

# Kākahī Monitoring Report

Kākahī monitoring for the Wairarapa Moana Wetlands Project

2020



# Introduction

Nau mai haere mai, welcome to the sixth annual report for the Wairarapa Moana community kākahi monitoring programme. We have now completed three surveys at each of the two monitoring sites; Lake Domain Reserve site (on the northern shore of Lake Wairarapa), and Lake Shore Scenic Reserve (on the western shore).

This citizen science programme is the first of its type in New Zealand. Using data gathered by community volunteers, we are gaining important insight into the development of and ecological impacts on kākahi - our threatened native freshwater mussels.



Figure 1

## Summary

28 citizen scientists gathered at Wairarapa Lake Shore Scenic Reserve on the Western shore of Lake Wairarapa to participate in the 2020 kākahi count. In small teams, they worked in 9 survey zones to gather 50 kākahi, or search for half an hour - whichever came first. This year a new method was introduced to target searching for young kākahi. One member from each team used a sieve to search the mud.

All kākahi found were common kākahi, *Echyridella menziesii*, which is consistent with previous surveys at this site.

The vast majority of kākahi found were between 51 and 70cm - indicating that the population is made up predominantly of older adults. This is similar to what has been found in previous surveys and indicates that the population could be ageing. There may not be sufficient young kākahi coming through for the population to survive into the future.



## Methods

The 2020 kākahi monitoring event was carried out at Wairarapa Lake Shore Scenic Reserve on 9 February, by a group of 28 citizen scientists of a range of ages. A 450m stretch of shoreline was sectioned off into 50m intervals to create nine replicate survey zones (Fig. 1). After we recorded our measurements, the kākahi were returned to the zone from which they were collected. Weather conditions were good with clear skies, warm water, and moderate winds.



### Looking for kākahi

If you have yet to meet one of these special native critters, the warm water temperatures of summer are the perfect time for a kākahi hunt. Wander out in the shallows without your shoes on at Lake Domain or Wairarapa Lake Shore Scenic Reserve and feel around on the bottom with your hands and feet - you may just find some kākahi! Be careful when you hold them (they're delicate), and be sure to place them safely back in the water once you've had a look.



## Collecting the kākahi

Each group of collectors waded through the substrate of mud, sand and gravel, feeling for kākahi with their feet and hands. Each of the nine zones were surveyed by a team of three - five people, while other team members worked as time keepers. In order to standardise collection effort, each team estimated their effort in terms of adult equivalents (for example, two young children working as collectors would be counted as one adult collector). To minimise disturbance, a maximum of 50 adult kākahi were collected from each replicate zone. This year, we introduced targeted searching for juveniles, which involved sieving the substrate to see if this helped to detect very small kākahi more easily.

## Measuring the kākahi population abundance

Kākahi were collected for either 30 minutes, or until 50 animals had been collected, whichever occurred first. This allowed us to standardise our results per unit of time. 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 it took 15 minutes to collect 50, then it was assumed that 200 would be collected in an hour. Dividing this by two adult equivalent collectors would give an abundance measure of 100 kākahi per person, per hour.

One person at a time carried out the sieving for juveniles in each replicate. We recorded the total amount of time they searched (some people found it hard to stop!) and produced an additional abundance measure of juveniles per person per hour.

## Recording species type

All kākahi collected were the 'common' kākahi (*Echyridella menziesii*). We kept an eye out for 'Auckland' kākahi (*Echyridella aucklandica*), a species which has not been recorded at this site yet but has been found in other parts of Lake Wairarapa.

## Measuring shell length

Shell lengths were measured to the nearest millimetre using Vernier callipers. 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 relationship between shell length and age at this site. However, we can assume that similar sized kākahi at the same site are ageing at similar rates, so by tracking size, we can track the rate at which the population is ageing.

## Scoring shell erosion

Each kākahi collected was also scored on a scale of one to four, 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'. Recording shell erosion was a simple addition to the other parameters we collected, and has the potential to provide information in the future regarding environmental changes such as wave action, substrate composition and water chemistry, as well as highlight any differences between the species.

## The monitoring programme

The site will be surveyed in a similar fashion every two years, alternating with the northern site at Lake Domain. Our methods can accommodate around 30 people (of all ages!) Each year we have new people joining in, as well as repeat attendance from people who have been with the programme from the beginning and worked on most, if not all, surveys. It's a great mix, as the latter uses their experience to help the former.



From left to right: 'common' kākahi (*Echyridella menziesii*), 'Auckland' kākahi (*E. aucklandica*).

<sup>1</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 require 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).



## The three musketeers

There are three species of kākahi in New Zealand. *Echrydella menziesii* is distributed throughout New Zealand, *E. aucklandica* has been found in Auckland, Northland, the lower North Island and the very bottom of the South Island. *E. onekaka* is known only from sites in the north-west of the South Island. *E. menziesii* and *E. aucklandica* are found in Lake Wairarapa. All three species are only found in New Zealand and all are classified as either "Threatened" or "Declining".

# Results – the 2020 survey

## Kākahi abundance and species composition

A total of 450 adult kākahi were collected during the count (Table 1). As in previous years, 100% were the 'common' kākahi and none of the 'Auckland' species were found. Recorded abundances ranged from 77 per person per hour (in zone 3), to 429 per person per hour (in zone 5), with an overall average of  $219 \pm 40$  per person per hour. A small number of juveniles were found using the sieving method - two in zone 1 and one in each of zones 7 and 8. In addition, two more juveniles were found using the wading method.

**Table 1.** Abundance of kākahi collected from the western shore monitoring site in 2020. W = wading method; S = sieving method..

Replicate zone	No. found		Collection time (minutes)		Number of adult equivalent collectors		Total Kākahi abundance (number of kākahi collected per person, per hour)	
	W	S	W	S	W	S	W	S
1	50	2	4	30	2	1	375	4
2	50	0	13	30	2	1	155	0
3	50	0	13	10	3	1	77	0
4	50	0	10	18	2	1	150	0
5	50	0	7	30	1	1	429	0
6	50	0	8	30	2	1	188	0
7	50	1	14	30	1	1	214	2
8	50	1	5	30	1	1	300	2
9	50	0	12	20	2	1	125	0

## Shell length

As in previous years, the size distribution of kākahi collected during this survey was strongly 'unimodal', with few small animals. We found four juveniles while sieving, as well as two that were less than 38mm long during the adult surveying. The smallest kākahi we found was 10.6mm, and the largest was 72mm. Overall, a very small range of shell lengths was recorded, with most kākahi falling within a narrow range representing older adults (Table 2, Fig. 2). Average shell length for the population this year (including juveniles) was  $59 \pm 0.3$ mm..

**Table 2.** Shell length of kākahi collected from the western shore monitoring site in 2020..

Size class (mm)	Number of kākahi
0-10	0
11-20	3
21-30	2
31-40	4
41-50	24
51-60	219
61-70	199
71-80	3
81-90	0
91-100	0
<b>Total:</b>	<b>450</b>

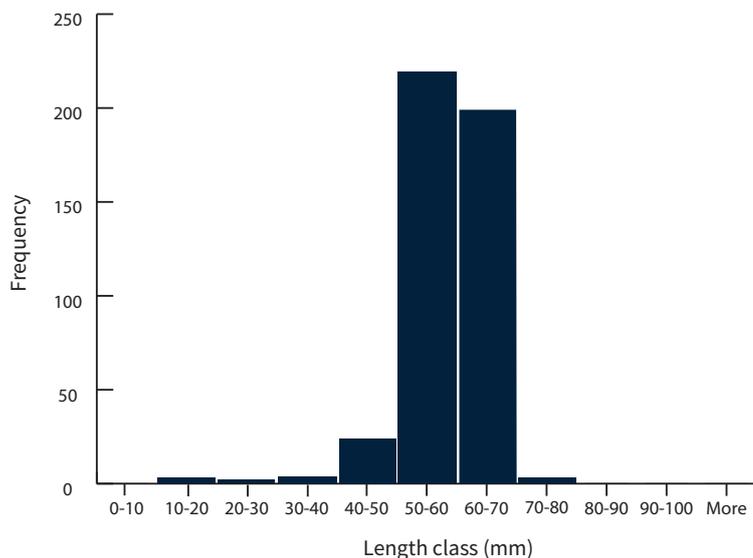
### Older than you?

Kākahi live for quite a long time, some are thought to be over 50 years old.

<sup>2</sup> Mean  $\pm$  1 SE

<sup>3</sup> Shell length less than 38 mm (or less than approximately 5 years old) has been used in the past to represent juvenile kākahi e.g. James MR (1985). Distribution, biomass, and production of the fresh-water mussel, *Hyridella-menziessi* (Gray) in Lake Taupo, New Zealand. *Freshwater Biology* 15: 307–314.

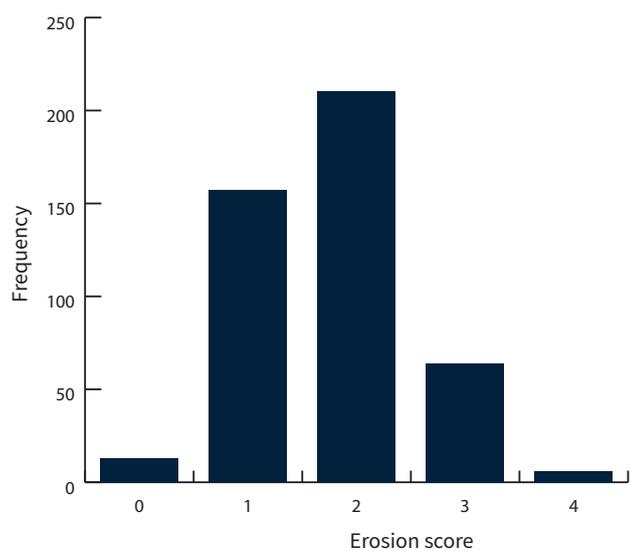
**Figure 2.** Histogram showing length distributions of kākahi surveyed during the Wairarapa Moana 2020 kākahi count.



## Shell erosion

A range of erosion conditions was recorded from the shells of kākahi collected, though most showed relatively low levels of erosion (Fig. 3). Six (1%) scored four (highest erosion), 64 (14%) scored three, and the remaining 85% scored either one or two.

**Figure 3.** Histograms showing erosion condition of kākahi surveyed at the Wairarapa Moana Western Shore site in 2020.



# Comparisons with previous years

## Kākahi abundance and species composition

Seven replicate zones were searched during 2016, ten during 2018, and nine in 2020. Average kākahi abundance figures are higher for each successive survey. However, the variability in the data means that these differences are not statistically significant.<sup>4</sup>

**Table 3.** Kākahi abundance at the Wairarapa Lake Shore Scenic Reserve monitoring site during monitoring in 2016–2020. \*2020 data includes juveniles found during sieving surveys (which were not carried out in previous years).

Replicate zone	Kākahi abundance (number of kākahi collected per person, per hour)		
	2016	2018	2020
1	88	214	379
2	167	87	155
3	240	214	77
4	300	125	150
5	100	58	429
6	214	188	188
7	250	250	216
8	-	300	302
9	-	214	125
10	-	500	-
Average ± 1 SE	194 ± 30	215 ± 39	225 ± 40

– Zone not searched



### Citizen science

Citizen scientists are people who are not trained as scientists, who carry out investigations and collect data to enhance our knowledge of the natural world. The projects may be, like this one, designed and coordinated by scientists, or they may be designed or co-designed by volunteers. Citizen science not only provides valuable information, it also supports people's connection with their environment.

### Searching for juveniles

Across Aotearoa, including at Lake Wairarapa, the kākahi population appears to be ageing. Over the previous five years of kākahi counts, very few young kākahi were found. This year, we decided to specifically include a search for juveniles, which will be included at both sites from now on. The low numbers of juveniles suggests that kākahi in Lake Wairarapa could be on the path to extinction.

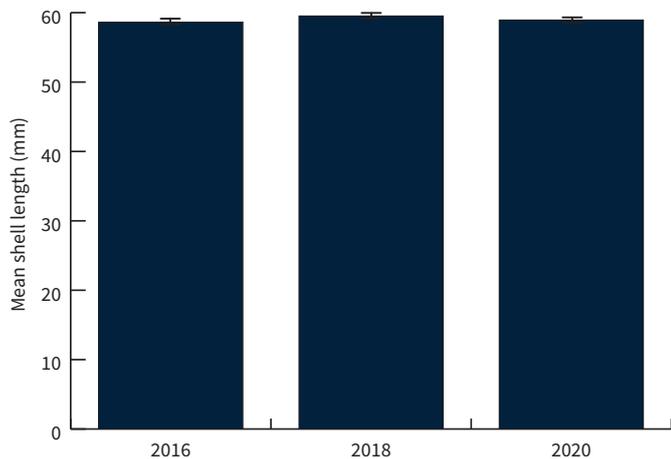
<sup>4</sup>  $F_{2,23} = 0.147, P = 0.864$

# Shell length

Average shell length (both with and without counting the juveniles we found while sieving) was consistent with previous years, and no trend was apparent (Table 4; Fig. 4).

**Table 4.** Kākahi length at the northern shore monitoring site during monitoring in 2015–17. A = including only kākahi found using the wading method; B = including all kākahi. Sieving for juveniles was not carried out in previous years.

	2016	2018	2020	
			A	B
Mean length (mm)	58.64 ± 0.3	59.53 ± 0.2	59.31 ± 0.3	58.94 ± 0.3
Length range (mm)	39–72	40–72	29–72	11–72



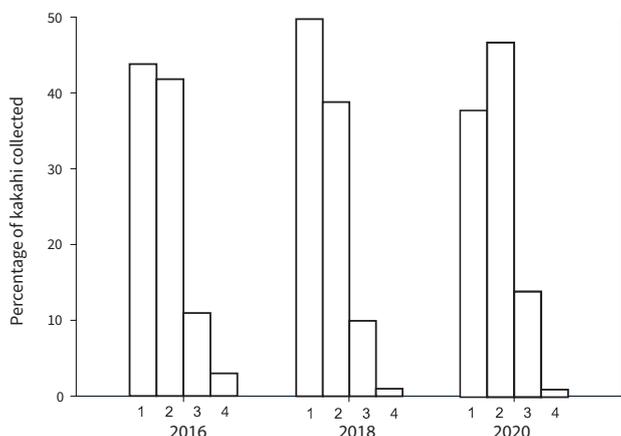
**Figure 4.** Mean shell length of kākahi collected at the western shore monitoring site during 2016–2020. Note 2020 bar includes 4 juvenile kākahi found while sieving..

# Shell erosion

Representation across the shell erosion classes was similar and within expected levels of variation over 2016-2020 (Table 5; Fig. 5). The consistency of the data being returned by this subjective measure potentially indicates the high quality of the observations made by the citizen scientist team.

**Table 5.** Kākahi shell erosion at the western shore monitoring site during monitoring in 2016–2020

Erosion class:	Percentage of kākahi in each erosion class		
	2016	2018	2020
1	44	50	38
2	42	39	47
3	11	10	14
4	3	1	1



**Figure 5.** Representativeness in shell erosion classes for kākahi collected at the western shore monitoring site during 2016–2020.

## Conclusion

Three separate surveys over six years have now been carried out at the western shore site, and so far no average length increase (which would point to an ageing population) has been detected. However, population data is naturally variable, and preliminary data from other work has indicated that kākahi in Lake Wairarapa are potentially only growing around 0.5mm per year, so more years' worth of data will need to be collected before any clear trend can be definitively identified. The next monitoring event for the western shore site will occur in 2022.



## Meet the scientist:

Amber McEwan is an ecologist and the principal scientist at Riverscapes Freshwater Ecology ([www.riverscapes.co.nz](http://www.riverscapes.co.nz)). She has many years of experience working with (and admiring!) kākahi, and is currently researching ways to successfully translocate them as one means of saving populations.

Amber is also an enthusiastic science communicator and freshwater advocate. She has written five children's books, designed a card game, and has written many articles about freshwater issues published in various media. She also manages Riverscapes Kids which offers educational resources that are free to download ([www.riverscapeskids.co.nz](http://www.riverscapeskids.co.nz)).



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

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