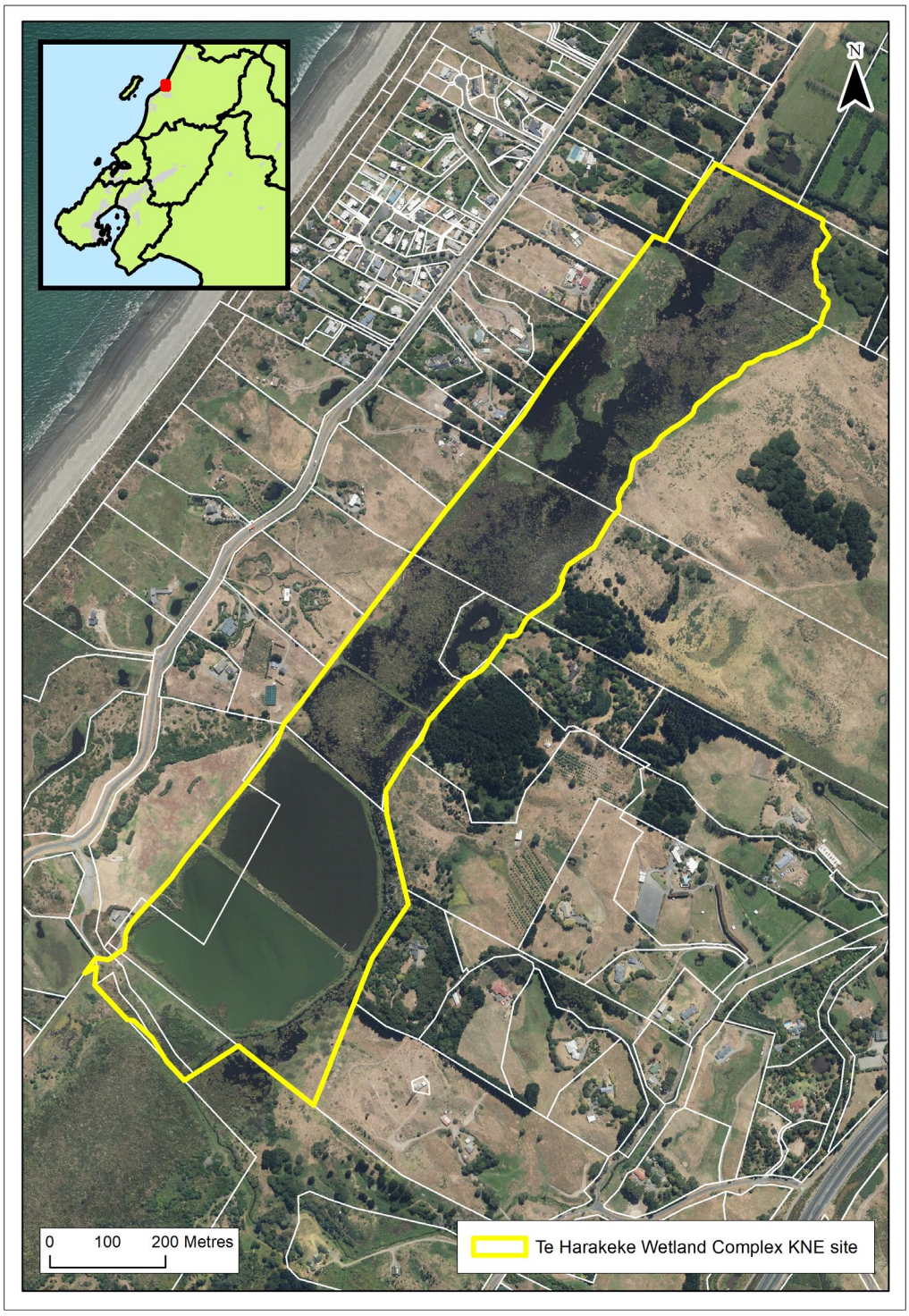
Management activity	Annual resourcing
Ecological weed control	$13,000
Pest animal control including auditing	$3,500
Revegetation	$2,000
Total	**$18,500**

12.2. Budget allocated by KCDC

KCDC supports a range of activities within the Pharazyn Reserve, including planting, weed control, rabbit control, and servicing the trap network. The total funding required for these activities is variable and hasn't been quantified annually.

Private landowners with Sites of Ecological Significance are also eligible for funding via the KCDC Riparian Fund and/or Heritage Fund in accordance with KCDC's District Plan. These funds are allocated on an annual basis by KCDC.

Appendix 1: Te Harakeke Wetland Complex KNE site maps



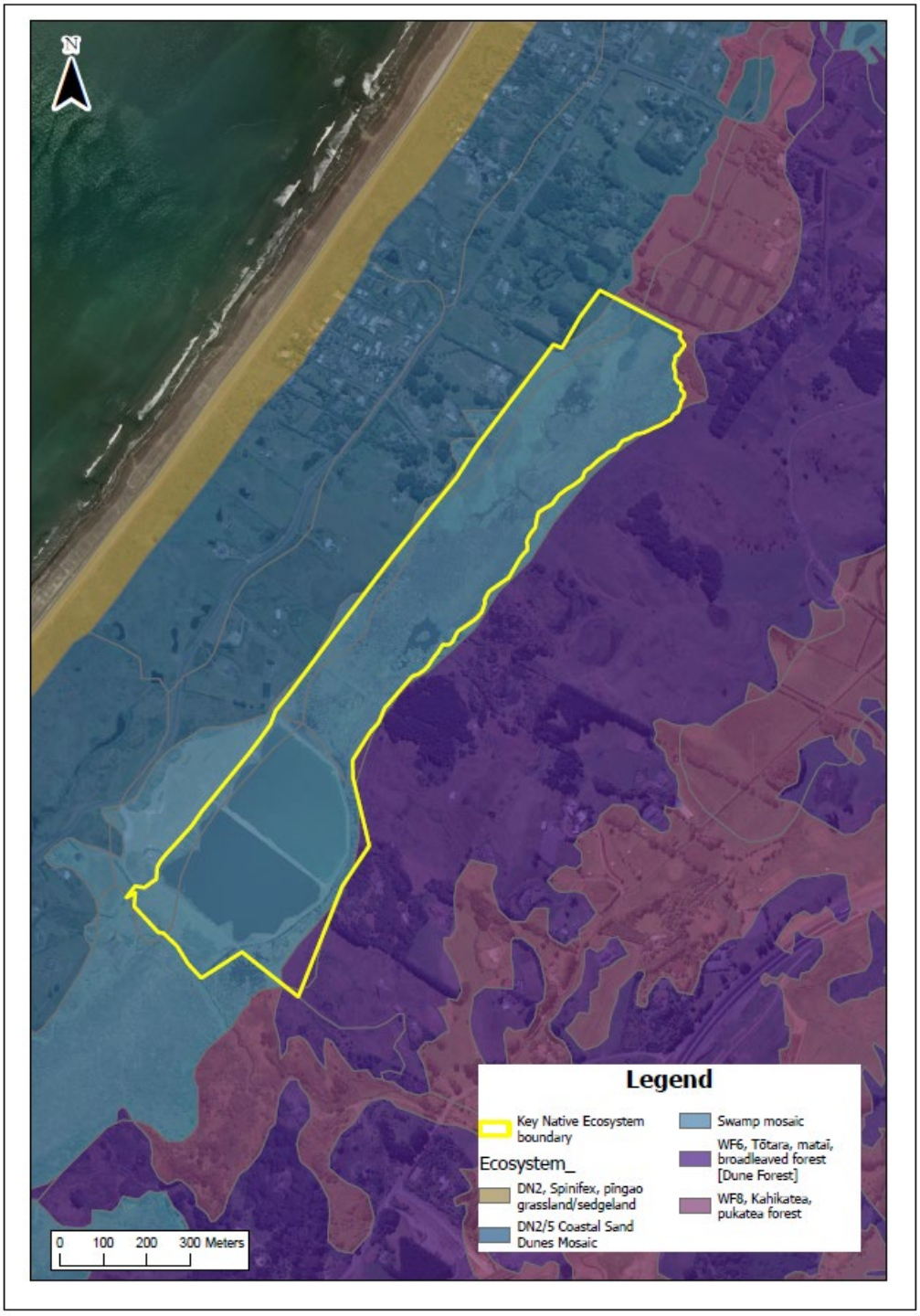
Map 1: Te Harakeke Wetland Complex KNE site boundary and land parcels

Map 2: Location of KCDC Pharazyn Reserve and Te Harakeke wetland boundary as described in NRP Schedule A3 – Outstanding Natural Wetlands

Map 3: QEII National Trust open space covenants at the Te Harakeke Wetland Complex KNE site

Map 4: Designated KCDC Ecological Site of Significance areas in the Te Harakeke Wetland Complex KNE site

Map 5: Land ownership and ecological weed control operational areas for the Te Harakeke Wetland Complex KNE site



Map 6: Singers and Rogers classification of pre-human forest vegetation types for the Te Harakeke Wetland Complex KNE site

Map 7: Pest animal control in the Te Harakeke Wetland Complex KNE site

Appendix 2: Nationally threatened species list

The following table lists nationally Threatened and At-Risk species that are resident in, or regular visitors to, the Te Harakeke Wetland Complex KNE site.

The New Zealand Threat Classification System (NZTCS) lists species according to their threat of extinction. The status of each species group (plants, reptiles, etc) is assessed over a five-year cycle[40]. Species are regarded as Threatened if they are classified as Nationally Critical, Nationally Endangered or Nationally Vulnerable[41]. They are regarded as At Risk if they are classified as Declining, Recovering, Relict or Naturally Uncommon.

Table 5: Nationally Threatened and At-Risk species at the Te Harakeke Wetland Complex KNE site

Scientific name	Common name	National threat status	Observation
Plants(vascular)[42]			
Machaerina articulata	Jointed twig-rush	Sparse	Allen & Beadle 2002[43]
Birds[44]			
Anas superciliosa	Grey duck	Threatened - Nationally Vulnerable	Allen & Beadle 2002; Boffa Miskell 2005[45]
Anthus novaeseelandiae	New Zealand pipit	At Risk – Declining	NZ eBird database 2021
Botaurus poiciloptilus	Australasian bittern	Threatened – Nationally Critical	Allen & Beadle 2002; Rob Cross, KCDC, per obs 2009; Birds NZ Wellington Region Data 2014[46]
Bowdleria punctata vealeae	North Island fernbird	At Risk – Declining	Allen & Beadle 2002; Rob Cross, KCDC, per obs 2015
Elseyornis melanops	Black-fronted tern	Threatened – Nationally Endangered	NZ eBird database 2021
Falco novaeseelandiae	New Zealand falcon	Threatened - Nationally Increasing	NZ eBird database 2021
Phalacrocorax carbo	Black shag	At Risk - Relict	Allen & Beadle 2002; Boffa Miskell 2005; Wildlands 2011[47]; Spearpoint 2017[48]; Cross, Hurley, Smith, 2018[49]
Phalacrocorax sulcirostris	Little black shag	At Risk - Naturally Uncommon	NZ eBird database 2021
Phalacrocorax varius	Pied shag	At Risk - Recovering	Spearpoint 2017

Scientific name	Common name	National threat status	Observation
Platalea regia	Royal spoonbill	At Risk - Naturally Uncommon	Banks pers.comm 2020
Poliocephalus rufopectus	New Zealand dabchick	Threatened - Nationally Increasing	Allen & Beadle 2002; Boffa Miskell 2005; Wildlands 2011; Spearpoint 2017; Cross, Hurley, Smith 2018
Porzana tabuensis	Spotless crake	At Risk – Declining	NZ eBird database 2021
Freshwater fish[50]			
Anguilla dieffenbachii	Longfin eel	At Risk - Declining	NZFDD
Galaxias maculatus	Inanga	At Risk - Declining	Kessels 1997[51]; McEwan 2017[52]
Neochanna apoda	Brown mudfish	At Risk - Declining	GW database 2021

Appendix 3: Regionally threatened species list

The following table lists regionally threatened species that have been recorded in the Te Harakeke Wetland Complex KNE site.

A methodology to create regional threat lists was developed by a collaborative group comprising representatives from DOC, regional councils and a local authority. The resulting regional threat listing methodology leverages off the NZTCS but applies a species population threshold adjusted to the regional land area under consideration (relative to the national land area) for species that are not nationally threatened. The assigned regional threat status cannot be lower than that of the national threat status, but can be higher, (e.g. a Nationally Vulnerable species could be assessed as being Regionally Critical). Other assessments made in the regional threat listing process include identifying populations that are national strongholds and the use of regional qualifiers, such as natural or historic range limits.

Table 6: Regionally threatened species recorded in the Te Harakeke Wetland Complex KNE site

Scientific name	Common name	Regional threat status	Observation
Birds[53]			
Anas gracilis	Grey teal	Recovering	Allen & Beadle 2002[54]; Boffa Miskell 2005[55]
Anas superciliosa	Grey duck	Critical	Allen & Beadle 2002[56]; Boffa Miskell 2005[57]
Anthus novaseelandiae	New Zealand pipit	Vulnerable	NZ eBird database 2021
Aythya novaeseelandiae	New Zealand scaup	Vulnerable	NZ eBird database 2021
Botaurus poiciloptilus	Australasian bittern	Critical	Allen & Beadle 2002; Rob Cross, KCDC, per obs 2009; Birds NZ Wellington Region Data 2014[58]; Andy McKay, KCDC, pers obs 2022
Bowdleria punctata vealeae	North Island fernbird	Critical	Allen & Beadle 2002; Rob Cross, KCDC, per obs 2015
Elseyornis melanops	Black-fronted dotterel	Vulnerable	NZ eBird database 2021
Falco novaeseelandiae	Bush falcon	Recovering	NZ eBird database 2021

Scientific name	Common name	Regional threat status	Observation
Himantopus himantopus	Pied stilt	Vulnerable	NZ eBird database 2021
Phalacrocorax carbo	Black shag	Critical	Allen & Beadle 2002; Boffa Miskell 2005; Wildlands 2011[59]; Spearpoint 2017[60]; Cross, Hurley, Smith, 2018[61]
Phalacrocorax melanoleucos	Little shag	Vulnerable	NZ eBird database 2021
Phalacrocorax sulcirostris	Little black shag	Vulnerable	NZ eBird database 2021
Phalacrocorax varius	Pied shag	Vulnerable	Spearpoint 2017
Platalea regia	Royal spoonbill	Coloniser	Banks pers.comm 2020
Poliocephalus rufopectus	New Zealand dabchick	Vulnerable	Allen & Beadle 2002; Boffa Miskell 2005; Wildlands 2011; Spearpoint 2017; Cross, Hurley, Smith 2018
Porzana tabuensis	Spotless crake	Endangered	NZ eBird database 2021
Freshwater fish[62]			
Anguilla dieffenbachii	Longfin eel	Declining	New Zealand Freshwater Fish Database 2001
Galaxias maculatus	Inanga	Declining	New Zealand Freshwater Fish Database 2001

Appendix 4: Threat table

Appendix 4 presents a summary of all known threats to the Te Harakeke Wetland Complex KNE site including those discussed in section 7.

Table 7: Threats to the Te Harakeke Wetland Complex KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
Ecological weeds		
EW-1	Ground covering ecological weeds smother and displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. Key ground covering ecological weed species for control include arum lily (*Zantedeschia aethiopica*) and periwinkle (*Vinca major*) (see full list in Appendix 5)	Entire KNE site
EW-2	Woody weed species displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. Key woody ecological weed species include grey willow (*Salix cinerea*), pine (*Pinus* spp.) and African boxthorn (*Lycium ferocissimum*) (see full list in Appendix 5)	Entire KNE site
EW-3	Climbing weeds smother and displace native vegetation often causing canopy collapse, inhibit indigenous regeneration, and alter vegetation structure and composition. Key climbing ecological weed species include blackberry (*Rubus fruticosus* agg.) and Japanese honeysuckle (*Lonicera japonica*) (see full list in Appendix 5)	Entire KNE site
EW-4*	Aquatic weeds out-compete native aquatic species and choke watercourses. Key aquatic ecological weed species include parrot's feather (*Myriophyllum aquaticum*) and water celery (*Apium nodiflorum*) (see full list in Appendix 5)	Entire KNE site
EW-5*	Exotic grass species displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. Key grass weed species include pampas (*Cortaderia selloana/C. jubata*) (see full list in Appendix 5)	C
EW-6†	Manchurian rice grass (*Zizania latifolia*), an exotic semi-aquatic grass species, displaces native vegetation, contributes to sediment accumulation causing flooding and alters the habitat for aquatic fauna and flora	Parts of the wetland immediately to the south of the KNE boundary

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
Pest animals		
PA-1*	Possums (*Trichosurus vulpecula*) browse palatable canopy vegetation until it can no longer recover[63,64]. This destroys the forest's structure, diversity and function. Possums may also prey on native birds and invertebrates[65]	Entire KNE site
PA-2	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[66,67]	Entire KNE site
PA-3	Mustelids (stoats[68,69] (*Mustela erminea*), ferrets[70,71] (*M. furo*) and weasels[72,73] (*M. nivalis*)) prey on native birds, lizards and invertebrates, reducing their breeding success and potentially causing local extinctions	Entire KNE site
PA-4	Hedgehogs (*Erinaceus europaeus*) prey on native invertebrates[74], lizards[75] and the eggs[76] and chicks of ground-nesting birds[77]	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 eggs and nestlings[78,79]	Entire KNE site
PA-5*	Pest and domestic cats (*Felis catus*) prey on native birds[80], lizards[81] and invertebrates[82], reducing native fauna breeding success and potentially causing local extinctions[83]	Entire KNE site
PA-6	Rabbits (*Oryctolagus cuniculus*) and hares (*Lepus europaeus*) graze on palatable native vegetation and prevent natural regeneration in some environments[84]	Dry edges of the KNE site
PA-7*	Wasps (*Vespula* spp.) adversely impact native invertebrates and birds through predation and competition for food resources. They also affect nutrient cycles in beech forests[85]	Entire KNE site
PA-9*	Grass carp (*Ctenopharyngodon idella*) consume large amounts of vegetation, alter water transparency, cause disturbance of the sediment and deposit fecal matter which can considerably alter habitat composition and impact aquatic communities[86]	B
Human activities		
HA-1*	Land use activities that alter the local hydrology, such as development schemes and sub-divisions can affect the water levels that sustain wetland ecosystems	Entire KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
HA-2*	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	Entire KNE site
Other threats		
OT-1*	A lack of legal protection can leave a site at risk of future development or destruction and resources invested in the site may be wasted. Part of this KNE site is private property and uncovenanted, having no protection status	A

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

†Threats marked with this symbol are managed and actioned by an external party.

Appendix 5: Ecological weed species

The following table lists key ecological weed species that have been recorded in the Te Harakeke Wetland Complex KNE site.

Table 8: Ecological weed species recorded in the Te Harakeke Wetland Complex KNE site

Scientific name	Common name	Priority	Management aim
Zizania latifolia	Manchurian rice grass	Severe	Exclusion
Asparagus scandens	Climbing asparagus	High	Exclusion
Alnus glutinosa	Alder	High	Suppression
Cortaderia jubata	Purple pampas	High	Suppression
Cortaderia selloana	Pampas	High	Suppression
Delairea odorata	German ivy	High	Suppression
Hedera helix	English ivy	High	Suppression
Helichrysum petiolare	Licorice plant	High	Suppression
Lilium spp.	Lily	High	Suppression
Lonicera japonica	Japanese honeysuckle	High	Suppression
Lupinus arboreus	Tree lupin	High	Suppression
Lycium ferocissimum	African boxthorn	High	Suppression
Passiflora spp.	Banana passionfruit	High	Suppression
*Pittosporum crassifolium**	Karo	High	Suppression
Rubus fruticosus agg.	Blackberry	High	Suppression
Salix cinerea	Grey willow	High	Suppression
Salix fragilis x S. euxina	Crack willow	High	Suppression
Ulex europaeus	Gorse	High	Suppression
Vinca major	Periwinkle	High	Suppression
Zantedeschia aethiopica	Arum lily	High	Suppression
Solanum pseudocapsicum	Jerusalem cherry	Moderate	Surveillance
Araucaria heterophylla	Norfolk Island pine	Moderate	Surveillance
Banksia integrifolia	Banksia	Moderate	Surveillance
Berberis glaucocarpa	Barberry	Moderate	Surveillance
Bidens frondosa	Beggar's tick	Moderate	Surveillance
Cupressus macrocarpa	Macrocarpa	Moderate	Surveillance
Fatsia japonica	Japanese aralia	Moderate	Suppression
Myriophyllum aquaticum	Parrot's feather	Moderate	Surveillance
Paraserianthes lophantha	Brush wattle	Moderate	Surveillance
Pinus halepensis	Aleppo pine	Moderate	Surveillance

Scientific name	Common name	Priority	Management aim
Pinus muricata	Bishop pine	Moderate	Surveillance
Pinus radiata	Radiata pine	Moderate	Surveillance
Rumex sagittatus	Climbing dock	Moderate	Surveillance
Tradescantia fluminensis	Tradescantia	Moderate	Surveillance
Achillea millefolium	Yarrow	Low	No management
Agrostis stolonifera	Creeping bent	Low	No management
Apium nodiflorum	Water celery	Low	No management
Calystegia sepium	Pink bindweed	Low	No management
Chenopodium album	Fathen	Low	No management
Cichorium intybus	Chicory	Low	No management
Cirsium vulgare	Scotch thistle	Low	No management
Conium maculatum	Hemlock	Low	No management
Conyza albida	Fleabane	Low	No management
Cotula coronopifolia	Bachelor’s button	Low	No management
Crepis capillaris	Hawksbeard	Low	No management
Cytisus scoparius	Broom	Low	No management
Dactylis glomerata	Cocksfoot	Low	No management
Digitalis purpurea	Foxglove	Low	No management
Geranium molle	Dove’s foot cranesbill	Low	No management
Holcus lanatus	Yorkshire fog	Low	No management
Hypochaeris radicata	Catsear	Low	No management
Jacobaea vulgaris	Ragwort	Low	No management
Lepidium africanum	Peppercress	Low	No management
Lolium perenne	Perennial ryegrass	Low	No management
Lythrum hyssopifolia	Hyssop loosestrife	Low	No management
Parentucellia viscosa	Tarweed	Low	No management
paspalum dilatatum	Paspalum	Low	No management
Paspalum distichum	Mercer grass	Low	No management
Pennisetum clandestinum	Kikuyu grass	Low	No management
Persicaria hydropiper	Water pepper	Low	No management
Persicaria maculosa	Willow weed	Low	No management
Phytolacca octandra	inkweed	Low	No management
Plantago lanceolata	Narrow-leaved plantain	Low	No management
Ranunculus repens	Buttercup	Low	No management
Rumex acetosella	Sheep's sorrel	Low	No management

Scientific name	Common name	Priority	Management aim
Rumex crispus	Curled dock	Low	No management
Rumex obtusifolius	Broad-leaved dock	Low	No management
Schedonorus arundinaceus	Tall fescue	Low	No management
Silybum marianum	Variegated thistle	Low	No management
Solanum chenopodioides	Velvety nightshade	Low	No management
Sonchus oleraceus	Sow thistle	Low	No management
Spergula arvensis	Spurrey	Low	No management
Sporobolus africanus	Rats tail	Low	No management
Trifolium dubium	Suckling clover	Low	No management
Trifolium pratense	Red clover	Low	No management
Trifolium repens	White clover	Low	No management

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

Appendix 6: Common and introduced animal species list

The following table lists all common native and introduced animal species that are resident in, or regular visitors to, Te Harakeke Wetland (including in parts outside the KNE site). If not otherwise specified, the observations were recorded by:

1. Spearpoint[87]
2. Allen & Beadle[88]
3. Boffa Miskell[89]
4. Wildlands[90]

Table 9: List of all the common and introduced animal species recorded in Te Harakeke Wetland (including parts outside the KNE)

Scientific name	Common name	Status	Observation
Birds[91]			
Alauda arvensis	Eurasian skylark	Introduced	1
Anas gracilis	Grey teal	Native - Not Threatened	1, 2, 3, 4
Anas platyrhynchos	Mallard	Introduced	1, 2, 4
Anas rhynchotis	New Zealand shoveler	Native - Not Threatened	1, 3, 4
Anser anser	Greylag goose	Introduced	1, 2, 4
Aythya novaeseelandiae	New Zealand scaup	Native - Not Threatened	1, 2, 3
Branta canadensis	Canada goose	Introduced	1, 3
Cacatua galerita	Sulphur-crested cockatoo	Introduced	2
Callipepla californica	California quail	Introduced	4
Carduelis carduelis	European goldfinch	Introduced	1, 2, 4
Carduelis chloris	European greenfinch	Introduced	2, 4
Carduelis flammea	Common redpoll	Introduced	4
Cereopsis novaehollandiae	Cape Barren goose	Introduced	3
Chrysococcyx lucidus	Shining cuckoo	Native - Not Threatened	1, 4
Circus approximans	Australasian harrier	Native - Not Threatened	1, 2, 3, 4
Coturnix ypsilophora	Brown quail	Introduced	4
Cygnus atratus	Black swan	Native - Not Threatened	1, 2, 3, 4
Egretta novaehollandiae	White-faced heron	Native - Not Threatened	1, 3
Emberiza citrinella	Yellowhammer	Introduced	2, 4
Fringilla coelebs	Chaffinch	Introduced	1, 4
Gerygone igata	Grey warbler	Native - Not Threatened	1, 2, 4

Scientific name	Common name	Status	Observation
Gymnorhina tibicen	Australian magpie	Introduced	1, 2
Himantopus himantopus	Pied stilt	Native - Not Threatened	1, 2, 3, 4
Hirundo neoxena	Welcome swallow	Native - Not Threatened	1, 2, 4
Larus dominicanus	Southern black-backed gull	Native - Not Threatened	1, 3, 4
Passer domesticus	House sparrow	Introduced	1
Phalacrocorax melanoleucos	Little shag	Native - Not Threatened	1, 4
Phasianus colchicus	Common pheasant	Introduced	1, 2, 4
Platycercus eximius	Eastern rosella	Introduced	1, 2, 4
Porphyrio melanotus	Pūkeko	Native - Not Threatened	1, 2, 3, 4
Prosthemadera novaeseelandiae	Tūī	Native - Not Threatened	1, 4
Rhipidura fuliginosa	Fantail	Native - Not Threatened	1, 2, 4
Sturnus vulgaris	Common starling	Introduced	1, 2, 4
Tadorna variegata	Paradise shelduck	Native - Not Threatened	1, 2, 3, 4
Todiramphus sanctus	Sacred kingfisher	Native - Not Threatened	1, 4
Turdus merula	Eurasian blackbird	Introduced	1, 2, 4
Turdus philomelos	Thrush	Introduced	1, 4
Vanellus miles	Spur-winged plover	Native - Not Threatened	1, 2, 4
Zosterops lateralis	Silvereye	Native - Not Threatened	1, 2, 4
Freshwater fish[92]			
Anguilla australis	Shortfin eel	Native - Not Threatened	McEwan 2017[93]; Kessing 1998[94]
Ctenopharyngodon idella	Grass carp	Introduced	Woodrow 2012[95]
Gobiomorphus cotidianus	Common bully	Native - Not Threatened	McEwan 2017

References

[1] New Zealand legislation. 1991. Resource Management Act 1991.
[2] Greater Wellington Regional Council. Greater Wellington Regional Council Long Term Plan Ko Te Pae Tawhiti: 2021 – 2031.
[3] Greater Wellington Regional Council. 2016. Greater Wellington Regional Council Biodiversity Strategy. http://www.gw.govt.nz/assets/council-publications/Biodiversity-Strategy-2016.pdf
[4] Greater Wellington Regional Council. 2023. Natural Resources Plan for the Wellington Region, Te Tikanga Taiao o Te Upoko o te Ika a Maui. Operative Version – 28 July 2023.
[5] Greater Wellington Regional Council. 2019. Greater Wellington Regional Pest Management Plan 2019–2039. GW/BIO-G-2019/74
[6] Crisp P, Govella S, Crouch L. 2016. Identification and prioritisation of high value terrestrial biodiversity sites for selection within the Key Native Ecosystems Programme in the Wellington region. Greater Wellington Regional Council, GW/ESCI-T-16/93.
[7] Greater Wellington Regional Council. 2023. Natural Resources Plan for the Wellington Region, Te Tikanga Taiao o Te Upoko o te Ika a Maui. Operative Version – 28 July 2023.
[8] Park M. 2012. Technical Report 26 - Ecological Impact Assessment, Volume 3 of the MacKays to Peka Peka Expressway Project AEE.
[9] Carkeek WC. 1840. The Kāpiti Coast: Maori Tribal History and Place Names of the Paekakariki-Otaki District. Re-issued: AH & AW Reed. 1965. P.185.
[10] Fuller SA. 1993. Wetlands in the Wellington Region. Wellington Regional Council Publication No. WRC/PP-G-93/16.
[11] Lewis A, Jones S, Edwards H, Spargo G, Schofield R, Vossler G, Brophy J, Miles L, Strawbridge A. 2012. MacKays to Peka Peka Expressway Project: Assessment of Environmental Effects Report. P.766.
[12] Department of Conservation. 1986. Wetlands of Ecological and Representative Importance (WERI) database. Department of Conservation, Wellington.
[13] Boffa Miskell Ltd. 2011. Desktop delineation and assessment of significance of wetlands of the wellington region methodology & results. Prepared for GWRC Regional Council. P50.
[14] Boffa Miskell. 2005. Pharazyn Reserve Management Plan. Prepared for Kāpiti Coast District Council by Boffa Miskell Ltd. P.27.
[15] Wildlands Consultants 2011. Pharazyn Reserve Landscape and Ecological Restoration Plan. Contract Report No. 2527. Prepared for Kāpiti Coast District Council by Wildlands Consultants Ltd, Rotorua. P65.
[16] Greater Wellington Regional Council. 2023. Natural Resources Plan for the Wellington Region, Te Tikanga Taiao o Te Upoko o te Ika a Maui. Operative Version – 28 July 2023.
[17] Greater Wellington Regional Council. 2023. Natural Resources Plan for the Wellington Region, Te Tikanga Taiao o Te Upoko o te Ika a Maui. Operative Version – 28 July 2023.
[18] Greater Wellington Regional Council. 2023. Natural Resources Plan for the Wellington Region, Te Tikanga Taiao o Te Upoko o te Ika a Maui. Operative Version – 28 July 2023.
[19] van Meeuwen-Dijkgraaf A, Rate S, Shaw W, Lloyd K. 2016. Kāpiti Coast Proposed District Plan: Review of Ecological Sites, Related Submissions and Plan Definitions. Prepared for Kāpiti Coast District Council by Wildlands Consultants Ltd, Rotorua. P.98.
[20] Ravine D. 1992. Foxton Ecological District: Survey report for the Protected Natural Areas Programme. Department of Conservation, Wanganui.
[21] Department of Conservation. 1986. Wetlands of Ecological and Representative Importance (WERI) database. Department of Conservation, Wellington.
[22] Boffa Miskell Ltd. 2011. Desktop delineation and assessment of significance of wetlands of the Wellington region methodology & results. Prepared for GWRC Regional Council.
[23] Allen RB, Beadle SM. 2002. Ecology and Restoration of Te Harakeke Wetland, Waikanae. Contract report 490, Wildlands Consultants Ltd, Rotorua.

[24] Ausseil A-G, Gerbeaux P, Chadderton W, Stephens T, Brown D, Leathwick J. 2008. Wetland ecosystems of national importance for biodiversity. Landcare Research Contract Report LC0708/158 for Chief Scientist, Department of Conservation.
[25] Wiser SK, Buxton RP, Clarkson BR, Hoare RJB, Holdaway RJ, Richardson SJ, Smale MC, West C, Williams PA. 2013. New Zealand's naturally uncommon ecosystems. In Dymond JR ed. Ecosystem services in New Zealand – conditions and trends. Manaaki Whenua Press, Lincoln, New Zealand. P.49–61.
[26] Ausseil A-G, Gerbeaux P, Chadderton W, Stephens T, Brown D, Leathwick J. 2008. Wetland ecosystems of national importance for biodiversity. Landcare Research Contract Report LC0708/158 for Chief Scientist, Department of Conservation.
[27] Walker S, Cieraad E, Barringer J. 2015. The Threatened Environment Classification for New Zealand 2012: a guide for users. Landcare Research.
[28] Singers NJD, Rogers GM. 2014. A classification of New Zealand's terrestrial ecosystems. Science for Conservation No. 325. Department of Conservation, Wellington. P.87.
[29] McEwen M ed. 1987. Ecological regions and districts of New Zealand. 3rd edn in four 1:500 000 maps. New Zealand Biological Resources Centre Publication No. 5. Wellington, Department of Conservation.
[30] McEwen W.M., (Ed.) 1987. Booklet to accompany SHEET 2. Descriptions of Districts in central New Zealand, from Eastern Wairarapa to Akaroa; also, Chathams, not shown on map. Ecological Regions and Districts of New Zealand. Wellington, Department of Conservation. P.139.
[31] Phreatos Groundwater Consulting. 2002. Te Harakeke Wetland Kāpiti Coast Hydrological Study Final Report. Wellington Regional Council. P.46.
[32] Law RA. 2008. The hydrological viability of Te Harakiki wetland, Waikanae. Unpublished MSc thesis. Victoria University of Wellington, Wellington.
[33] Owen Spearpoint, 21/11/2022. Internal GW file note.
[34] Wildlands Consultants. 2011. Pharazyn Reserve Landscape and Ecological Restoration Plan. Contract Report No. 2527. Prepared for Kāpiti Coast District Council by Wildlands Consultants Ltd, Rotorua. P.65.
[35] Rob Cross (KCDC), Alex Hurley and Katrina Smith (GWRC), pers obs. 2018.
[36] Megan Banks, GWRC, pers.comm. 2020.
[37] Riverscapes Frsehwater Ecology. 2017. Wetland fish surveying.
[38] Greater Wellington Regional Council. 2018. Terrestrial State of the Environment Monitoring 2018 Wetlands: Te Harakeke Wetlands. P.3.
[39] Greater Wellington Regional Council. 2023. Natural Resources Plan for the Wellington Region, Te Tikanga Taiao o Te Upoko o te Ika a Maui. Operative Version – 28 July 2023. P.199.
[40] Townsend AJ, de Lange PJ, Duffy CAJ, Miskelly CM, Molloy J, Norton DA. 2008. New Zealand Threat Classification System manual. Department of Conservation, Wellington.
[41] Rolfe J, Makan T, Tait A. 2021. Supplement to the New Zealand Threat Classification System manual 2008: new qualifiers and amendments to qualifier definitions, 2021. Department of Conservation, Wellington.
[42] de Lange PJ, Rolfe JR, Barkla JW, Courtney SP, Champion PD, Perrie LR, Beadel SM, Ford KA, Breitwieser I, Schonberger, I, Hindmarsh-Walls R, Heenan PB, Ladley K. 2018. Conservation status of New Zealand indigenous vascular plants, 2017. New Zealand Threat Classification Series 22. Department of Conservation, Wellington.
[43] Allen RB, Beadle SM. 2002. Ecology and Restoration of Te Harakeke Wetland, Waikanae. Contract report 490, Wildlands Consultants Ltd, Rotorua. P.33.
[44] Robertson HA, Baird KA, Elliot GP, Hitchmough RA, McArthur NJ, Makan TD, Miskelly CM, O'Donnell CFJ, Sagar PM, Scofield RP, Taylor GA, Michel P. 2021. Conservation status of birds in Aotearoa New Zealand, 2021. New Zealand Threat Classification Series 36. Department of Conservation, Wellington.
[45] Boffa Miskell. 2005. Pharazyn Reserve Management Plan. Prepared for Kāpiti Coast District Council by Boffa Miskell Ltd. P.27.
[46] Birds NZ Wellington Region Data. 2014. eBird Checklist: https://ebird.org/newzealand/view/checklist/S21624904. eBird: An online database of bird

distribution and abundance [web application]. eBird, Ithaca, New York. Available: http://www.ebird.org. (Accessed: January 15 2019).

[47] Wildlands Consultants. 2011. Pharazyn Reserve Landscape and Ecological Restoration Plan. Contract Report No. 2527. Prepared for Kāpiti Coast District Council by Wildlands Consultants Ltd, Rotorua.P.65.

[48] Owen Spearpoint, GWRC Regional Council, pers. comm. 2017.

[49] Rob Cross, Alex Hurley, Katrina Smith, pers obs. 2018.

[50] Dunn NR, Allibone RM, Closs GP, Crow SK, David BO, Goodman JM, Griffiths M, Jack CD, Ling N, Waters JM, Rolfe JR. 2018. Conservation status of New Zealand freshwater fishes, 2017. New Zealand Threat Classification Series 24. Department of Conservation, Wellington.

[51] Kessels G. 1997. Kāpiti Urban Roading Project. Preferred alignment ecological effects assessment. Opus Consultants Ltd, Hamilton.

[52] McEwan A. 2017.Wetland fish surveying. Kāpiti. Report No. 17-25, Riverscapes Freshwater Ecology Ltd, Masterton. 29p.

[53] Crisp, P 2020. Conservation status of native bird species in the Wellington region. Greater Wellington Regional Council. GW/ESCI-G-20/75.

[54] Allen RB, Beadle SM. 2002. Ecology and Restoration of Te Harakeke Wetland, Waikanae. Contract report 490, Wildlands Consultants Ltd, Rotorua. P.33.

[55] Boffa Miskell. 2005. Pharazyn Reserve Management Plan. Prepared for Kāpiti Coast District Council by Boffa Miskell Ltd. P.27.

[56] Allen RB, Beadle SM. 2002. Ecology and Restoration of Te Harakeke Wetland, Waikanae. Contract report 490, Wildlands Consultants Ltd, Rotorua. P.33.

[57] Boffa Miskell. 2005. Pharazyn Reserve Management Plan. Prepared for Kāpiti Coast District Council by Boffa Miskell Ltd. P.27.

[58] Birds NZ Wellington Region Data. 2014. eBird Checklist: https://ebird.org/newzealand/view/checklist/S21624904. eBird: An online database of bird distribution and abundance [web application]. eBird, Ithaca, New York. Available: http://www.ebird.org. (Accessed: January 15 2019).

[59] Wildlands Consultants. 2011. Pharazyn Reserve Landscape and Ecological Restoration Plan. Contract Report No. 2527. Prepared for Kāpiti Coast District Council by Wildlands Consultants Ltd, Rotorua.P.65.

[60] Owen Spearpoint, GWRC Regional Council, pers. comm. 2017.

[61] Rob Cross, Alex Hurley, Katrina Smith, pers obs. 2018.

[62] Crisp, P, Perrie A, Morar, S. 2022. Conservation status of indigenous freshwater fish in the Wellington region. Greater Wellington Regional Council. GW/ESCI-T-22/02.

[63] Pekelharing CJ, Parkes JP, Barker RJ. 1998. Possum (*Trichosurus vulpecula*) densities and impacts on fuchsia (*Fuchsia excorticata*) in South Westland, New Zealand. New Zealand Journal of Ecology 22(2): 197–203.

[64] Nugent G, Sweetapple P, Coleman J, Suisted P. 2000. Possum feeding patterns. Dietary tactics of a reluctant folivore. In: Montague TL ed. The brushtail possum: Biology, impact and management of an introduced marsupial. Lincoln, Manaaki Whenua Press. Pp. 10–19.

[65] Sweetapple PJ, Fraser KW, Knightbridge PI. 2004. Diet and impacts of brushtail possum populations across the invasion front in South Westland, New Zealand. New Zealand Journal of Ecology 28(1): 19–33.

[66] Daniel MJ. 1973. Seasonal diet of the ship rat (*Rattus r. rattus*) in lowland forest in New Zealand. Proceedings of the New Zealand Ecological Society 20: 21–30.

[67] Innes JG. 2005. Ship rat. In: King CM ed. The handbook of New Zealand mammals. Oxford University Press. Pp. 187–203.

[68] Murphy E, Maddigan F, Edwards B, Clapperton K. 2008. Diet of stoats at Okarito Kiwi Sanctuary, South Westland, New Zealand. New Zealand Journal of Ecology 32(1): 41–45.

[69] King CM and Murphy EC. 2005. Stoat. In: King CM ed. The handbook of New Zealand mammals. Oxford University Press. Pp. 261–287.

[70] Ragg JR. 1998. Intraspecific and seasonal differences in the diet of feral ferrets (*Mustela furo*) in a pastoral habitat, east Otago, New Zealand. New Zealand Journal of Ecology 22(2): 113–119.

[71] Clapperton BK, Byron A. 2005. Feral ferret. In: King CM ed. The handbook of New Zealand mammals. Oxford University Press. Pp. 294–307.
[72] King CM. 2005. Weasel. In: King CM ed. The handbook of New Zealand mammals. Oxford University Press. Pp. 287–294.
[73] King CM, Flux M, Innes JG, Fitzgerald BM. 1996. Population biology of small mammals in Pureora Forest Park: 1. Carnivores (*Mustela erminea, M.furo, M.nivalis* and *Felis catus*). New Zealand Journal of Ecology 20(2): 241–251.
[74] Jones C, Sanders MD. 2005. European hedgehog. In: King CM ed. The handbook of New Zealand mammals. 2nd edition. Melbourne, Oxford University Press. Pp. 81–94.
[75] Spitzen-van der Sluijs AM, Spitzen J, Houston D, Stumpel AHP. 2009. Skink predation by hedgehogs at Macraes Flat, Otago, New Zealand. New Zealand Journal of Ecology 33(2): 205–207.
[76] Jones C, Moss K, Sanders M. 2005. Diet of hedgehogs (*Erinaceus europaeus*) in the upper Waitaki Basin, New Zealand. Implications for conservation. New Zealand Journal of Ecology 29(1): 29–35.
[77] Jones C, Sanders MD. 2005. European hedgehog. In: King CM ed. The handbook of New Zealand mammals. 2nd edition. Melbourne, Oxford University Press. Pp. 81–94.
[78] Ruscoe WA, Murphy EC. 2005. House mouse. In: King CM ed. The handbook of New Zealand mammals. Oxford University Press. Pp. 204–221.
[79] Newman DG. 1994. Effect of a mouse *Mus musculus* eradication programme and habitat change on lizard populations on Mana Island, New Zealand, with special reference to McGregor's skink, *Cyclodina macgregori*. New Zealand Journal of Ecology 21: 443–456.
[80] King CM, Flux M, Innes JG, Fitzgerald BM. 1996. Population biology of small mammals in Pureora Forest Park: 1. Carnivores (*Mustela erminea, M.furo, M.nivalis* and *Felis catus*). New Zealand Journal of Ecology 20(2): 241–251.
[81] Reardon JT, Whitmore N, Holmes KM, Judd LM, Hutcheon AD, Norbury G, Mackenzie DI. 2012. Predator control allows critically endangered lizards to recover on mainland New Zealand. New Zealand Journal of Ecology 36(2): 141–150.
[82] King CM, Flux M, Innes JG, Fitzgerald BM. 1996. Population biology of small mammals in Pureora Forest Park: 1. Carnivores (*Mustela erminea, M.furo, M.nivalis* and *Felis catus*). New Zealand Journal of Ecology 20(2): 241–251.
[83] Gillies C, Fitzgerald BM. 2005. Feral cat. In: King CM ed. The handbook of New Zealand mammals. Oxford University Press. Pp. 308–326.
[84] Norbury G, Flux JEC. 2005. Brown hare. in: King CM ed. The handbook of New Zealand mammals. Oxford University Press. Pp. 151–158.
[85] Beggs JR. 2001. The ecological consequences of social wasps (Vespula spp.) invading an ecosystem that has an abundant carbohydrate resource. Biological Conservation 99: 17–28.
[86] Dibble D, Kovalenko KE. 2009. Ecological Impact of Grass Carp: A Review of the Available Data. Journal of Aquatic Plant Management. 47. P.15.
[87] Owen Spearpoint, GWRC Regional Council, pers comm 2017.
[88] Allen RB, Beadle SM. 2002. Ecology and Restoration of Te Harakeke Wetland, Waikanae. Contract report 490, Wildlands Consultants Ltd, Rotorua.
[89] Boffa Miskell. 2005. Pharazyn Reserve Management Plan. Prepared for Kāpiti Coast District Council by Boffa Miskell Ltd.
[90] Wildlands Consultants. 2011. Pharazyn Reserve Landscape and Ecological Restoration Plan. Contract Report No. 2527. Prepared for Kāpiti Coast District Council by Wildlands Consultants Ltd, Rotorua.
[91] Robertson HA, Baird K, Dowding JE, Elliot GP, Hitchmough RA, Miskelly CM, McArthur N, O'Donnell CFJ, Sagar PM, Scofield P, Taylor GA. 2017. Conservation status of New Zealand birds, 2016. New Zealand Threat Classification Series 19.
[92] Goodman JM, Dunn NR, Ravenscroft PJ, Allibone RM, Boubee JAT, David BO, Griffiths M, Ling N, Hitchmough RA, Rolfe JR. 2014. Conservation status of New Zealand freshwater fish, 2013. New Zealand Threat Classification Series 7.P. 12.
[93] McEwan A. 2017.Wetland fish surveying. Kapiti. Report No. 17-25, Riverscapes Freshwater Ecology Ltd, Masterton. P.29.
[94] Keesing VF. 1997. Statement of Evidence RMA Appeals 1481/98 and RMA 1482/98.
[95] Ron Woodrow, per obs. 2012.

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