ASSESSING FOOD AVAILABILITY FOR KIWI AT RELEASE SITES

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Save the kiwi

Department of Conservation
Te Papa Atawhai

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Introduction

There are several factors to consider when planning to establish kiwi in an area. One of these is whether there will be sufficient food available for kiwi throughout the year at the new site.

This guide will firstly help you to decide whether an invertebrate assessment is advisable and/ or necessary before translocating kiwi and secondly, describes how to carry out basic soil invertebrate sampling to provide an indication of food availability for kiwi.

The technique does not require advanced invertebrate knowledge beyond identifying invertebrates into basic groups such as earthworms, cicada nymphs and grass grub larvae. The method can therefore be carried out by individuals or community groups planning to translocate kiwi to an area and who want to ensure there will be sufficient food for kiwi to establish and thrive.

Photo credits: Oscar Thomas

Background

Prior to human colonisation, kiwi were abundant throughout most of Aotearoa. However, the places that could once sustain kiwi have decreased and this is partly due to the introduction of animals such as rats, mice, possums, mustelids, and hedgehogs that not only prey on kiwi, but also compete with them for some food items like invertebrates.

The number of kiwi that an area can sustain can be difficult to determine as it may change from season to season, be higher in some years compared to others (e.g., drought years), can differ with soil type (e.g., soil dryness/moistness/drainage) and several other factors. By considering the quantity and type of invertebrates available to kiwi during spring, summer, autumn and winter, a rough indication of the suitability of the area for kiwi and carrying capacity can be obtained.

An invertebrate survey can provide an indication of the availability of kiwi food in a new area and the findings can then be compared to areas where there are known densities of kiwi and there has been similar invertebrate sampling. If the new site has similar numbers and variety of invertebrates as an existing site where kiwi are thriving, then this would provide confidence to proceed with a kiwi translocation. If the new site has low diversity (particularly if lacking earthworms, cicada nymph or grass grub larvae) and low numbers of total invertebrates, then a translocation may not be advisable or would need to proceed with caution, possibly by releasing only a few individuals initially and monitoring these closely.

There are several techniques used to sample for the presence of invertebrates. These include pitfall trapping, foliage beating, sweep netting, light trapping and soil core sampling. The various techniques can be used to sample invertebrates that occupy different substrates, or which may spend part of their lifecycle in the soil or underground and the remainder above ground (e.g. cicada nymphs). However, soil core sampling is one of the most common methods used to sample for invertebrates, and the soil is also where most of the diet of kiwi is found. A limitation of only surveying for soil invertebrates is that it there is no account for surface invertebrates which kiwi are known to feed on at some times of the year when those in the soil move deeper into the ground and beyond the probing length of a kiwi bill. However, it does give some reassurance that a translocated population of kiwi should do well if the invertebrate life is comparative to other areas where kiwi are already established and doing well.


Photo credits: Alex McVinnie

Why and when is it necessary to assess new sites for invertebrates before translocating kiwi.

It is important to firstly determine whether an invertebrate assessment of an area is required prior to a kiwi translocation proceeding.
Generally, an invertebrate survey is not required if:

- kiwi live nearby, and the planned translocation/s are into the present range of kiwi or,
- kiwi were abundant in the area within the last 50 years but are now absent or in low numbers.

However, an invertebrate assessment is required if;

- kiwi are to be translocated into areas where they have not been present in historic times (~50 years).
- the planned translocation/s are into the present range of kiwi, but the soil type is significantly different from the surrounding areas.
- kiwi are no longer present but were in the area historically but never reached high numbers for unknown reasons.

If an invertebrate assessment is required for the new site, then the information you collect will provide confidence that the establishment of kiwi will be not compromised by a lack of food. The information you gather regarding the invertebrates available to kiwi will also support the next step in the Department of Conservation permit application process; to submit a Translocation Outline. The Translocation Outline document identifies the intentions of the proposed translocation and provides evidence that the area will be suitable for kiwi. If the Translocation Outline document is supported, then the applicant may be asked to submit a Full Translocation Proposal.

In some situations, DOC may request that the findings of an invertebrate assessment of the proposed kiwi release site are submitted with the Translocation Outline.

The kiwi diet

Kiwi are omnivores and so feed on a wide variety of foods. However, 70 to 80% of their diet is mainly invertebrates found in the soil. Additionally, kiwi will feed on surface insects such as moths, beetles, cicadas, and grasshoppers found above ground in leaf litter or rotten logs. They will also eat some fruits and have even been known to feed on blackberries.

The most common food items of kiwi in order are earthworms, scarabaeid larvae (grass grub family) and cicada nymphs, followed by click beetle larvae, ground weta, carabid beetles, centipedes, and cranefly larvae (Kleinpaste and Colbourne 1983).

Familiarise yourself with some of the more common invertebrates. There are many resources available:

https://www.doc.govt.nz/Documents/science-and-technical/inventory-monitoring/im-toolbox-invertebrates-invertebrate-identification-aids.pdf

https://soilbugs.massey.ac.nz/

Equipment needed

- A flat spade with blade 20 cm deep by 20 cm wide (preferable as it makes it easier to dig the correct sized soil cube)
- A sheet of black plastic [~1.5 m x 1.5 m]
- A GPS or device for recording sample locations
- A notepad and pen/pencil
- A map of the area to be surveyed

Figure 1 Equipment required for invertebrate surveying

Surveying for soil invertebrates

Step 1 Preparation

planning the survey

1. Ten sample locations are required for the release area, and five samples collected at each of the 10 locations (total of 50 samples).
2. Sampling is repeated four times a year in spring (September to November), summer (December to February), autumn (March to May) and winter (June to August).
3. Divide the total area to be surveyed proportionately into different habitat types depending on size (e.g. 30% may be sand dunes, 20% pasture/grass land, 20% pine forest, 20% native forest, and 10% crop paddocks). (See Figure 2)

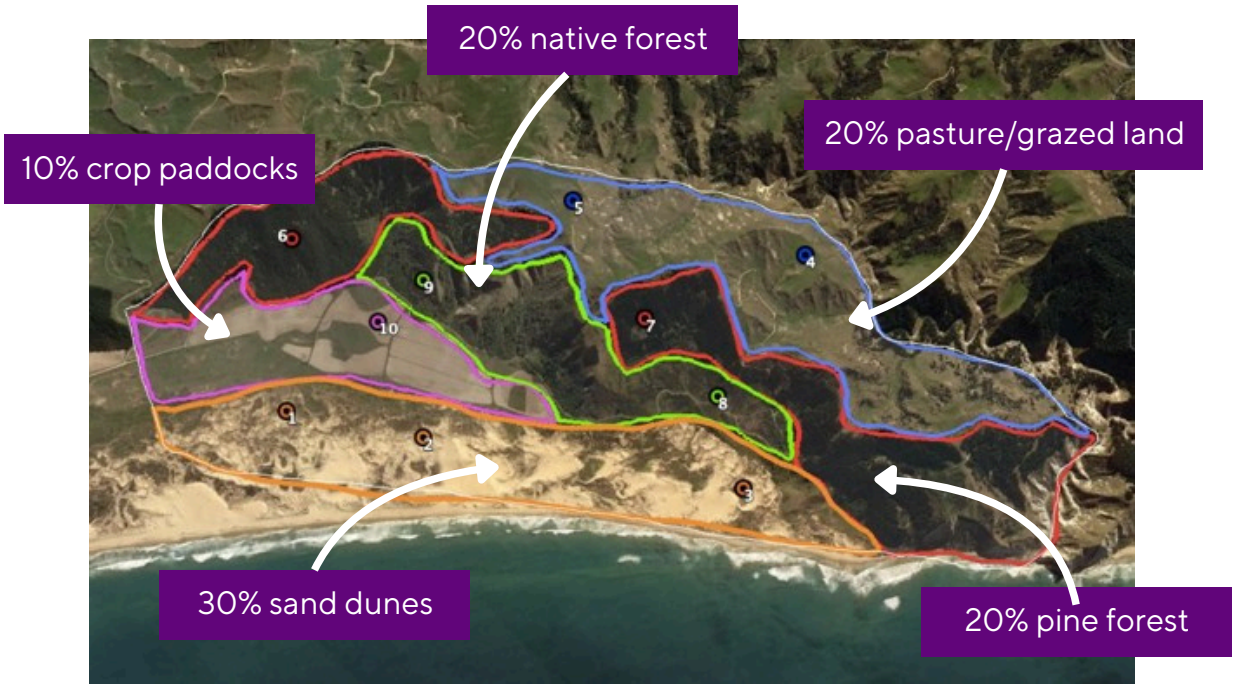

Figure 2 Example of allocating the area to be surveyed proportionately into different habitat types.

4. Allocate the 10 sample locations proportionately to the different habitat types (e.g. three will be in sand dunes, two in pasture, two in pine forest, two in native forest and one in the crop paddocks).
5. At each of the 10 sample locations locate five sampling points 5 to 10 metres apart (e.g., see location 6 in pine forest and sampling points 6A, 6B, 6C, 6D and 6E). (See Figure 3)

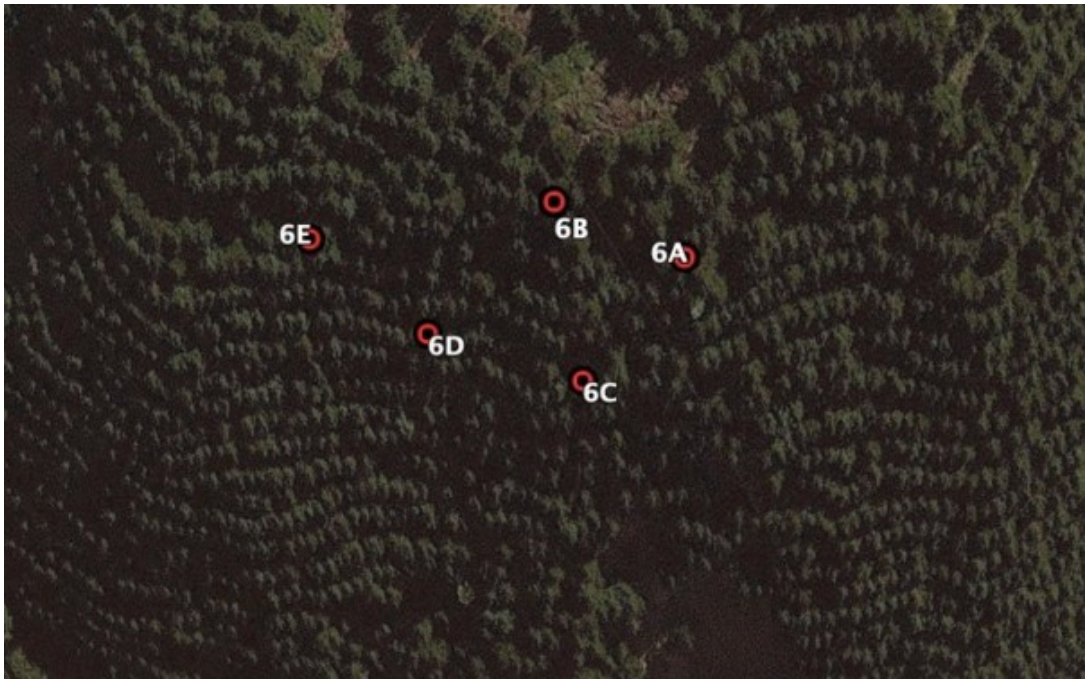

Figure 3 Example of five sample locations within habitat type 6. The five samples can be selected within 5 to 10 metres of each other.

Step 2 Invertebrate sampling and recording

1. Record the date, sample period, sample number/code, habitat description, vegetation type, soil type, and GPS location for each sample point.
2. Dig a hole 20 cm x 20 cm wide and 20 cm deep.
3. Remove the cube of soil and place onto a black plastic sheet.
4. Sort through the soil systematically by hand.
5. Record the type and number of any invertebrates over 8 mm in length. Invertebrates under 8 mm in length are rarely eaten by kiwi. Take a photo of anything you are unsure of so that it can be identified later.
6. Once the soil sample has been thoroughly sorted and the invertebrates counted/recorded, return them alive, along with the soil back into the hole.
7. Repeat five soil samples at each of the 10 locations.
8. Repeat the sampling four times annually, in Spring, Summer, Autumn and Winter to get an indication of invertebrate availability throughout the year.

Dig

Sift

Sort

Figure 4 Dig, sift and sort. Soil invertebrates are usually white or pale in colour and show-up against the black plastic.

Common earthworm

Cicada nymph

Scarabaeid larvae

Figure 5 Three common food items of kiwi; earthworms, cicada nymphs and scarabaeid larvae.

Step 3 Follow up

Enter your invertebrate information on a spreadsheet.

For assistance with interpreting your results contact the Kiwi Recovery Group Leader.

Include the invertebrate results with the Translocation Outline document (link below) to provide support and guidance around deciding whether the area is suitable for kiwi.

https://www.doc.govt.nz/globalassets/documents/getting-involved/volunteer/translocation-outline-application-form-11.doc

The information you have collected will contribute towards building a national picture of how kiwi distribution relates to abundance and diversity of soil invertebrates.

Further reading

Thomas Dixon. 2015. What they do in the shadows: Habitat utilisation and diet of Brown Kiwi (Apteryx mantelli) adults within a high-density island population.A thesis submitted in partial fulfilment of the requirement for the degree of Master of Science in Ecology. 184pp.

Jess Scrimgeour, Isabel Castro, Rogan Colbourne, Craig Gillies, Kevin Hackwell, Michelle Impey, Arapata Reuben, Hugh Robertson, Tamsin Ward-Smith, Sandy Yong. National Kiwi Translocation Guidelines, 2021. Developed by the Kiwi Recovery Group. 14p.

Kleinpaste, R.: Colbourne, R. 1983. Kiwi food study. New Zealand Journal of Ecology 6: 143-144.

Savoca, M.S; Gardiner, J; Colbourne R and Tennyson, A.J.D. 2018. Vertebrate prey in the diets of free-ranging kiwi (Apteryx spp). Notornis, Vol. 63: 242-244.

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