

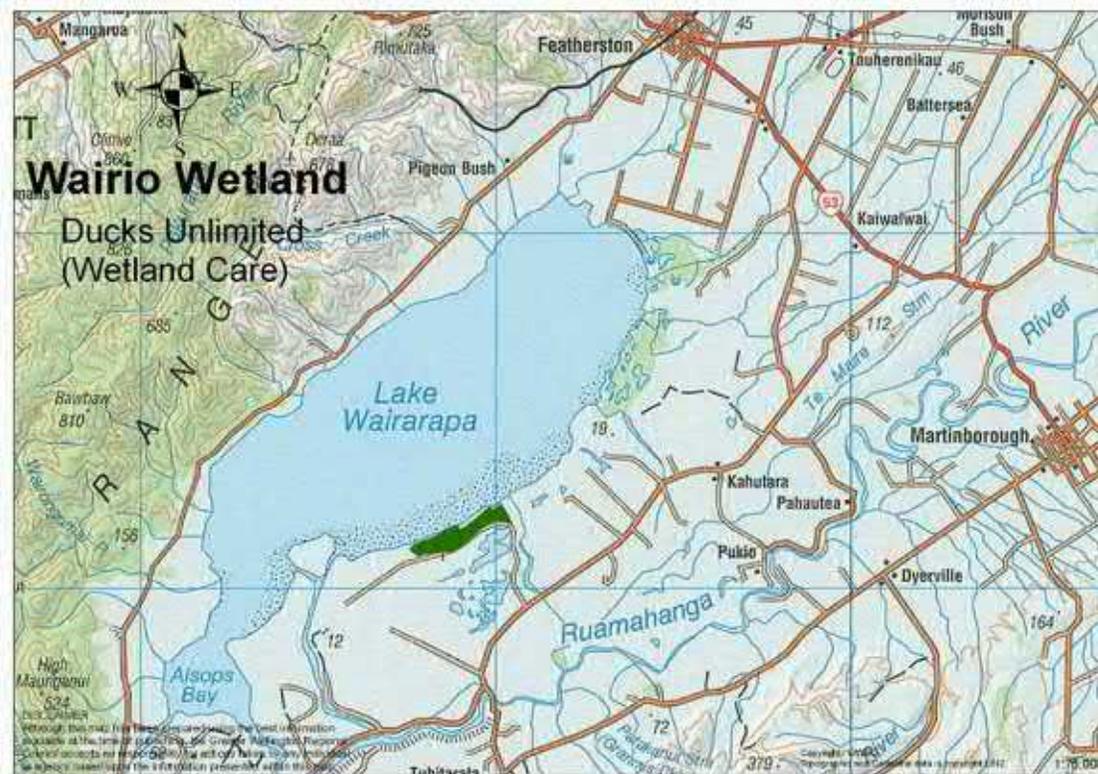
# WAIRIO WETLAND RESTORATION STRATEGIC PLAN

## EASTERN SHORE OF LAKE WAIRARAPA

2021 - 2030

### BACKGROUND

Local legend has it that the Wairio Wetland, located on the eastern shores of Lake Wairarapa was once a paradise, providing habitat for substantial numbers of waterfowl and aquatic species.



**Figure 1:** Map of the lower Wairarapa plain, with the Wairio Wetland on the South-Eastern shores of Lake Wairarapa (highlighted in green).

The 132-hectare Wetland was adversely affected by the Lower Wairarapa Valley Development Scheme (LWVDS) during the 1960/70s which resulted in large areas bordering the Lake being drained and cleared of predominantly willow forest and sedges. The construction of Parera Rd which separated the Wetland from the adjacent Matthews Lagoon & Boggy Pond wetlands cut off critical water flows. Seed from willow trees planted in the upper reaches of tributaries of the Ruamahunga River for erosion control

also invaded the Wetland. The willow infestation was subsequently felled and bulldozed into parallel windrows, running east-to-west across the Wetland. In short, the Wetland was a seriously “modified” site.

During the 1980s, following a growing awareness of the environmental effects of marginal land development, a planned "polder" scheme to establish dykes and further drain the eastern margins of the Lake, including the Wetland, was abandoned.

The Conservation Act of 1987 passed responsibility for "stewardship" of the Wairio Block to the Department of Conservation (DOC). The objective was for DOC to hold such land for conservation purposes but, in the interim, the block was leased to the Government owned Land Corp, for periodic pastoral grazing.

During the late 1980s, Ducks Unlimited New Zealand (DU) and DOC personnel attempted to partially re-flood the original Wetland. A channel was dug from the Lake on the north-western side of the Wetland and a floodgate was installed. At the southern end of the Wetland, a low earth dam was constructed. It was hoped that flood water from the Lake and surface water would be retained in the Wetland, however these measures failed, mostly due to damage from cattle grazing, and both the floodgate and dam fell into disrepair.

## **MANAGEMENT HISTORY 2005-2021**

In 2005 DU and DOC signed an initial 5-year, Land Management Agreement whereby DU would manage the restoration of the Wetland. This agreement has now been extended twice, the current period running through to the end of 2021.

DU has the responsibility to manage the restoration project but DOC retains an absolute right to terminate the arrangement at any stage if they are not happy with DU's performance or if DOC's objectives for the Wetland should change in some significant way. In this regard, ownership of the Wairio Block will pass to local Iwi groups, Ngāti Kahungunu and Rangitāne as part of the recently signed Treaty of Waitangi Settlement Agreement.

DU has welcomed input from and works with others who share the Wetland restoration objectives via a Restoration Committee which is convened & chaired by a DU representative. Work at Wairio has been progressed in a staged manner to match available resources with the significant task involved. The map on page 4 (Figure 3) shows Stages 1 – 4. The area between Stages 1 – 3 has been controlled to date using managed grazing. The map also shows the walkway constructed on the south, centre and western edges of the Wetland. In 2020 Wairarapa Moana (the Lake and surrounding wetlands) were granted RAMSAR status as a wetland of international significance.

## VISION

*In 100 years Wairio will be a pristine and self-sustaining wetland supporting abundant native flora and fauna, that filters nutrients and sediment from the incoming water before it reaches the wider Wairarapa Moana complex and is a place people can visit for recreation and to appreciate a regenerating ecosystem.*

## OBJECTIVES

- A. BIODIVERSITY: Restore a pristine and sustainable wetland ecosystem that provides high quality habitat for indigenous plants and animals.
- B. WATER QUALITY: Increase the filtration of water run-off from the surrounding area before it enters Lake Wairarapa.
- C. EDUCATION AND RESEARCH: Provide an environmental education experience for primary & secondary school students and a site for scientific research into restoration practices by tertiary students.
- D. CONNECTIONS: Provide a space that connects people to nature, with recreation and educational value for stakeholders and general visitors, in addition to cultural values for local Iwi.
- E. FINANCIAL AND HUMAN RESOURCES: Ensure sufficient financial and human resources are available to complete the restoration of the Wairio Wetland.



**Figure 2:** Stage 4 of the Wairio Wetland (top-right) and bund wall separating Stage 3 and Stage 4. Two areas of raupō beds are visible in Stage 4 (photo credit: Stephen Hartley, February 2021)

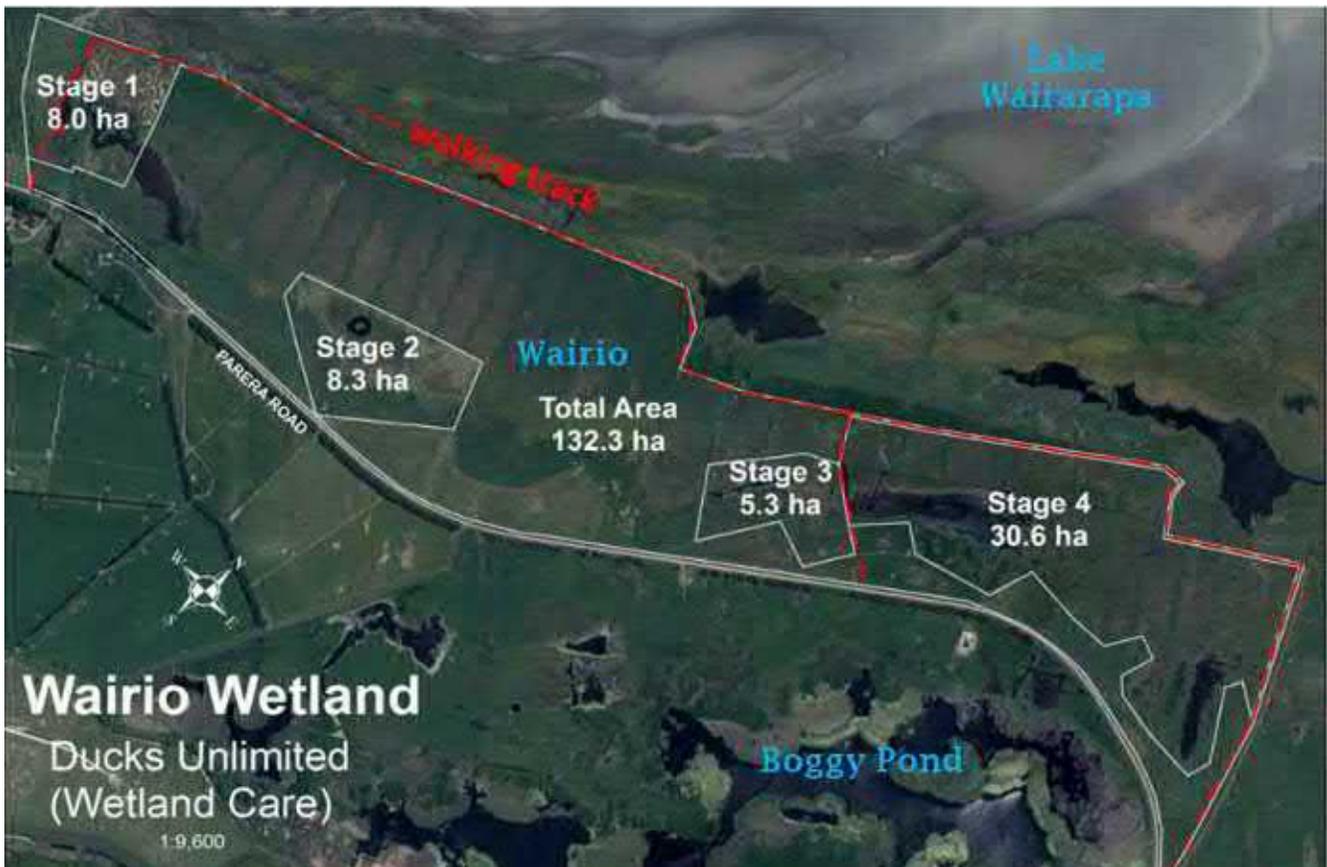
# PLANS

## A – Restore a Pristine and Sustainable Wetland Ecosystem that supports native Biodiversity

### 1. Water Supply and Retention

Areas of permanent water with extensive margins of ephemeral wetland have been created by the repair of the southern dam at Stage 1, the creation of three additional dams at the southern ends of Stages 2, 3 & 4, and a major western perimeter dam adjacent to the Lake. All these dams have been constructed with gently sloping walls and grassed to reduce the destructive force of water during a significant flood event.

Due to the modest gradient over the site, large areas of permanent water and ephemeral wetlands have been created with quite modest dams. Areas adjacent to the dams were deepened by the excavation of earth for the dams, increasing the amount of permanent water within the Wetland. Further modest dams (running east-west) and low islands could be considered between Stages 1 & 3.



**Figure 3:** Map of Wairio Wetland and environs (background imagery courtesy of Google Earth).

Surface water is supplemented by water from the Lake in times of flood or severe westerly winds by flowing over the western perimeter dam at designed locations. Additionally, the Wetland water level is assumed to be influenced by subterranean flows from the Lake which has its own target water control levels under the LWVDS.

## 2. Earth Works

In addition to the construction of the dams / low islands and adjacent deepening of the Wetland, the parallel windrows of willow debris have been intersected in the fenced off areas to create islands and further areas of ephemeral wetland. These islands afford waterfowl somewhat more secure nesting areas. Further work in these areas is possible.



**Figure 4:** Construction of Stage 1 in 2006.

### **3. Protecting and Improving Habitat for Native Plants and Animals**

#### **i. Enhancing Overall Plant Diversity**

The restoration of the Wetland has created a 100-hectare shallow, sheltered wetland which is different to what is found at the main lake, Matthews and Boggy wetlands. The relatively stable water levels at Wairio are also an advantage. The specialized wetland habitat created at Wairio supports a wide range of bird species and fish species the majority of which are native and some of which are classified as nationally threatened (Australasian Bittern, Brown Mudfish). “The overall number of waterbirds using Wairio has increased tenfold since DU started the project.” – John Cheyne, wetland consultant and DU member.

Both the Wetland ephemeral and surrounding areas and the dam walls have been largely replanted. This was done following the fencing of Stages 1 - 4 to exclude grazing stock, using eco-sourced sedges, flaxes, and trees. It is expected that native seedlings present in the soil, will germinate over time, especially as the plantings become established. Additional native species endemic to the region but not yet present within the Wetland, will be planted to help ensure suitable habitat and food availability for native fauna.

#### **ii. Fortifying Flax Varieties**

The Wairarapa Moana was traditionally used by Iwi to harvest different varieties of flax, with intended specialization for each variety (i.e., weaving). Collaborating with local Iwi will allow for the reestablishment of some of the almost 40 different varieties within Wairarapa Moana. Easily accessible placement of these flaxes would enhance the cultural value of the Wetland and create more habitat for native fauna, along with a slight increase to filtration.

#### **iii. Establishing Kahikatea Swamp Forest**

A Kahikatea swamp forest will be established in the northern area of Stage 4. It is expected to be approximately 5 hectares and will provide a new habitat type within the wetland. This will further increase the effective filtration of the Wetland, especially with the additional diverted water from Boggy Pond and Matthews Lagoon flowing into this area. Research conducted within the Stage 3 area into best practices for restoration planting will be utilized to ensure maximum survival of the Kahikatea. Other opportunities for Kahikatea swamp forests exist in the southwest and northeast areas of the Wetland.

#### **iv. Modest Excavations to Improve and Create Habitat Variety**

Ideally, prior to planting the Kahikatea swamp forest, minor excavations will be carried out in this area to create a series of shallows and islands, creating additional ephemeral areas, ideal waterfowl feeding areas, and habitat for aquatic species like Mudfish and Tadpole Shrimp. This will create a gradient of inundation, allowing species such as Totara to be established in drier areas and species such as Kahikatea to be planted in areas with longer periods of inundation. Additional scallop shaped shallows will be created around the edge, which will hopefully become booming sites for male Bittern once they are colonized by Raupō.



**Figure 5:** Australasian bittern – a critically endangered wetland species present at Wairio. (Photo Credit – Steve Playle 2018)

#### **4. Raupō Control for Bittern**

There are currently limited locations within the Wetland that are suitable for mating Bittern. Additional booming sites for Bittern will be created by spraying scalloped shaped ~50 m wide bays into existing areas of raupō beds.

Spraying to control raupō more generally will be required to maintain the Wetland habitat created to date. Whilst raupō provides valuable habitat for shallow feeding waterfowl, it colonizes open areas of shallow water, excluding species that require open water. Additionally, raupō stands collect sediment that will slowly fill in ponds, which will gradually compromise the created habitat if it is not managed.

## 5. Tonganui (South Wairarapa) Ecological Corridors

The Aorangi Restoration Trust is currently working with local farmers to create ecological corridors from the Aorangi to the Remutaka Ranges. There is potential for the Wetland to become a critical link in this structure.

## 6. Pest Plant Control

An ongoing program to control noxious weeds, e.g., blackberry, gorse, lupin, alders, wild roses, and willows is in place and will continue. This will also require managed grazing in currently unfenced areas.

## 7. Predator Control

A predator control program employing approximately 120 DOC250 and 120 Timms traps is currently managed within the Wetland by GWRC, which suppresses mustelid, rodent, feral cat, and possum populations (Appendix 1). This effort is critical for the re-establishment and long-term conservation of the vulnerable species that have returned to the Wetland, including Bittern, Spotless & Marsh Crake and Royal Spoonbills. Extending the current network of traps, both within and adjacent to the Wetland, should lower the current density of predators within the Wetland, providing greater safety for fauna that are vulnerable to even low densities of predators (i.e., nesting female Bittern).



**Figure 6:** Royal Spoonbills benefiting from restoration work and predator control. (2021)

## **B – Improve Water Quality via Increased Filtration**

### **1. General Improvements to Filtration**

The work described and planned in Section A (Biodiversity) will significantly help filtration of nutrients and sediment as water flows south through the Stages of the Wetland (from Stage 4 to Stage 1) and back into the Lake from the south-western corner of Stage 1.

### **2. Increased Water Reticulation**

Work was undertaken in 2019 by Greater Wellington Regional Council (GWRC) to reticulate water from Boggy Pond and Matthews Lagoon via a conveyance channel to the Wetland, rather than letting it flow directly into the Oporua spillway, which flows into the lake. This reticulation will increase the area and duration of standing water, improving the health / mauri of the Wetland, and increasing the filtration of nutrients from neighboring farms before the water enters the Lake. Unfortunately, the conveyance channel was breached but was repaired by GWRC in early 2021.



**Figure 7:** Looking west across extensive shallow water in Stage 3 (late Spring, 2020)

## **C – Provide Environmental Education and Support Scientific Research**

### **1. Primary Schools**

Continue to work with local primary schools (Kahutara, Pirinoa and Martinborough) to provide practical educational opportunities at the Wetland, e.g., identification of wetland flora and fauna, including aquatic species.

### **2. Secondary Schools**

Seek to provide similar relevant opportunities to Kuranui College, Greytown.

### **3. Restoration Event Participation**

Continue to provide opportunities to both primary and secondary school students, along with the wider public with practical restoration activities, e.g., public planting days.



**Figure 8:** Planting day with children from local primary schools and students from Taratahi Agricultural Training College.

#### 4. Collaboration with Victoria University of Wellington (VUW)

Following discussions with VUW's Centre for Biodiversity & Restoration Ecology (CBRE), Stage 3 became a controlled site in 2011 for the agreed research program of a Masters student. Research into the best practice for wetland restoration is still being carried out by VUW students within Stage 3 and has resulted in multiple papers (see Technical Information in Appendix) that are relevant to future plantings that may occur within the Wetland and the wider Wairarapa Moana.



**Figure 9:** Jim Campbell (DU), Prof. Ben Bell (VUW), Trish Walbridge (VUW Foundation) & Jim Law (DU) following the agreement for VUW's CBRE to conduct experimental plantings within Stage 3 (2010).

The decade of upkeep and monitoring for this experiment has provided a valuable time series of data, which will lead to better understanding of the long-term implications of restoration decisions. This is especially valuable, with ephemeral wetlands being notoriously poorly studied within New Zealand.

There will be additional collaboration with VUW's CBRE for the planned Kahikatea swamp forest project, with the project presenting opportunities for additional research into the best practice for wetland restoration. Other potential areas of research include the impact of managed grazing in areas still significantly impacted by noxious plant growth.

Separately, DU provided a VUW Masters student with a scholarship in 2020 to assist in research related to the Wetland. DU intends to make further scholarships available annually to university students.



**Figure 10:** VUW student researchers in Stage 3. (Photo credit: Stephen Hartley, 2017)

## **5. Establish Data Recording Protocols**

Whilst significant progress has been made with the restoration of the Wetland, regular quantitative measurements of this progress should be captured in the following areas:

- i.** Water quality and levels (permanent and ephemeral areas).
- ii.** Waterfowl and aquatic species populations and breeding success.
- iii.** Continued predator control reporting.

## **D – Connecting People to Nature**

### **1. Walkways**

The dam surfaces have been sown with grass and are now mown regularly by a DOC contractor providing an easy walkway around the Wetland. This walkway could be linked to the previously envisioned walkway along the Southeastern shore of the Lake.

### **2. Signage**

Additional information points along the Wetland walkway will help to educate curious visitors about the various species present within the wetland, along with highlighting the efforts made by DU to restore and create this space. Furthermore, better signage is needed on the main Kahutara Road to help direct people to the Wetland.

### **3. Bird Viewing Hide**

A bird viewing hide will be built in 2021 on the walkway extending into Stage 4 to enhance the ornithological experience and more general recreational possibilities at the Wetland. Further hides will be located throughout the Wetland.

### **4. Sustainable Harvest**

Traditional sustainable harvest of eels or Tuna and Raupō by Iwi, and gamebirds by hunters will enhance usage of the Wetland.

### **5. Online Visibility**

Improving public knowledge of the Wetland and DU's efforts in leading the project will be improved through greater online visibility that shows the continuing recovery of the Wetland. This will help to attract a larger number of visitors to the Wetland and encourage more volunteers to help the restoration effort.

## **E – Financial and Human Resources**

### **1. Financial Resources**

DU has and will continue to allocate funds from its own member generated resources and solicit support from other like-minded organizations, charities, and individuals to complete this project. To date, funds have been contributed by Banrock Station Wines, The Rotary Club of South Wairarapa, The Pharazyn Trust, The Treadwell Trust, The Nikau Foundation and the local Chapters of both Forest & Bird and The Ornithological Society. More recent support from Fish & Game’s Game Bird Habitat Trust and GWRC’s Wairarapa Moana Restoration Fund has greatly assisted the project. Additionally, local individuals have recently made significant financial contributions.



**Figure 11:** Ross Cottle and Taratahi students planting Stage 1 in 2008.

### **2. Human Resources**

Volunteers come from DU membership ranks, local Rotarians, Forest & Bird and Ornithological Society members, DOC & GWRC staff and the wider public. It is expected that this support will continue to grow, especially as the results of prior years’ plantings become more visible and knowledge of the Wetland grows.

Pupils from the local Pirinoa, Kahutara and Martinborough Primary Schools and students from the former Taratahi Agricultural Training Centre have also assisted with plantings which has hopefully provided long-term educational spin-offs and helped to instill a desire to protect and enhance the environment.

### 3. New Regulatory Environment

As a result of the restoration success of DU, the Wetland has now been classified by GWRC as a wetland of regional significance with attendant increased regulatory control. This requires significant additional time and cost obtaining GWRC resource consent approval for what were previously considered minor restoration activities. In the absence of simplified regulations, employing a consultant with expertise in resource consent activities will most likely be required.



**Figure 12:** Jim Law (left) and Ross Cottle (right) prior to 2018 planting of Stage 4.

## **PLANNED OUTCOME**

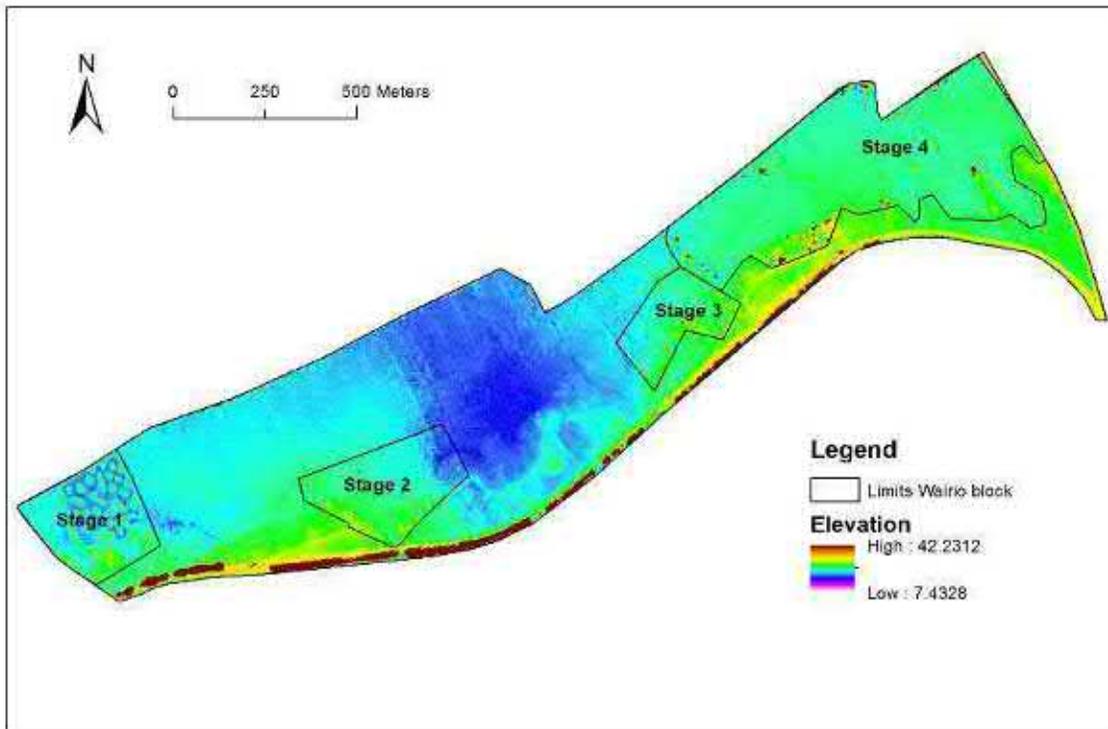
The Wetland is now on the road to recovery, and it is possible to believe that it will again become a wetland paradise. The Wetland restoration works have been recognized nationally, being a co-winner of the community awards granted by the Morgan Foundation in 2015 and receiving ongoing positive local media coverage.

In the foreseeable future, the Wetland will have an increasing number of Stages comprising securely fenced areas of permanent water, ephemeral wetlands cloaked in native sedges and trees, providing waterfowl and wader habitat, and allowing public access for educational purposes, general interest and sustainable harvest. Over time, the fenced areas will be merged, enclosing most of the Wetland. During the dry summer months, managed grazing in the unfenced areas will continue to be used to limit the growth of noxious plants.

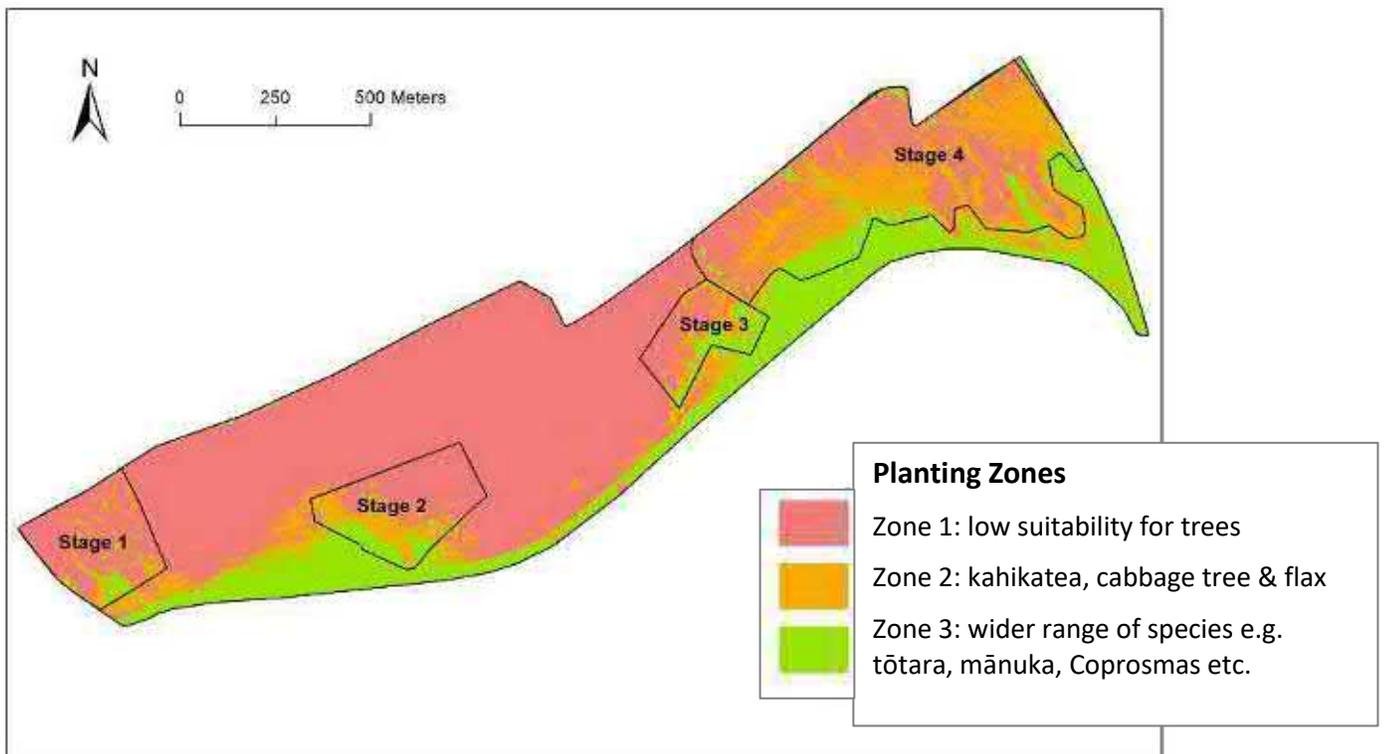
In the wider context, this project has become both a catalyst and pilot program for the restoration of the wider eastern shores of the Lake.

The greater Wairarapa Moana, comprising Lakes Wairarapa (including the Wetland) and Onoke became a certified “Ramsar Site” in 2020, under the international Ramsar Convention. This international recognition reflects the size and inherent natural beauty of Wairarapa Moana as well as the efforts being undertaken at the Wetland and elsewhere around Lakes, to help restore the paradise of legend.

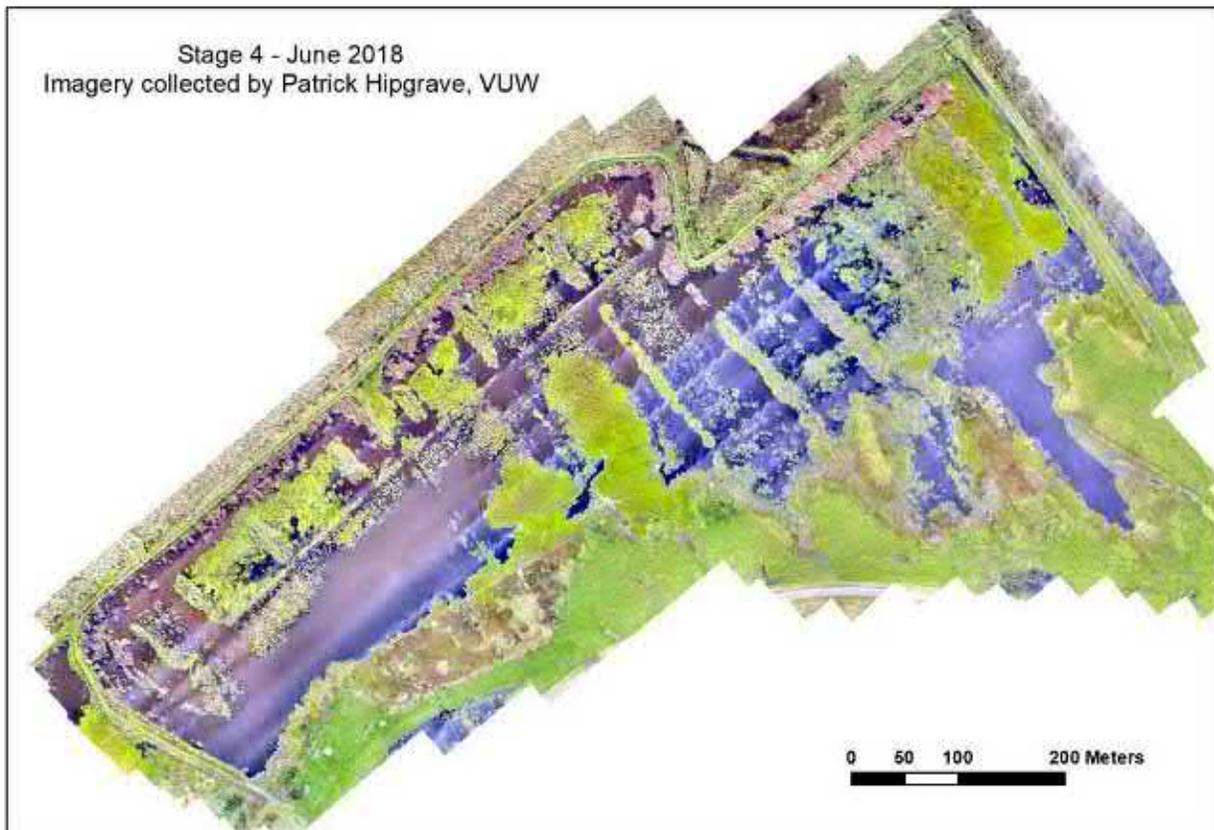
## Appendix – Technical Information



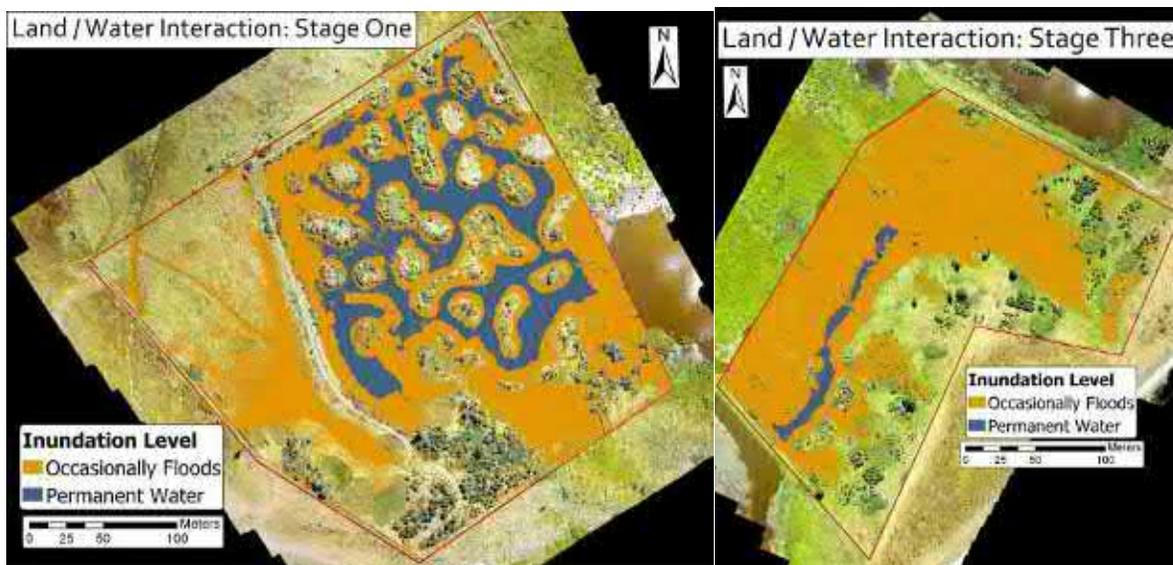
**Figure A1.** Digital surface model for the Wairio Block, 2014 (brown indicates tree tops, blue = low points).



**Fig A2.** Potential planting zones, based on elevation and susceptibility to flooding.



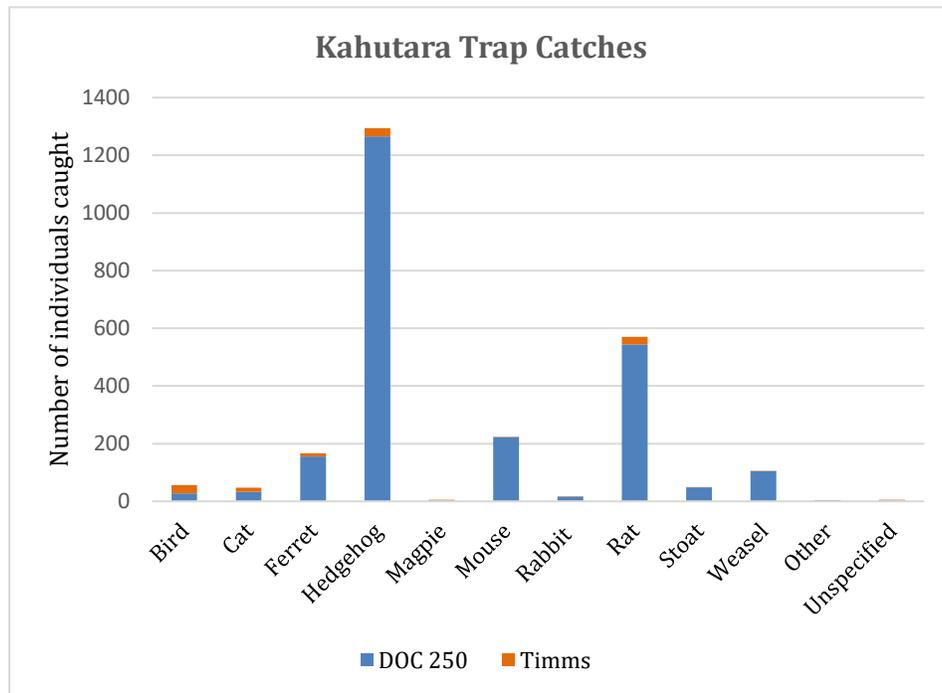
**Figure A3.** Drone imagery of Stage 4, Winter 2018. Raupo beds have a straw-colored appearance at this time of year.



**Figure A4.** Extent of water inundation across stages 1 and 3, as recorded between June 2018 and March 2019. (Images by Patrick Hipgrave, VUW)



**Figure A5:** Map of trap layout in Kahutara lagoon site (Wairio + Boggy Pond + Matthews Lagoon) ◆ = DoC 250, ▲ = Timms traps (with meat bait). Base map source: LINZ.



**Figure A6:** Number of individuals caught in DoC 250 and Timms traps in Kahutara lagoon site over a six year period (Aug, 2013- Jul, 2019). Analyses by Liduli Livera (VUW).