

FAUNA MONITORING GUIDE

Kahikatea Green Wheel

Guide to pest, wētā
and bat monitoring



Photography: Andrew Blayney

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Kahikatea Green Wheel

The Kahikatea Green Wheel (KGW) has a set of indicators to tell you about the health of your kahikatea forest stand. This guide to fauna monitoring will show you how to collect data for the KGW indicators #4 and #18, and the bonus bat indicator #32.

Pest animals, such as rodents and stoats, threaten native plants and animals in kahikatea bush stands. A low number of pests is a good sign, while a high or growing number of native indicator species such as ground wētā or native long-tailed bats (pekapeka-tou-roa) is a sign that pest control is working.

These small animals are seldom seen, so we use devices that record their presence. There are several ways to detect animals in native bush, including tracking tunnels, chew cards, wax tags, traps and bat detectors. We recommend tracking tunnels for wētā and small pests.



The Kahikatea Green Wheel (KGW) has been developed to help you check on the health of your kahikatea forest patch, or track how your restoration project is going.

For a landowner guide and many other tools to help apply the Kahikatea Green Wheel, see waikatoregion.govt.nz/kahikatea-green-wheel

Tracking tunnel monitoring for small pests and wētā

Tracking tunnels with ink cards are one of the easiest ways to get an idea of how many pest animals (indicator #4) or native ground wētā (indicator #18) are in your site. Small animals love to run through tunnels, they will get harmless ink on their feet and leave their footprints on the card. It's a great task for kids to get involved in.

Reporting how many tunnels were tracked, or cards chewed each year indicates if pest or ground wētā numbers are increasing, decreasing or staying about the same. These methods won't measure the actual number of pests, just differences in their abundance or activity level over time.

In a nutshell

- Put out 10 tracking tunnels at 20m spacing through your kahikatea stand¹.
- Load them in winter with inked cards baited with peanut butter for 7 days.
- Check for animal footprints on the white cards at the end of the week.
- Enter the data into the KGW spreadsheet to calculate values for pests and wētā (KGW indicators #4 and 18).
- Do this every year, then average up 5 year's worth of data for your KGW update.

¹ You could also deploy 10 chew cards to detect possums as well as smaller animals, although possums will often pull the card out of tracking tunnels and leave their prints.

Before you start

Gather the tools you will need to do the job.
Put a rough plan together – when, what, who, how.



Visit the webpage

Go to waikatoregion.govt.nz/kahikatea-green-wheel and look through the documents and tools that will help you.



Download the KGW spreadsheet

You will fill this out later to make your KGW chart. Lots of fields are automated to do the maths for you, including the tracking tunnels worksheet.



Print out datasheets

Print out the **Tracking Datasheet** (page 9) to write what species ran across your ink card or bit your chew card. OR download the Kahikatea Green Wheel Spreadsheet to your device and complete it directly.



Collect your field gear

Make a list of the gear you will need (safety gear, tracking tunnels, tunnel pins, inked cards, chew cards, lure) and gather it together. Think about how you will mark tunnel / chew card locations to easily find them again. See the handy gear list on this page.



Plan your site visits

Use the safety and timing notes in this guide to plan your site visits. Plan where you will place your tunnels/cards – keep them at least 20m apart in all directions.

If you wish to monitor POSSUMS you can use chew cards in addition to tracking tunnels. See landcare.org.nz/file/module-7-animal-pest-monitoring/open



Learn how to identify footprints

See pestdetective.org.nz/ to help you identify animal footprints. Consider joining a tracking tunnel monitoring team in one of the many community pest control projects to learn more about how to identify tracks.

Handy field gear checklist

- This guide.
- Safety gear.
- 10 tracking tunnels with metal pins.
- 10 inked tracking cards.
- Tracking Datasheet.
- Pencil (and spare) and 20 paper clips.
- Magnifying glass.
- Peanut butter and plastic or butter knife to dab on the ink card.
- Slug bait.
- Flagging tape, stakes with a ring of bright insulation tape, or cattle tags, markers and nails to mark tunnel locations.
- If you want to use chew cards as well as tracking tunnels you will need 10 chew cards, 10 flat head nails and a hammer.

You can buy tunnels and cards from suppliers online.

Safety gear to take

- Fully charged up phone or other communication device.
- Company – even a reliable dog is better than being on your own.
- Suitable clothing – sturdy footwear, weather protection, high vis clothing so you can be found if you get hurt.
- Plenty of water and energy food.
- Map and compass or GPS if your site is large.

Plan your visits

Stay safe

Staying safe is your number one priority. If you are the landowner or site manager, you probably already know how to visit your site safely.

Things to consider are:

- Working alone – make sure someone responsible knows where you are and when you plan to return.
- Terrain – watch out for swampy ground, walk if it's not safe to take a vehicle to your site.
- Sharp or poisonous plants – including blackberry, native cutty grasses, and Jerusalem cherry.
- Dangerous animals – e.g. wasps in summer, overly protective or aggressive livestock, wandering dog packs, trespassers.

When to go

How often

Once per year. Animals should be monitored regularly, particularly pests so you can keep on top of them. If you have the time, do your tracking monitoring every year, and use the averaged results for your five-yearly KWG assessment.

You will need to visit the forest twice.

1. To set out tunnels and ink cards for 7 days.
2. To collect tracked cards.

Time of year

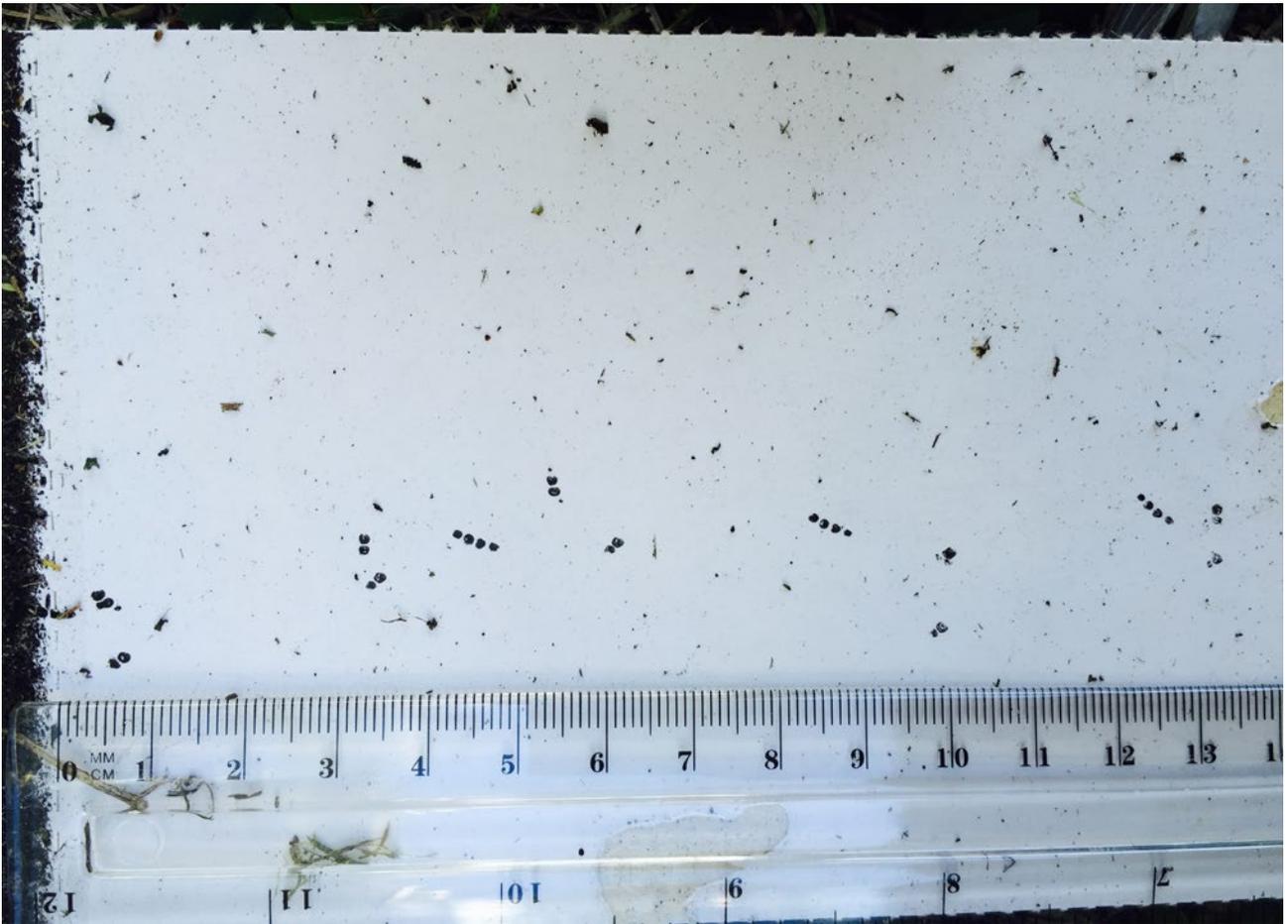
Late winter/early spring. If your site is in a natural, swampy state you may need to choose a drier time of year, or put tunnels on logs or floating pads – tracking tunnels are useless when they get wet!

The time and effort required will depend on your wetland size and ease of access. With two people working together it will probably take on average 10 minutes to set up a tunnel or chew card and move to the next one if your site is easy to move through. Extra time will be required to analyse the cards.

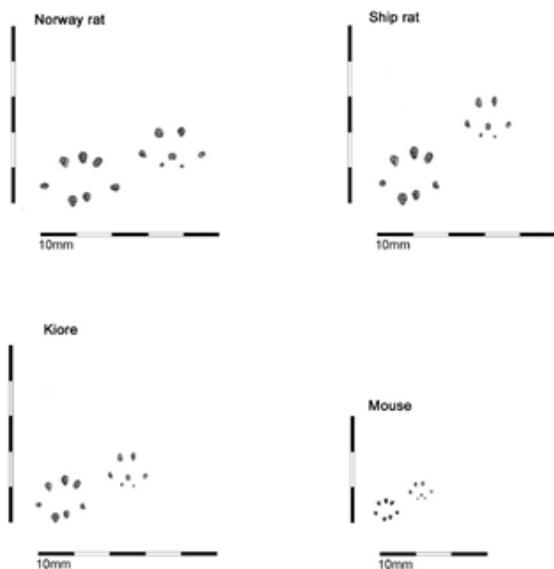


Learn your footprints

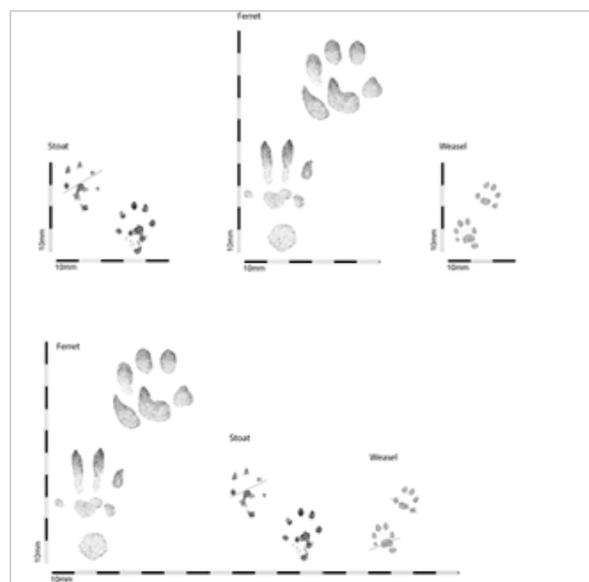
Wētā footprints - rows of 4 dots lined up like a traffic light pole



Rodent footprints



Mustelid (stoat/weasel/ferret) footprints



See more animal prints on Pest Detective: pestdetective.org.nz/

Inside the bush

Set out 10 tracking cards

Plan out a line where you will place your tunnels, minimum 20m apart. You may need 2 parallel lines in a small site – keep the lines at least 20m apart too. Give each tunnel a number – use a white or silver marker to write on the tunnel. Peg the tunnel down on flat, dry ground.

Mark the spot

Mark the location, ideally at eye level. Use bright coloured flagging tape, a wooden stake with bright insulation tape around the top, or a cattle ear tag on a tree. Label it with the tunnel number. If you can, take a GPS and mark the location of each tunnel.

Load up ink cards

Write the tunnel number and date deployed on the back of an ink card. Unfold it and carefully slide it into the tunnel, white card/ink facing up. Pin each end of the card with a paperclip to keep it flat. Take care not to touch the ink or smudge the card.

Put a small dab of peanut butter lure in the crease of the card, and a few slug pellets at the ends of the tunnel – slugs and snails love to eat the cards.

Collect the cards after 7 nights

Collect all the cards. Double check the date deployed and card numbers are written on the cards as you collect them in and add the date collected on the card.

Complete the tracking tunnels datasheet

Write all of the species you can identify on each card on the datasheet (you may need to double check with someone else or against reference images back in the office).

Don't leave any blank lines on your datasheet – if there are no prints on the card write “Nil” or “None”.

It is important to know how many readable cards you have to accurately count the tracking rate – the proportion of readable cards tracked by a wētā or a pest animal. If you can't find a card, write “Unreadable – card missing” on the datasheet. If the card has been smeared by water damage, or chewed up by slugs or snails to the extent that you can't see any prints, write “Unreadable – damaged” on the datasheet (you can toss unreadable cards out).

Do not toss out any marked cards (take them back to the office, dry and store them). Write the species identified on tracked cards and keep them as a reference set to check future prints against.

Collect the tunnels and store them for next year

If you leave the tunnels out they may get overgrown and hard to find. You may wish to collect them and store them in a shed for next year. Keep the location well marked though, so you can put the tunnel back in the same location next year.



Back in the office

Double-check, dry, and store the cards

Double check the cards for wētā or pest sign as soon as possible (confirm with a specialist if needed).

Don't throw out cards with prints/ bite marks on them. Hang ink cards up to fully dry so they don't go mouldy. Don't leave ink cards open on a table to dry before you check them - indoor mice may add their own prints and change your results!

Store dry cards in an airtight container, so you can refer back or check them with experts. You may also want to take photos of marked prints, as a backup – put a clear ruler next to the prints/bite marks for scale and write the card number and dates on the tracked side of the card so they will be seen in the photo.



Mouse and copper skink prints on a tracking card.

Enter these into your green wheel

The Kahikatea Green Wheel spreadsheet has a worksheet where you can enter your tracking data – see the 'Tracking tunnels' tab.

If you complete the worksheet, the KGW scores will be automatically calculated for indicators #4 and #18. This will give you an annual KGW star value that you will need to copy into the My Green Wheel tab of the spreadsheet. If you are updating the entire green wheel once every 5 years, just average the scores from the annual tracking data for the past 5 years each time you re-do your Green Wheel. The spreadsheet is set to do that automatically – look for the '5-year Average' value in the last column.

Once all the data values are entered, click the Update my Wheel button in the tab 'My Green Wheel' to create a picture of how your forest is doing.

Beyond KGW

You might also want to show your tunnel/chew card locations and what animals were recorded on them on Google Maps, or create a graph to show change over time. The WETMAK Pest monitoring module 7, has some good tips on that, see landcare.org.nz/file/module-7-animal-pest-monitoring/open

	Year 1	Year 2	Year 3	Year 4	Year 5	5-YEAR AVERAGE
EXAMPLE 17 July 2018 to 31 July 2018						
Date						
Card 1						
Card 2	mouse					
Card 3	rat					
Card 4	unreadable					
Card 5	unreadable					
Card 6	unreadable					
Card 7	stoat					
Card 8						
Card 9	rat					
Card 10						
Number of cards with pest prints	4	0	0	0	0	0
Number of readable cards	8	10	10	10	10	10
% of cards tracked by pests	50	0.0	0	0	0	0
My star rating for #4	3	5	5	5	5	5

Wētā and other species WRITE IN UNSHADED BOXES ONLY
 In the table below, write whatever species you can identify on each card. If the card is impossible to read, for instance lost, all chewed up by snails or smeared with mud write "Unreadable"
 This indicator is based on wētā, but it can be useful information to keep a record other species such as skinks, frogs, birds, caterpillars
 You need to know the number of cards that are unreadable to calculate the wētā tracking rate - check you spelt each entry correctly, it doesn't matter if you use capital letters or not

Wētā and Pest Tracking Datasheet¹

Site name _____ Site UKID²: _____

Address: _____ Start Point (NZTM): _____

Date Cards set out: _____ Date Cards collected: _____

Recorder: _____ Start time: _____

Analyst: _____ Finish time: _____

Card number	Species Detected	Notes
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Write all species you can identify in the “species detected” column for each card. If the card is missing, unable to be found or so damaged that you can’t see the white card write “Unreadable” in the “species detected” column, and add an explanatory note in the “notes” column.

¹ Adapted from WETMAK, Landcare Trust: landcare.org.nz/file/module-7-animal-pest-monitoring/open

² Find your site on waikatoregion.govt.nz/vegetation-biodiversity-map to get its UKID

Long-tailed bat monitoring⁵

This indicator is an optional extra for those who want to know more about the native species in their kahikatea stands.

Long-tailed bats (pekapeka-tou-roa) are known to use kahikatea forest patches in the Waikato, and in the lowlands, kahikatea forests may be among the few natural areas left for long-tailed bats to roost in.

While landowners can't control where bats choose to roost, you can increase the survival of any bats that are present or that move to your site by leaving suitable roosting habitat (this can also include exotic trees outside your kahikatea stand) and managing predators (rats, mustelids, and cats) to low numbers. Regularly-used bat roosts can be further protected by placing metal bands around the trunks above and below the roost, however, ensure you involve experts to reduce risk to the bats (which may be present during the day).

If long-tailed bats are roosting in your kahikatea forest patch, you might be able to see them at dusk, especially during the warmer months (October-April). They usually emerge just before dark, and can be mistaken for small birds like swallows. Bats fly in an erratic, zig zag pattern, so check their flight pattern.

If you want to be confident that long-tailed bats are present in your kahikatea stand, there are two main options:

1. Handheld bat detectors
2. Automatic acoustic recorders

Handheld detectors transform the high-pitched echolocation calls of bats to a frequency we can hear. They are easy to carry and use. See directions for use below.

Automated bat monitoring (ABM) devices are hung up in trees and left out for two to three weeks to detect and record bat echolocation calls. If bats only occasionally visit your site, you will have a better chance of detecting them using an ABM than a handheld detector. You will need to analyse the sound files and learn to pick up the call patterns, but there are instructions and free software to help the more technically savvy (see directions below).

Waikato Regional Council has a number of handheld and automatic bat monitoring devices that may be available for loan – please contact us via the **Project Echo** site or the Project Echo **Facebook page**.



In a nutshell

- Check for bats during warmer seasons
- Do a dusk bat walk with a handheld detector – walk slowly with a device that will allow you to hear bat calls
- OR deploy automatic bat detectors for two weeks to record bat calls and use software to analyse the recordings
- Do this every year for five years to generate your KGW score.

⁵ Some of this material has been sourced from: www.waikatoregion.govt.nz/assets/WRC/WRC-2019/Projec_Echo_bat_Tips_OCT2012_web.pdf

Handheld bat detecting

Stay safe

Using handheld detectors involves walking around forest areas at dusk. Follow these tips to stay safe:

- If you are unfamiliar with the site you are planning to visit, take a look during the day to orientate yourself.
- Ensure you are well equipped with a first aid kit, warm and waterproof clothing, appropriate footwear and a torch.
- Where there are bats there are often mosquitoes, so arm yourself with suitable clothing and insect repellent.
- Take a responsible companion and mobile phone with you, and ensure someone at home knows where you are and when you plan to return.

Plan your outing

Plan a “bat walk” route that you will follow to detect bats. Follow the same route each year. Aim to repeat your survey at the same time of year for five years in a row to collect data for your Green Wheel star rank.

Bats roost in old or large trees. At night they look for food along bush edges and roads, and in gaps through the bush, so plan your “bat walk” in these places – for a small kahikatea stand your walk may be around the entire perimeter of the forest.

For the best chance of seeing a bat, stand with your back to the forest, turn off torches to let your eyes adjust to the dark, and look up at patch of clear sky. This makes it easier to see the bat’s silhouettes against the sky.

When to go:

- Bats are most active in spring and summer (October to February).
- Pick a fine, warm and calm evening.
- Bats emerge from their roosts after sunset. Some come out as soon as the sun goes down, others may take up to 30 minutes to emerge.

Minimise bat disturbance

Bats are generally sensitive to high levels of light and noise. While looking for bats it is a good idea to:

- keep noise levels to a minimum
- avoid shining your torch as much as possible, particularly in roost sites
- use a red lens torch or place red cellophane over your torch
- leave your dog at home.

Using a bat detector

Bat detectors are battery operated - take spare batteries with you (check the device to see what type of batteries it uses).

To use a bat detector:

- switch it on
- check the frequency dial is set to 40kHz
- turn up the volume to ensure you don’t miss any bat passes – you can turn it down once you know what you are listening for
- point the microphone forwards and upwards at a slight angle
- listen for clicking sounds - there are examples of what these sound like on the WRC Project Echo website ([LINK](#)).

Record your results

Keep a diary of the nights you went out, how long you stayed, where you walked and if you detected any bat calls or saw any bats (either counts as a positive “sighting” for your Green Wheel star value)

Also record any detections on Waikato Regional Council’s online bat **sighting form**.



Automatic bat monitors

Stay safe

Automatic detectors are installed during the day. Take standard field precautions to keep yourself safe in the forest.

Plan your visit

Decide how many recorders you will deploy and where you will put them. For a small stand, two ABMs is adequate.

When to deploy the recorders:

- Bats are most active in spring and summer (October to February).
- Pick a fortnight with some forecast fine, warm and calm evenings.

Where to deploy the recorders:

- ABMs can pick up a bat call from 20 to 30 metres away.
- Find a secure site (where no people or livestock can tamper with the device).
- Bats forage along forest edges, so this is a good location for an ABM.
- Find a branch that you can easily reach near the forest edge.
- Put a tag (e.g. yellow cattle tag) on the tree so you can use the same location each time.

Sort your gear

You can borrow ABMs from Waikato Regional Council. Talk to staff first to make sure you have a good plan in place for using them and analysing the data afterwards.

You will also need:

- batteries and memory cards – check with council staff
- large re-usable cable ties or similar to hang the detectors up on a tree

Deploy your ABM

To use an ABM

- Ensure it has a set of fully charged batteries and a memory card with plenty of space (16 or more gigabytes).
- Check that the date and time are correctly set.
- Follow the instructions to programme the ABM for evening recording and to detect calls of the correct frequency
- Leave the device in the same location for two weeks and then collect it
- Repeat this every year, at the same time of year and in the exact same location.

Analyse the results

Download the bat analysis software **BatSearch3** and **instructions** on how to read the sound files. You may need to work with council or Project Echo staff to learn how to do this.

Record your results

Ensure your results are provided to Waikato Regional Council so they can be included in the national DOC database - this helps to build a better picture of where bats occur in the Waikato landscape.

He taiao mauriora

Healthy environment

He ōhanga pakari

Strong economy

He hapori hihiri

Vibrant communities

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