

# Kākahī Monitoring Report

Kākahī monitoring for the Wairarapa Moana Wetlands Project

August 2018



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# Ngā mihi/greetings

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

We have now completed two surveys at each of two Lake Wairarapa sites. These were the northern shore site at Lake Domain Reserve in 2015 and 2017, and the western shore site at Wairarapa Lake Shore Scenic Reserve in 2016 and 2018 (Fig.1)<sup>1</sup>.

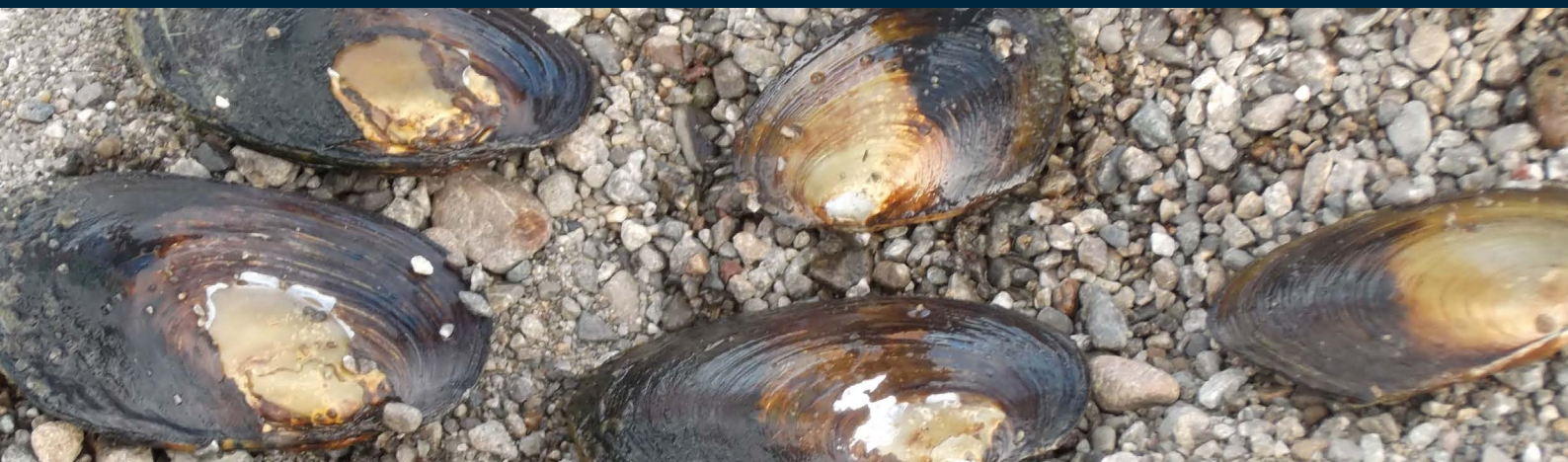
This kākahi/freshwater mussel monitoring programme was initiated to contribute to a wider programme of monitoring to inform the Wairarapa Moana Wetlands Project about the health of Lake Wairarapa.



**Figure 1.** Satellite image of Lake Wairarapa, showing the two sites used in the kākahi monitoring programme - the northern shore site (Lake Domain Reserve) and the western shore site (Wairarapa Lake Shore Scenic Reserve).

1. See [www.waiwetlands.org.nz](http://www.waiwetlands.org.nz) for previous monitoring reports.

**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.





# Monitoring methods

This kākahi monitoring was carried out at Wairarapa Lake Shore Scenic Reserve on 10 February 2018 by a group of 40 community volunteers. A 500 m stretch of shoreline was sectioned off into 50 m intervals to create ten survey zones (Fig. 2). After recording measurements, the kākahi were returned to the zone in which they were collected.



**Figure 2.** Map of the Lake Wairarapa western shore kākahi monitoring area and the zones searched for the 2018 survey.





## Collecting the kākahi

Teams of 3-4 people were allocated a zone to survey, with at least two people collecting kākahi and the third working as a timekeeper and communicator. Each group of collectors waded, feeling through the substrate (of mud, sand and gravel) for kākahi with their feet and hands. In order to minimise disturbance, a maximum of 50 kākahi were collected from each zone.

## Measuring the kākahi population density

Kākahi were collected for 30 minutes or until 50 samples had been collected, whichever occurred first. This allowed us to standardise our results per unit time<sup>2</sup>. If 50 kākahi were collected by two people in less than 30 minutes, then we recorded the amount of time it took to collect them. For example, if it took 15 minutes to collect 50, then it was assumed that 200 would be collected in an hour. Dividing this by the number of team members gave us a density of 100 kākahi per person, per hour.

## Recording species type

Kākahi were identified by species, as being the 'common' kākahi (*Echyridella menziesii*) or the 'Auckland' kākahi (*E. aucklandica*). This allows us to monitor the population of each species as well as the relative species abundance. For example, we can detect whether one species is outcompeting the other.

## Measuring shell length

Shell lengths were measured to the nearest millimetre using Vernier callipers. By measuring the shells, we are able to keep track of the size distribution of the population and detect whether sufficient juveniles are present to achieve ongoing population renewal.

## 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 is a simple addition to the other parameters we collect and may provide information in the future regarding environmental changes such as wave action, substrate composition and water chemistry.

## The monitoring programme

The western shore site will continue to be surveyed using the same methods every two years, alternating with the northern lake shore site at Lake Domain Reserve. Our methods can accommodate and benefit from as many participants as possible – the more survey zones we complete each time, the better our data will be.



2. 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).



# 2018 monitoring results

## Kākahi abundance

A total of 500 kākahi were collected during the count (Table 1). Of these, all were ‘common’ kākahi, which is consistent with previous data collected at this site.

The fairly abundant kākahi population at this site made collection relatively rapid, with total collection time ranging from 3 to 13 minutes. Recorded abundances ranged from 58 per person per hour (in zone 5), to 500 per person per hour (in zone 10), with an average of  $215 \pm 39^3$  per person per hour.

**Table 1.** Numbers of kākahi collected from the western shore monitoring site in 2018.

Survey zone	Number of kākahi found	Collection time (minutes)	Kākahi density (number of kākahi collected per person, per hour)
1	50	7	214
2	50	11	87
3	50	7	214
4	50	8	125
5	50	13	58
6	50	8	188
7	50	4	250
8	50	5	300
9	50	7	214
10	50	3	500
Total: 500			Average: $215 \pm 39$

## 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. Further work is needed to quantify the particular relationship between shell length and age at this site. If we assume that similar sized kākahi at the same site are ageing at similar rates, we can track the rate of ageing by tracking size (in the absence of certainty).

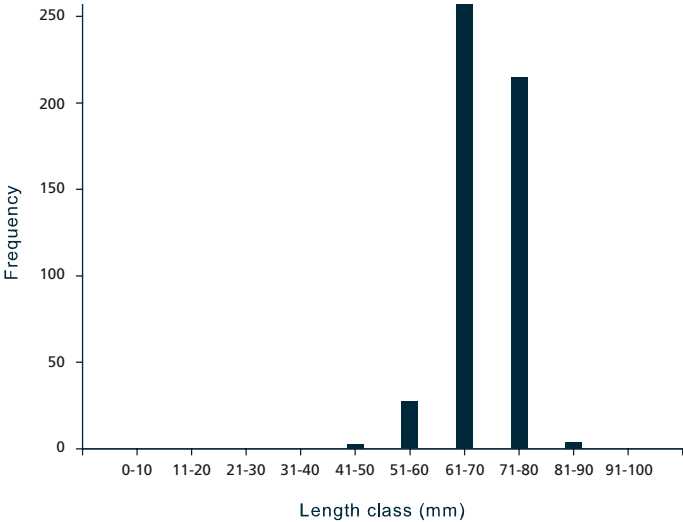
The size distribution of kākahi collected during this survey was strongly unimodal (ie, one maximum peak), with few small animals. Therefore, we can assume that the age distribution is similarly unimodal, with very few juveniles present.

Overall, a very small range of shell lengths was recorded, with most kākahi falling within a narrow range representing older adults (Table 2, Fig. 3). Shell length ranged from 40-72 mm, with an average of  $59.53 \pm 0.2$  mm. Ninety five percent of the kākahi found were between 60 and 70 mm, and no kākahi fitting the description of ‘juvenile’ (ie,  $< 38$  mm<sup>4</sup>) were collected during the standardised count (although a 37 mm individual was found afterwards).

**Table 2.** Shell length of kākahi collected from the western shore monitoring site in 2018.

Size class (mm)	Number of kākahi
0-10	0
11-20	0
21-30	0
31-40	1
41-50	20
51-60	261
61-70	214
71-80	4
81-90	0
91-100	0
Total:	500

**Figure 3.** Length distributions of kākahi collected at the western shore monitoring site in 2018.



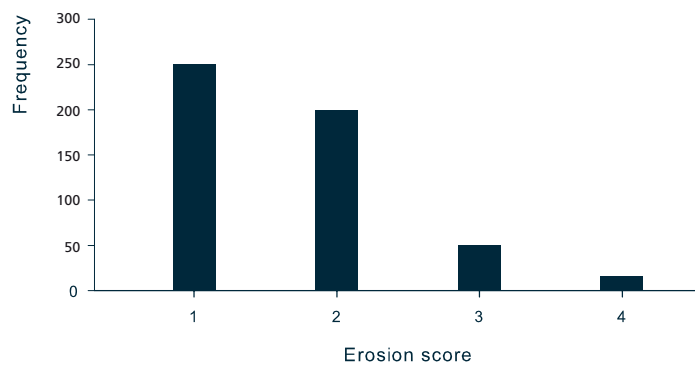
3. Mean  $\pm$  1 SE (standard error).

4. 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

While a range of erosion conditions was recorded from the shells of kākahi collected, most showed only low levels of erosion (Fig. 4). Only five individuals (1%) received the highest erosion score of 4, and 49 (10%) scored 3, with all the rest (89%) scoring either 1 or 2 (lower erosion).

**Figure 4.** Erosion condition of kākahi collected at the western shore monitoring site in 2018.





# Comparison of 2016 and 2018 data

Seven zones were completed during the 2016 survey, however, increased volunteer recruitment in 2018 meant that ten zones were able to be surveyed this year.

## Kākahi abundance

Similar kākahi abundances were recorded during 2016 and 2018 (Table 3).

**Table 3.** Kākahi abundance at the western shore monitoring site for 2016 and 2018 surveys.

Survey zone	Kākahi density (number of kākahi collected per person, per hour)	
	2016	2018
1	88	214
2	167	87
3	240	214
4	300	125
5	100	58
6	214	188
7	250	250
8	-	300
9	-	214
10	-	500
Average: $194 \pm 30$		Average: $215 \pm 39$

\* Only 7 zones were searched in 2016

## Shell erosion and shell length

No statistically significant difference in shell erosion was apparent between 2016 and 2018. The mean shell length was approximately 1 mm greater in 2018 and this difference was statistically significant (Table 4).

**Table 4.** Kākahi length and shell erosion at the western shore monitoring site for 2016 and 2018 surveys.

	2016	2018
Number collected	348	500
Mean length (mm)	$58.64 \pm 0.3$	$59.53 \pm 0.2$
Length range (mm)	39-72	40-72
Mean erosion (score 1-4)	$1.72 \pm 0.04$	$1.62 \pm 0.03$



# Conclusion

The western shore kākahi population is comprised primarily of adults displaying low levels of shell erosion. Despite the apparent abundance of individuals, no juveniles were found. The mean shell length recorded during the 2018 survey indicates that the population average age is increasing, ie, insufficient recruitment<sup>5</sup> is occurring to sustain the population.

However, given the natural variation inherent in population data, it is necessary for multiple years' worth of data to be collected before a clear trend can be definitively identified. The next monitoring event for this site will occur in 2020.

## **Kākahi are an important part of lake ecosystems.**

In shallow lakes such as Lake Wairarapa, kākahi play an important role in regulating the populations of algae in the water by consuming them via filter-feeding. Kākahi are in decline in Lake Wairarapa, as well as in most parts of NZ, and their absence could be contributing to high summer algae levels, including algal blooms in lakes and lagoons. Although we don't have much historical or long-term recent data to make precise comparisons regarding kākahi declines, oral and anecdotal histories describe large, dense beds in Lake Wairarapa, which we simply don't see anymore.

Declines in host fish numbers, which are needed to support the kākahi larval stage, are likely a contributing factor to kākahi declines. Native fish populations in Lake Wairarapa and the wider Ruamāhanga catchment have declined steeply in recent decades due to migratory barriers created by the drainage scheme, exotic fish introductions, and pollution caused primarily by land use intensification.

## 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.

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5. The process by which new individuals are added to the population.



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

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

