

# Kākahi Monitoring Report

## Kākahi monitoring for the Wairarapa Moana Wetlands Project

February 2017



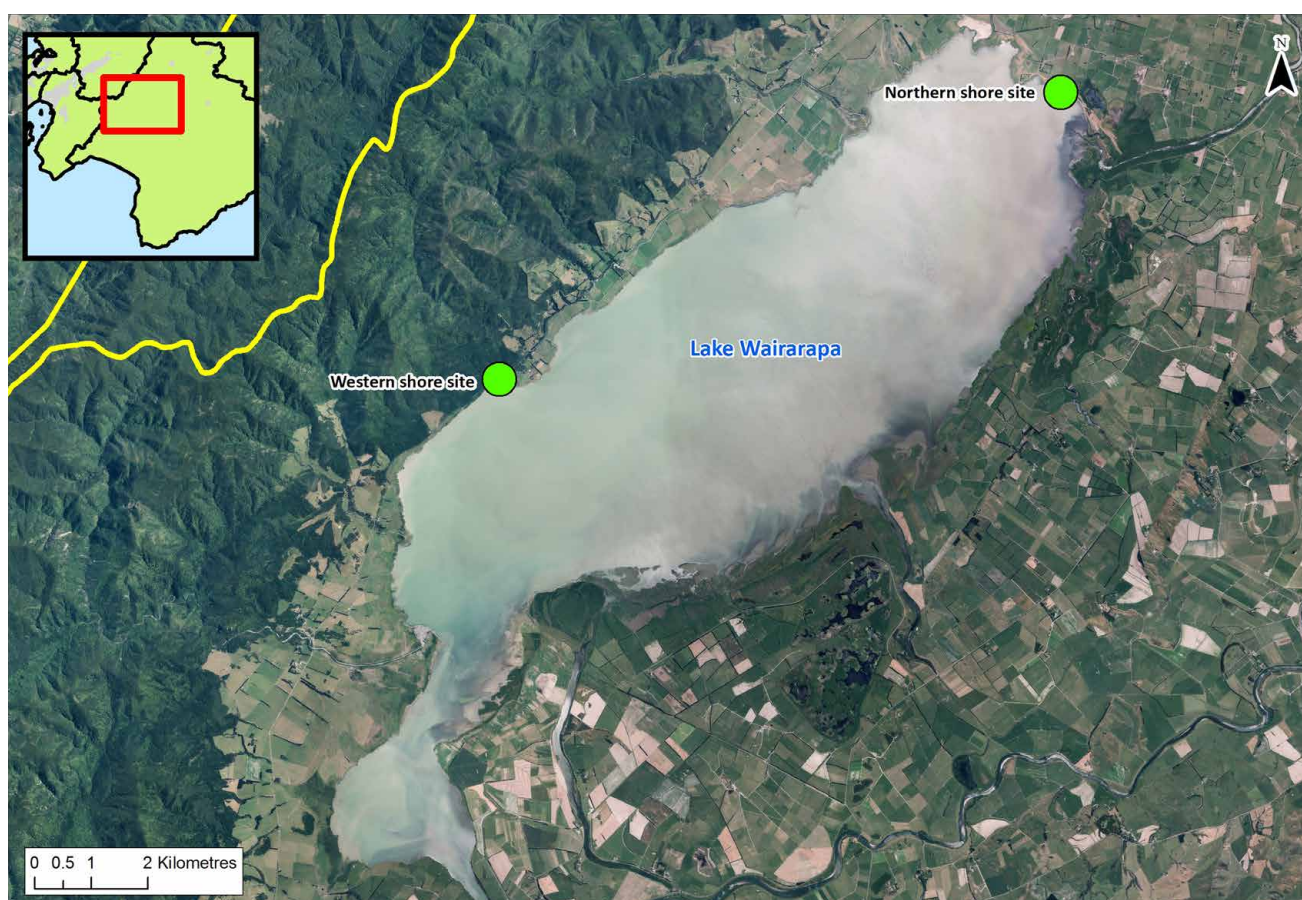
### Ngā mihi/greetings

Welcome to the third annual report for the Wairarapa Moana community kākahi monitoring programme.

The northern shore site was revisited for this year's monitoring event, providing the first opportunity in the programme for the collection of repeat data. The first monitoring event took place at Lake Domain Reserve at the northern shore of Lake Wairarapa

in 2015 and the second at the Wairarapa Lake Shore Scenic Reserve area on the western shore (see Figure 1).<sup>1</sup>

This kākahi/freshwater mussel monitoring programme contributes to a wider programme of monitoring to inform the Wairarapa Moana Wetlands Project<sup>2</sup> about the health of Lake Wairarapa.



**Figure 1.** Map showing the two Lake Wairarapa sites that are surveyed on alternate years as part of the kākahi monitoring programme.

**Kākahi** are filter feeding animals and help to improve water quality by reducing algae and sediment in the water. Lake Wairarapa has two of the three species that are known to live in New Zealand. Populations of kākahi are in decline throughout New Zealand, and throughout the world. In New Zealand this decline is linked to the deterioration of the water quality in lakes and rivers. So, the health of a kākahi population helps to gauge ecosystem health of a lake or wetland.

[www.waiwetlands.org.nz](http://www.waiwetlands.org.nz)

<sup>1</sup> See [www.waiwetlands.org.nz](http://www.waiwetlands.org.nz) for the 2015 and 2016 kākahi monitoring reports

<sup>2</sup> The Wairarapa Moana Wetlands Project is a collaborative restoration partnership between South Wairarapa District Council, Ngāti Kahungunu ki Wairarapa, Rangitāne o Wairarapa, Papawai and Kohunui marae, Department of Conservation and Greater Wellington Regional Council.



# Monitoring methods

The 2017 kākahi monitoring was carried out on the 11th February 2017 by a group of 30 community volunteers. A 500 metre stretch of shoreline was sectioned off into 50 metre intervals to create ten survey zones (see Figure 2). After we recorded our measurements, the kākahi were returned to the zone from which they were collected.



**Figure 2.** Map of the Lake Wairarapa northern shore kākahi monitoring area, and the survey zones that were searched during the 2017 monitoring event.





## Collecting the kākahi

Each of the ten survey zones was surveyed by a team of three people, with two people collecting kākahi and the third working as a timekeeper and communicator. In order to minimise disturbance, a maximum of 50 kākahi were collected from each zone. Each pair of collectors waded, feeling through the substrate (of mud, sand and gravel) for kākahi with their feet and hands. Particularly clear water on the survey day also meant kākahi were visible under the water in many locations.



Figure 3. photo of a kākahi and its trail in the substrate

## Measuring the kākahi population density

Kākahi were collected either for 30 minutes or until 50 samples had been collected, whichever occurred first. This allowed us to standardise our results per unit time<sup>3</sup>. If 50 kākahi were collected in less than 30 minutes, then we recorded the amount of time it took to collect them. For example, if two people took 15 minutes to collect 50, then it would be assumed that 200 would be collected in an hour, giving a density of 100 kākahi per person, per hour.

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<sup>3</sup> Ecological data is commonly standardised per unit area in order to be compared to future data and/or data from other areas. Kākahi in lake Wairarapa are too sparse and patchily distributed for quadrats (for example) to return useful data, and large areas would be needed in order to collect enough kākahi to draw valid conclusions. Because achieving complete coverage of large areas would necessitate spending long periods of time in cold water, this option presents a health and safety issue. For these reasons the use of time as a quantifying unit was considered the most suitable option (this method is also used elsewhere for kākahi surveying).

## Recording species type

Kākahi were identified by species, as either the 'common' kākahi (*Echyridella menziesii*) or the 'Auckland' kākahi (*E. aucklandica*). As well as allowing us to keep track of each species, this will allow us to monitor the ratio of the species, and detect, for example, if one species is outcompeting the other.

## Measuring shell length

Shell lengths were measured to the nearest millimetre using Vernier callipers. By recording the shell lengths, we will be able to keep an eye on the size distribution of the population, and detect whether sufficient juveniles are being produced to sustain the population.

## Scoring shell erosion

Each kākahi collected was also scored according to the amount of erosion present on the shell. If no or very little erosion was present on the shell then it was scored as 'one'. If most of the top layer was eroded it was scored as 'four' (with intermediate scores of two and three). Recording shell erosion over time may enable us to make links to environmental changes, such as substrate composition or water chemistry.

## The monitoring programme

The northern lake shore site will be surveyed in a similar fashion every two years, alternating with the western shore site at Wairarapa Lake Shore Scenic Reserve. Our methods can accommodate and benefit from as many participants as possible - the more survey zones we complete, the better our data will be.



# 2017 monitoring results

## Kākahi abundance

A total of 464 kākahi were collected during this year’s count (Table 1). Of these, 441 (95%) were the ‘common’ kākahi and 23 (5%) were the ‘Auckland’ species.

People collected their 50 kākahi in just a few minutes from some zones while others collected for the full 30 minutes. Recorded abundances ranged from 21 per person per hour, (in zone 1), to 500 per person per hour (in zones 5 and 9), with an overall average of  $187 \pm 56^4$  per person per hour.

**Table 1.** Numbers of kākahi collected from the Lake Wairarapa northern shore monitoring site in 2017.

Survey zone	Number of kākahi found*	Collection time (minutes)	Kākahi density (number of kākahi collected per person, per hour)
1	21	30	21
2	43	30	43
3	50	16	94
4	50	10	150
5	50	3	500
6	50	9	167
7	50	18	83
8	50	6	250
9	50	3	500
10	50	23	65
Total: 464			Average: $187 \pm 56$

\*Total kākahi collected by two people working together in one zone

## Population size distribution

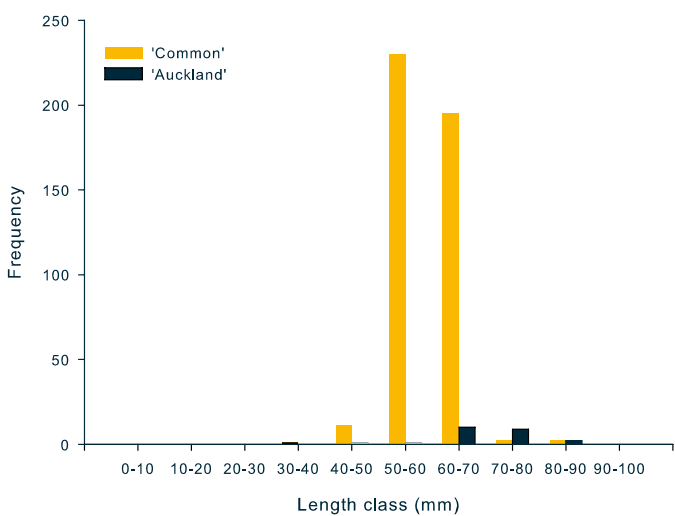
The size of kākahi is related to their age, although the relationship between shell length and age varies with location and species. We assume that similar sized kākahi at a site are a similar age.

Overall, a very small range of shell lengths was recorded, with most kākahi falling within a narrow range representing older adults (Table 2, Figure 4). The ‘common’ kākahi ranged in length from 40 – 84 mm, and the ‘Auckland’ species from 48 – 84 mm. Average lengths were  $60 \pm 0.2$  mm and  $70 \pm 1.7$  mm respectively. Nearly all (98%) of the ‘common’ kākahi found were between 50 and 70 mm, whereas most (83%) of the ‘Auckland’ kākahi were slightly longer, between 60 and 80 mm. No kākahi which fit the description of ‘juvenile’ (i.e. < 38 mm<sup>5</sup>) were collected during the count.

The size distribution of kākahi collected during this survey was strongly unimodal (ie, there was one clear peak in the values). Therefore, we can assume that the age distribution is similarly unimodal, with very few juveniles present.

**Table 2.** Shell length of kākahi collected from the northern shore monitoring site in 2017.

Shell length of kākahi collected from the northern shore monitoring site in 2017. Size class (mm)	Number of kākahi	
	‘common’	‘Auckland’
0-10	0	0
11-20	0	0
21-30	0	0
31-40	1	0
41-50	11	1
51-60	230	1
61-70	195	10
71-80	2	9
81-90	2	2
91-100	0	0
Total:	441	23



**Figure 4.** Length distributions of ‘common’, and ‘Auckland’ kākahi surveyed during the Wairarapa Moana 2017 kākahi count.

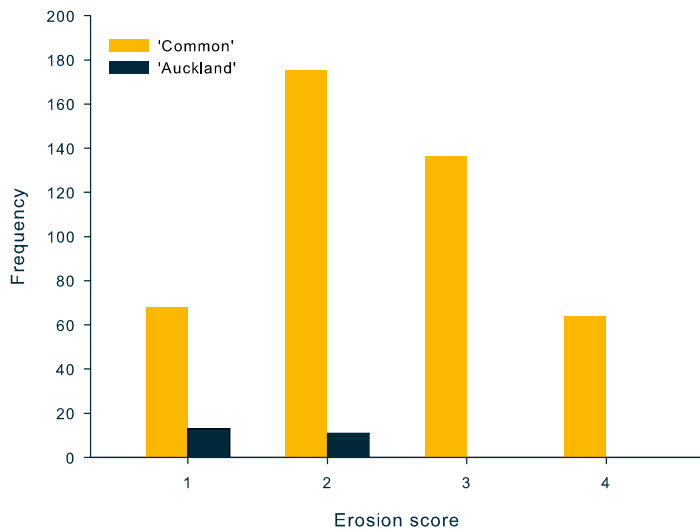
4 Mean  $\pm$  1 SE (standard error)

5 Shell length less than 38 mm (or less than approximately 5 years old) has been used in the past to represent juvenile kākahi eg, James MR (1985). Distribution, biomass, and production of the fresh-water mussel, Hyridella-menziesi (Gray) in Lake Taupo, New Zealand. Freshwater Biology 15: 307–314.



## Shell erosion

A range of erosion conditions of the shells from the kākahi collected was recorded (Figure 5). The 'common' kākahi shells were generally more eroded. For this species, 68 scored 1 (15%; least erosion), and 64 scored 4 (14%; most erosion), with all the rest (71%) scoring either 2 or 3 (intermediate erosion). Kākahi shells from the 'Auckland' species, on the other hand, all scored either 1 or 2.



**Figure 5.** Erosion condition of 'common', and 'Auckland' kākahi surveyed at the northern shore site in 2017.



# Comparison of 2015 and 2017 data

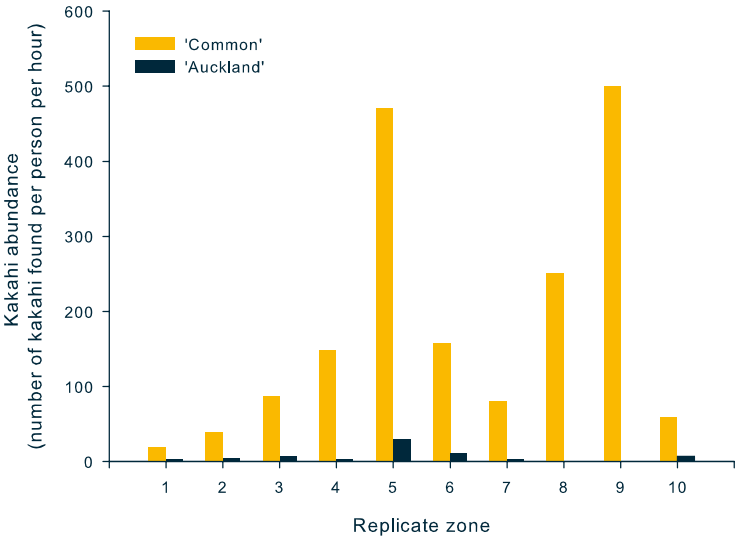
Five survey zones were searched during 2015, whereas increased volunteer availability meant that ten zones were searched during 2017 (the same five zones plus an additional five adjacent zones to the east).

Higher kākahi abundances were recorded in 2017, compared with 2015 (Table 3). This is most likely attributable to the exceptionally clear water conditions experienced during this year’s survey, making collection generally easier. The additional sites searched in 2017 were closer to the Tauherenikau delta and may also have contributed to the higher abundance recorded. Kākahi may be less common in the zones furthest away from the delta (Figure 6) and these sites made up a higher proportion of the total area searched in 2015, but more data needs to be collected to support this theory.

**Table 3.** Abundance of kākahi at the northern shore monitoring site during monitoring in 2015 and 2017.

Survey zone	Kākahi density (number of kākahi collected per person, per hour)	
	2015*	2017
1	36	21
2	35	43
3	21	94
4	100	150
5	115	500
6	-	167
7	-	83
8	-	250
9	-	500
10	-	65
Average: 62 ± 19		Average: 187 ± 56

\* Only 5 zones were searched in 2015

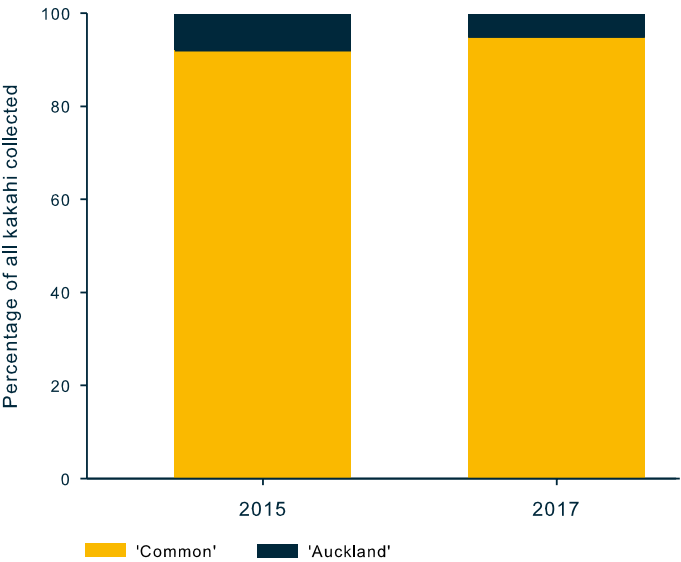


**Figure 6.** Kākahi abundance at each of the ten replicate zones searched at the northern shore site in 2017 (higher zone numbers are closer to the Tauherenikau delta).

6 Common kākahi length: t = 0.8141, df = 616, P = 0.4159  
Auckland kākahi length: t = 0.7673, df = 36, P = 0.4479  
Common kākahi erosion: t = 0.6301, df = 616, P = 0.5289  
Auckland kākahi erosion: t = 0.9855, df = 36, P = 0.3309



Species composition was similar during both years, the 'Auckland' species making up 8% of the population in 2015, and 5% in 2016 (Figure 7). In terms of length and erosion, some small differences were apparent between 2015 and 2017 (Table 4), however none of these differences were statistically significant.



**Figure 7.** Species composition of kākahi collected at the northern shore monitoring site during 2015 and 2017.

**Table 4.** Shell length and shell erosion of kākahi at the northern shore monitoring site during 2015 and 2017.

	'common' kākahi		'Auckland' kākahi	
	2015	2017	2015	2017
Number collected	177	441	15	23
Mean length (mm)	60.3 ± 0.3	60.0 ± 0.2	68.0 ± 1.9	70.0 ± 1.7
Length range (mm)	37-70	40-84	57-80	48-84
Mean erosion (score 1-4)	2.0 ± 0.1	2.4 ± 0.4	1.3 ± 0.2	1.5 ± 0.1



# Conclusion

The kākahi collected at the Lake Wairarapa northern shore site in 2017 indicated that the population is comprised mostly of adults.

No significant differences in measured population parameters were found between 2015 and 2017 at the northern shore monitoring site. In particular, no statistically significant increase in average length was observed. This could indicate that this is a renewing population rather than an ageing one. However, given that population data is naturally variable, it is necessary to collect multiple years' worth of data before a clear trend can be identified.

The next monitoring event for this site will occur in 2019.

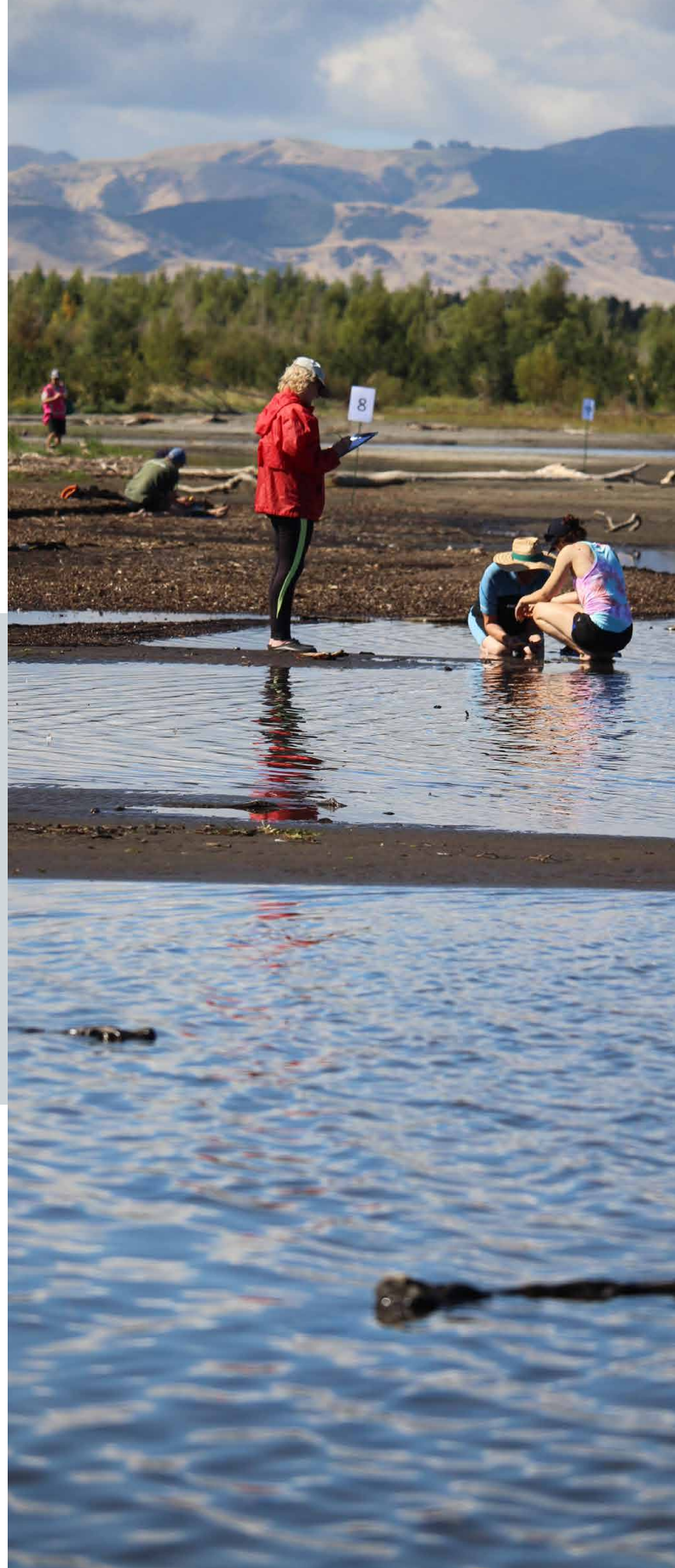
**The early stages of monitoring at Lake Wairarapa show the presence of very few juvenile kākahi.** If sufficient juveniles aren't surviving then the future of the kākahi population looks bleak. However, knowledge about this stage of the kākahi life cycle is limited. Juvenile mussels are sensitive to contaminants such as ammonia, heavy metals and excess sediment. These enter the waterways in a catchment through various uses of land and activities in urban areas. Also, kākahi larvae depend on host fish during their development and these native fish are in decline.

Pollutants (including sediment) need to be prevented from entering our waterways and wetlands to protect and improve the habitat for kākahi and other freshwater animals. We can do this by fencing off streams and replanting trees to reduce erosion. We also need to ensure the careful use, containment or disposal of pesticides, fertilisers, other chemicals and waste products.

## Acknowledgements

Thanks very much to those involved in the kākahi monitoring and in the preparation of this report, in particular Amber McEwan (Riverscapes Freshwater Ecology Ltd) and the volunteer kākahi collectors.

This report has been prepared for the Wairarapa Moana Wetlands Project, a joint initiative by Greater Wellington Regional Council, Department of Conservation, South Wairarapa District Council, Kahungunu ki Wairarapa, Rangitane o Wairarapa and Papawai and Kohunui marae.



**If you'd like to get involved in future surveys please get in touch:**

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