

Kākahi Monitoring Report

Kākahi monitoring for the Wairarapa Moana Wetlands Project

March 2015



Figure 1. The two species of kākahi found at Lake Wairarapa: *Echyridella menziesii* (At Risk, Declining) & *E. aucklandica* (Threatened, Nationally vulnerable)

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Why monitor?



Kākahi help us gauge ecosystem health in Lake Wairarapa. They will only survive and flourish within certain environmental conditions. Their method of feeding - known as 'filter-feeding' - means that they are sensitive to changes in water quality and sediment (small rock and soil particles) deposition. Declines in kākahi numbers or health may indicate a decline in the overall health of the lake.

Kākahi are also important from a cultural perspective. Historically, they have been important to Māori as a source of mahinga kai (food) and the shells were used as tools. In a survey commissioned by the Wairarapa Moana Wetlands Project (McEwan, 2012ⁱⁱⁱ), it was found that the kākahi in Wairarapa Moana were mostly older animals (kākahi are slow growing and have been recorded living for up to 50 years). The lower numbers of juvenile mussels indicated that the population might not be sustainable into the future. It is important that we collect further information so that we can not only protect this population, but learn what it may have to tell us about the health of our lake.



Kākahi Monitoring Report

Kia ora/Welcome to the first report from the Wairarapa Moana community-involved kākahi monitoring programme – the first of its kind in New Zealand. This programme has been initiated to contribute to a wider programme of monitoring to inform the Wairarapa Moana Wetlands Projectⁱ about the overall health of Lake Wairarapa

Kākahi play an important role in the health of freshwater and wetland ecosystems and have a fascinating life cycle. You can find out more about them in our Kākahi Monitoring Guide at: www.waiwetlands.org.nz

While there are hundreds of species of freshwater mussels found throughout the world, New Zealand has only three speciesⁱⁱ, all unique to this country. Lake Wairarapa has two species of kākahi (Figure 1). Unfortunately populations of these native mussels are in decline throughout New Zealand, highlighting the need to protect them and their habitat in Lake Wairarapa.

Goals of the Programme

To learn more about Wairarapa Moana kākahi

Information from this monitoring programme will help us to learn about the status and health of the Lake Wairarapa kākahi population.

In particular, we want to better understand the current population size-distribution, that is the range of sizes in the population, as this will tell us how urgent our conservation efforts need to be. For example, if we find that the size-distribution is not changing over several years, this will indicate that the population is ageing. Unless younger mussels establish themselves in good numbers the population will die off. Ageing could be caused by reproductive failure or by low juvenile survival, but either way, urgent intervention will be required to avoid this population becoming extinct.

To learn about the environment

Monitoring kākahi is one way of obtaining long-term information about changes in the local environment. The results may help us understand the progress of current management actions aimed at restoring the environment, or indicate the value of alternative ones.

To contribute to the national knowledge base

NIWA are currently setting up a national database for kākahi information. The data collected from our monitoring at Lake Wairarapa will contribute to this, adding to both local and national knowledge of these endangered animals. People can contribute their own observations to the NatureWatch website (www.naturewatch.org.nz - let us know if you'd like help with this).

To support community involvement at Wairarapa Moana

Kākahi monitoring is technically relatively easy and offers an opportunity to develop greater public awareness of the ecological and cultural values of Wairarapa Moana and the restoration efforts being made to protect and restore these values.

Monitoring Methods



Figure 2. Measuring kākahi shell length using Vernier callipers

This first monitoring event was carried out along the lake shore at Lake Domain, on the northern shore of Lake Wairarapa in March of 2015 (Figure 3). A 250 metre stretch of the shore was sectioned off into five 50 metre intervals to create five survey zones. After we recorded our measurements, we returned the kākahi to the zone in which they were collected.

Collecting the kākahi

Each of the five zones was surveyed by a team of three people. Two people collected kākahi and the third acted as a timekeeper and communicator with other teams as needed. In order to minimise disturbance, a maximum of 50 kākahi were collected from each zone. Each pair of collectors waded through their zone, feeling for kākahi with their feet and hands.

Measuring the kākahi population density

Kākahi were collected either for 30 minutes or until 50 kākahi were collected, whichever occurred first. This allowed us to standardise our results per unit time¹. 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 the two team members gave us a density of 100 kākahi per hour. By monitoring kākahi density, we will be able to detect any changes that may occur.

Recording the species type

Kākahi were identified by species - either the 'common' kākahi (*Echyridella menziesii*) or the 'Auckland' kākahi (*E. aucklandica*). As well as allowing us to keep track of both species separately, this will allow us to monitor species ratios, 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 (Figure 2). By measuring the shells, we will be able to keep an eye on the size distribution of the population, and detect whether enough juveniles are present to achieve ongoing population renewal.

Classifying shell erosion

Each kākahi collected was also classified according to the amount of erosion present on the shell. Erosion was graded 1-4, with '1'

being very little erosion present and '4' being most of the top layer of the shell eroded (Figure 4).

Recording shell erosion was a simple addition to the other information we collected and has the potential to provide information in the future regarding environmental changes.

Factors that can contribute to shell erosion can include:

- wave action; where kākahi can be scraped back and forth against stones on the lake bed
- substrate composition; where a muddy lake bed will cause less friction than a stony one
- water chemistry; where more acidic water may react with and weaken the shell.

The monitoring programme

The site will be surveyed in a similar fashion every two years, alternating with another site on the western lake shore. Fifteen people were involved in the March 2015 survey but our methods can accommodate (and would benefit from) many more participants in future years, the more survey zones (replicates) we complete, the better our data will be.

¹ 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).

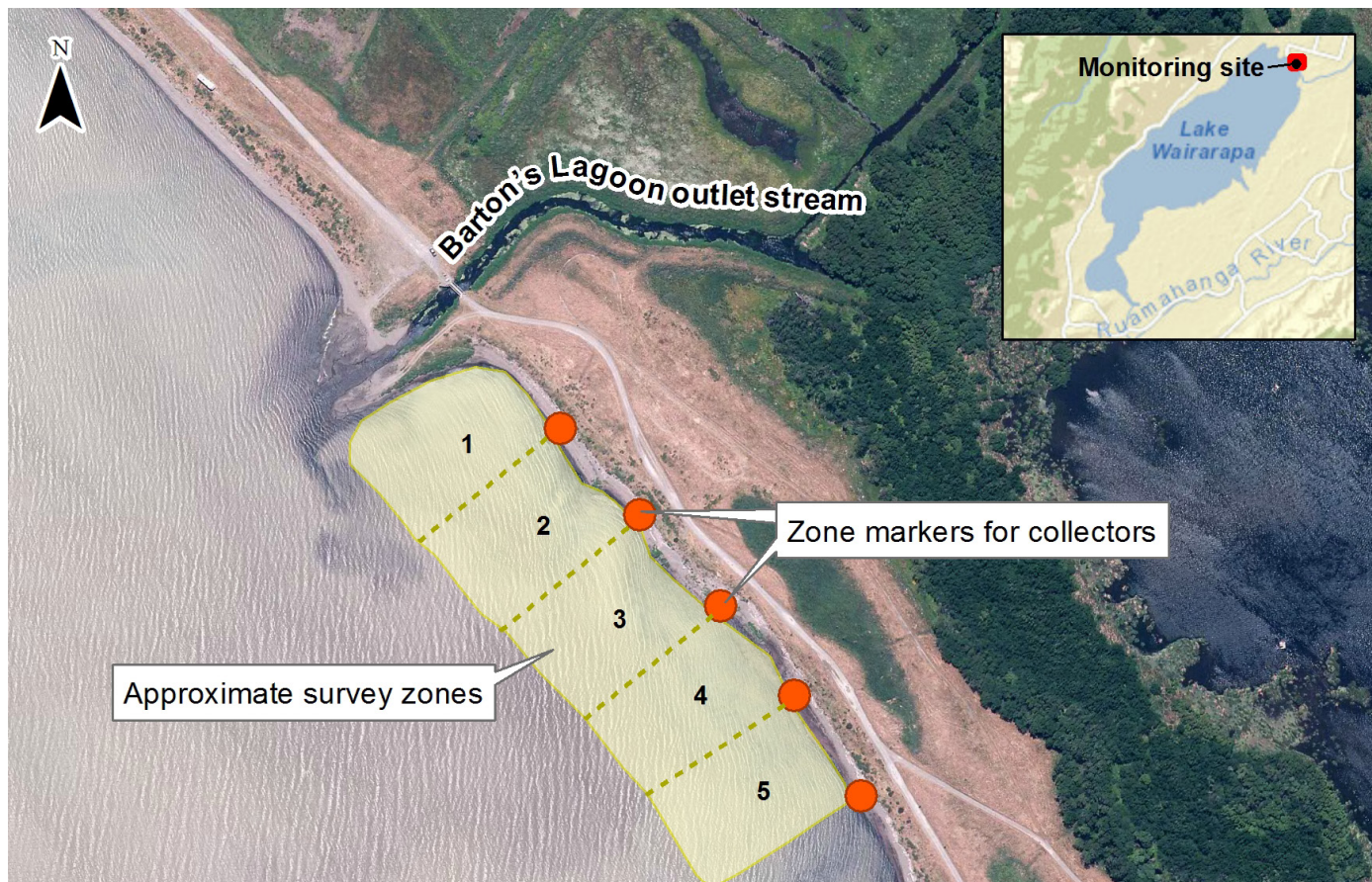


Figure 3. Map of the northern shore monitoring area, Lake Wairarapa

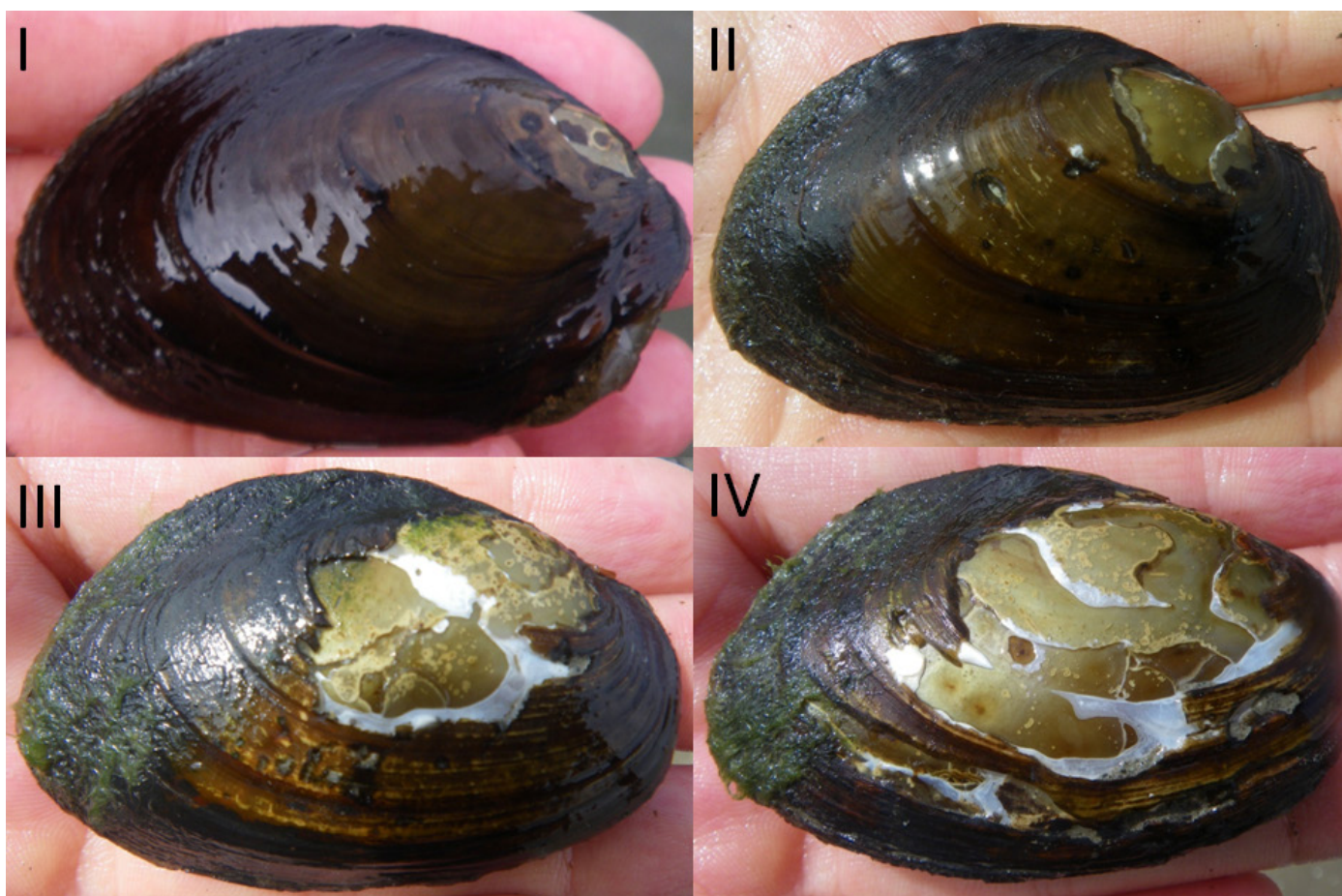


Figure 4. Erosion grades of kākahi shells

Results & Discussion



As this is the first event in a long term monitoring programme, discussion is largely limited to findings. Comparisons will be made in future monitoring reports.

A total of 192 kākahi were collected during the survey (Table 1). Of these 177 (92%) were the 'common' kākahi and 15 (8%) were the (nationally more rare) 'Auckland' kākahi (a 1:0.16 ratio).

The average number of kākahi collected from each replicate zone was 62 per hour. The lowest number (21 per hour) of kākahi were found in replicate 3, whereas team members in zones 4 and 5 found around 50 kākahi in around 15 minutes (about 100 per hour). The numbers of kākahi are thought to possibly vary in an area because of the availability of a suitable food source, for example algae.

Replicate zone	Number of kākahi found*	Collection time (minutes)	Kākahi density (number of kākahi collected per person, per hour)
1	36	30	36
2	35	30	35
3	21	30	21
4	50	15	100
5	50	13	115
Total	192	118	Average: 62 ± 19

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

Table 1. Numbers of kākahi collected during Year 1 of the Wairarapa Moana community-led kākahi monitoring programme

Population size distribution

The size of kākahi is related to their age, although the relationship between shell length and age varies with location, and further work is needed to quantify the particular relationship between the species and the conditions present at the northern shore site. We can, however, assume that similar sized kākahi at the same site are ageing at similar rates, so by tracking size we can track rate of ageing, in the absence of certainty regarding age per se.

The size distribution of kākahi collected during this survey was strongly unimodal, 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). The shells of the 'common' kākahi ranged from 37 to 70mm in length, with 99% of these measuring between 50 – 70mm; average length 60.2mm. The size range of the Auckland kākahi was 57 to 80mm in length and the average length was 68mm. There was only one juvenile (< 38 mm)^{iv} kākahi in the whole sample.

Size class (mm)	Common kākahi	Auckland kākahi
0-10	0	0
11-20	0	0
21-30	0	0
31-40	1	0
41-50	1	0
51-60	89	2
61-70	86	7
71-80	0	6
81-90	0	0
91-100	0	0
Total	177	15



Table 2. Shell length of kākahi collected from the northern shore site during Year 1 of the Community Monitoring Programme

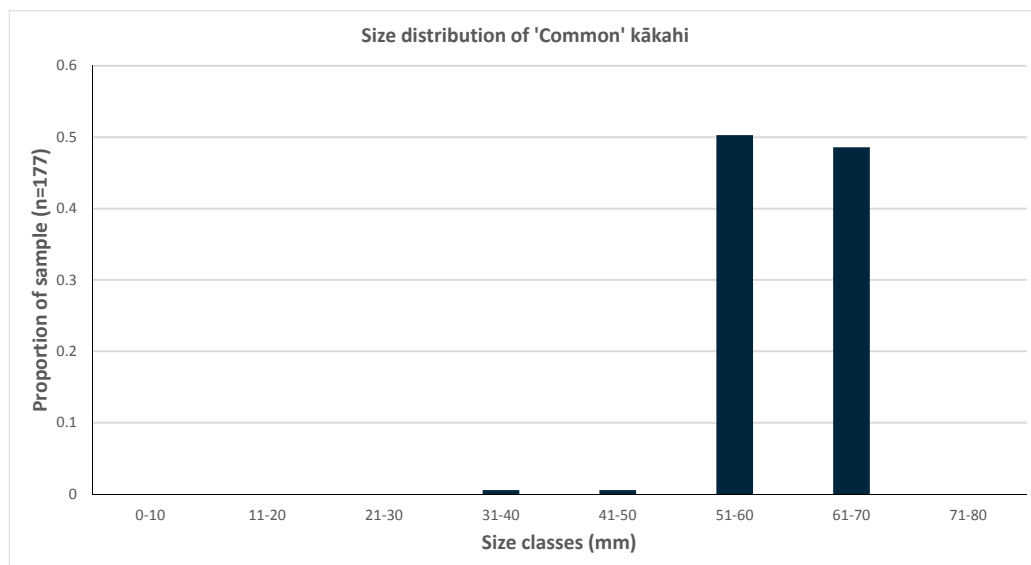


Figure 5. Size distribution of 'common' kākahi collected from the northern nhore site during Year 1 of the community monitoring programme

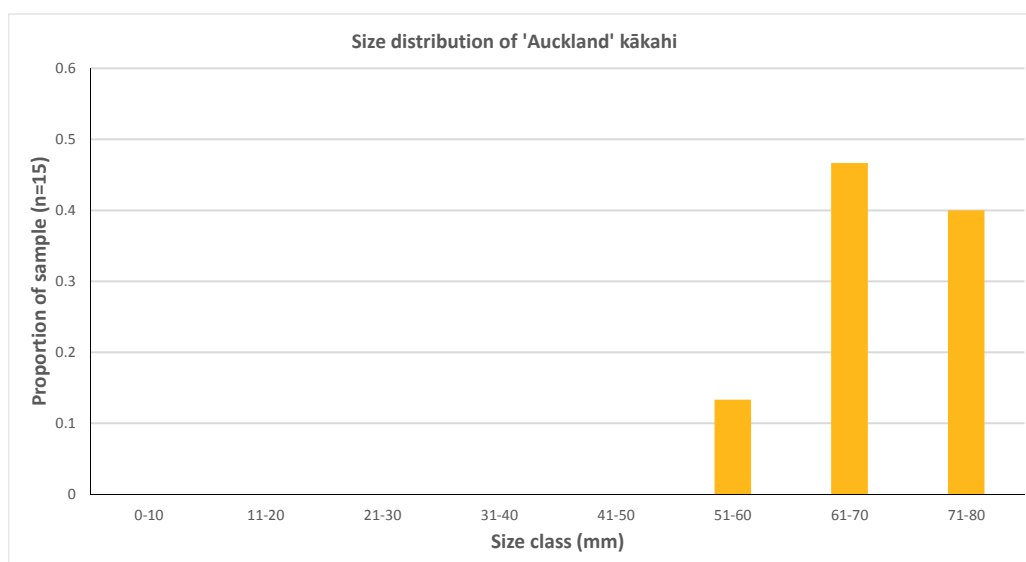


Figure 6. Size distribution of 'Auckland' kākahi collected from the northern shore site during Year 1 of the community monitoring programme

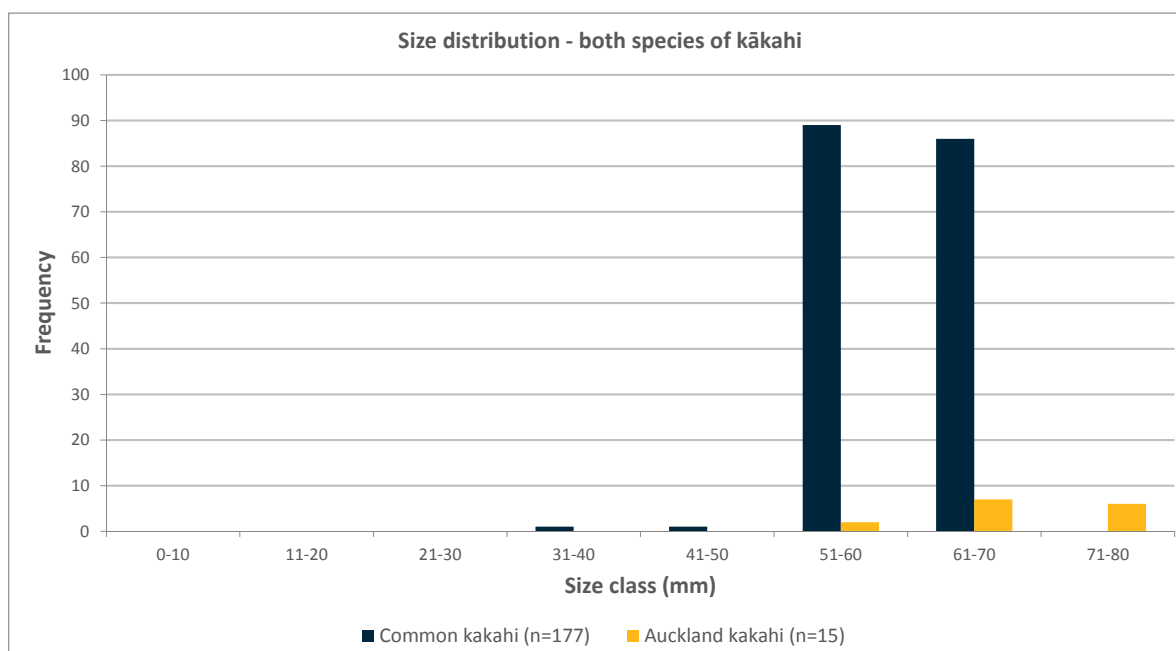


Figure 7. Size distribution of both species of kākahi collected from the northern shore site during year 1 of the community monitoring programme

Shell Erosion

Overall, most kākahi displayed low-moderate amounts of shell erosion, with 72% of ‘common’ and 93% of ‘Auckland’ kākahi being assigned to erosion class 1 or 2 (Table 3, Fig. 8). The ‘Auckland’ kākahi shells were generally less eroded than the ‘common’ shells.

Erosion class (1-4)	Common kākahi	Auckland kākahi
1	64	12
2	63	2
3	39	1
4	11	0
Total	177	15



Table 3. Degree of erosion recorded on kākahi shells collected from the Northern Shore site during Year 1 of the Community Monitoring Program (see the Monitoring Methods section for explanation of erosion classes)

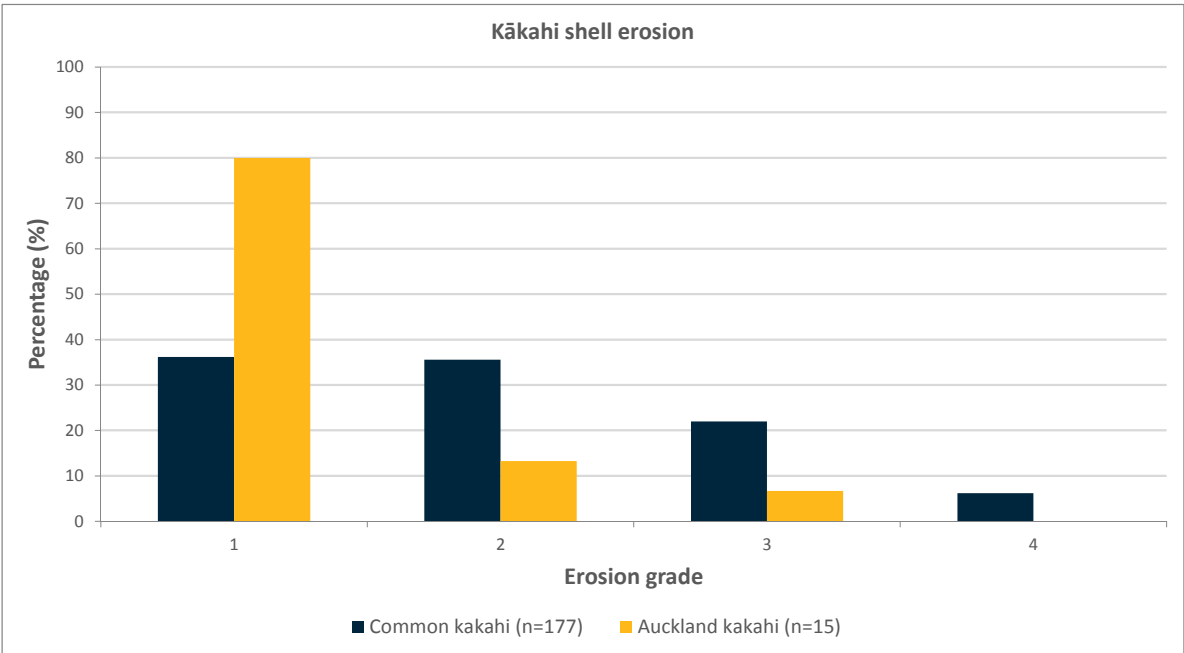


Figure 8. Degree of erosion recorded on kākahi collected from the northern shore site during year 1 of the community monitoring programme

In summary

In summary, the results of this survey show that the kākahi population at the northern Lake Wairarapa shore is represented mostly by adults. There appears to be very few juvenile kākahi. We are relying on future years of monitoring to inform us about whether this population is being sustained.

If you’d like to get involved in future surveys please contact:

biodiversity@gw.govt.nz or Toni de Lautour 027 240 4732

ⁱA restoration project of Lake Wairarapa and Lake Onoke and their surrounding wetlands involving Greater Wellington Regional Council, Department of Conservation, South Wairarapa District Council, Kahungunu Ki Wairarapa, Rangitane o Wairarapa, Kohunui Marae and Papawai Marae.

ⁱⁱFenwick, M and Marshall, B. (2006). A new species of Echyridella from New Zealand, and recognition of Echyridella lucasi. Molluscan Research 26(2): 69–76

ⁱⁱⁱMcEwan, A. (2012). Wairarapa Moana kākahi survey. Report prepared for Wairarapa Moana Wetlands Project, <http://waiwetlands.org.nz/assets/WairarapaMoana/Environment/Wairarapa-Moana-kakahi-survey-report-2012.pdf>

^{iv}Shell length less than 38 mm has been used a number of times to represent ‘juvenile’ kākahi (e.g. 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

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