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āta mātai, mātai whetū

The GREAT KIWI EARTHWORM Survey

Help improve our knowledge of earthworm abundance and diversity, and how it changes across the New Zealand landscape.

What is living underneath you?

New Zealand's pasture earthworms arrived accidentally with the first European settlers, and because of this they can still have a patchy distribution. New Zealand also has a large number of interesting native earthworms, but these are not common under pasture.

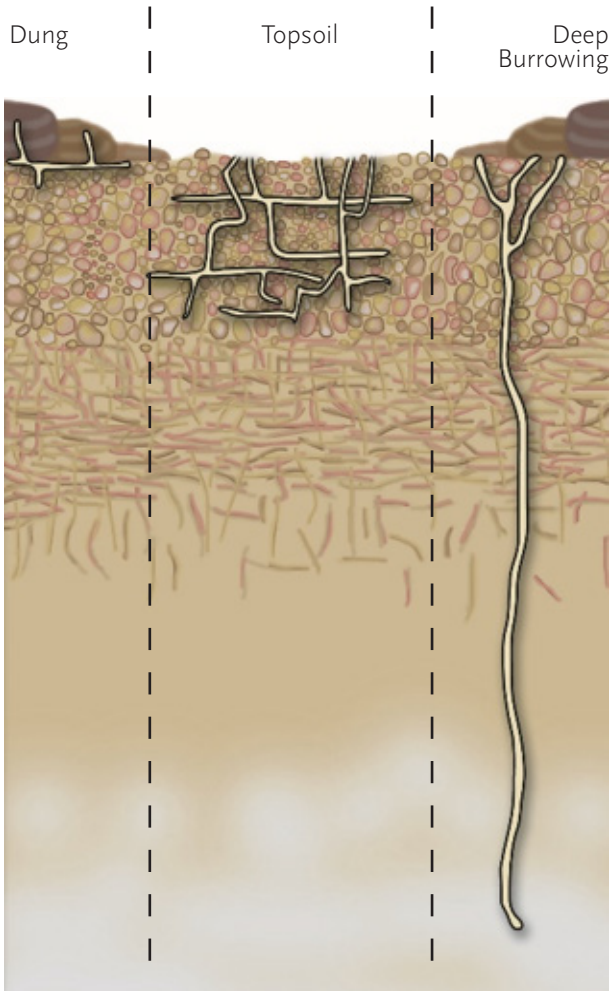
What types of earthworms are there?

There are three ecological groups of earthworms with different roles in the soil that should be present in your soil:

Dung: earthworms feed on dung and do not form permanent burrows. They contribute to ecosystem services by supporting plant growth, nutrient supply and greenhouse gas regulation.

Topsoil: earthworms burrow through the topsoil, feeding on the organic matter here. They contribute to ecosystem services by supporting plant growth, water and air movement, flood mitigation and physical support.

Deep-burrowing: earthworms feed on dung on the soil surface and take this into their deep burrows. They contribute to ecosystem services by supporting plant growth, water and air movement, flood mitigation, physical support, nutrient supply, and greenhouse gas regulation.



Scan here to visit earthworms.nz and view a video about the Great Earthworm Survey with Dr Nicole Schon.

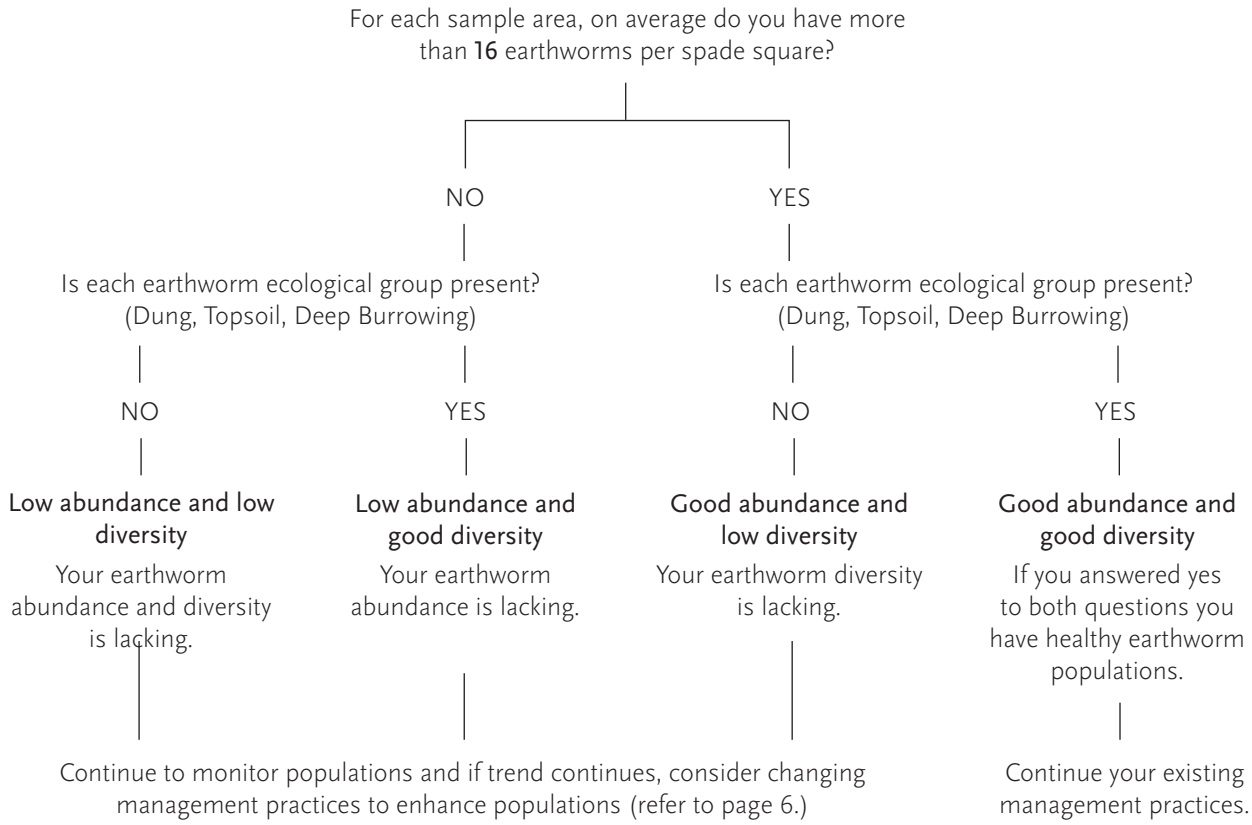
Join the survey

Follow these steps to take part in the Great Kiwi Earthworm Survey. You will gain a better understanding of what is living underneath you, and whether you have healthy earthworm populations.

Step 1: Take a sample

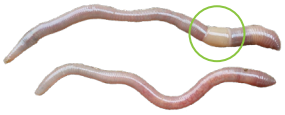
1. Sampling should happen at the same time each year during June-September when earthworms are most active.
2. Select a representative area to be sampled (e.g. on farm choose land management units and transects used for soil fertility monitoring).
3. In each sample area collect three spade squares (20x20 cm, 20 cm deep) along a transect.
4. Sort through one spade square on a sheet of plastic and collect earthworms into a container of water. Take particular care sorting through the root zone.
5. Count all earthworms and place onto paper towel. This shows if you have good or low abundance.
6. Place adult earthworms onto data sheet. Look at the colour and size of the adult earthworms. Use the keys provided to either identify ecological groups for an assessment of soil health or species for diversity.
7. Record your results on the data sheet and take a close-up photo out of direct sunlight. Repeat steps 4-7 for each spade square.
8. Go online to record this information at www.earthworms.nz.

Step 2: Find out if you have a diverse abundance of earthworms



Step 3: Identifying earthworm ecological groups

Use the adult earthworms in your sample to check your ecological groups



ADULT has a saddle

Head end

IMMATURE has no saddle

Ecological groups and their activity in the soil

Is your earthworm dark in colour? Is it less than 9cm long when not moving?

You likely have a dung earthworm.

Features: Red in colour, fast moving normal size

Is your earthworm pale in colour with the same colour underneath the head?

You likely have a topsoil earthworm.

Features: Tend to be grey but colours can vary, normal size

Note: Some topsoil earthworms can be dark in colour.

Is your earthworm dark in colour? Is it more than 9cm long when not moving?

You likely have a deep-burrowing earthworm.

Features: Larger, darkened head end

Common earthworm species

Lumbricus rubellus
'dung worm'

Aporrectodea caliginosa
'grey worm'

Aporrectodea longa
'blackhead worm'

Aporrectodea rosea
'pink worm'

Lumbricus terrestris
'nightcrawler'

Less common dung/compost earthworms:

Dendrodrilus rubidus
'bark worm'

Aporrectodea trapezoides
'southern worm'

Amynthas corticis
'snake worm'

Allobophora chlorotica
'green worm'

Eisenia fetida
'tiger worm'

Octolasion cyaneum
'yellow tail worm'

8cm

There are 200+ native species which vary in size and colour.

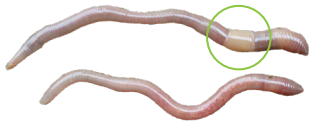
Disclaimer: This only provides suggestion of ecological diversity and species key is provided to get better representation of diversity in the soil.

Step 4: Identifying earthworm species

Use this decision tree to find out which species are present in your spade square.

1. Do you have an adult earthworm?

ADULT has a saddle



Head end

IMMATURE has no saddle

NO

Immature earthworms cannot be identified. Return earthworm to soil.

YES

2. Is your earthworm pale in colour with the same colour underneath the head?

YES

Is the earthworm a red-brown colour with a purple sheen and iridescent in bright light?

Is the earthworm very large, forming large casts? If YES then:
Deep: *Lumbricus terrestris 'nightcrawler'* (90-300mm)

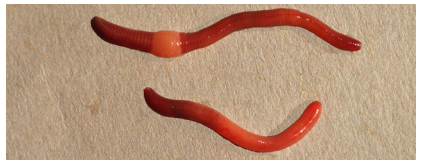
OR... is it smaller with a reddish saddle and very active when disturbed? If YES then:
Dung: *Lumbricus rubellus 'dung worm'* (25-150mm)

NO

Is the earthworm bright red with yellow?

Is it found in a rich organic matter with yellow bands (when it stretches)? if YES then:
Dung: *Eisenia fetida 'tiger worm'* (30-130mm)

OR... is it short with faint yellow colouring concentrated at the tail end? If YES then:
Dung: *Dendrodrilus rubidus 'bark worm'* (20-100mm)



NO

Is the earthworm dark grey-brown colour?

Is the earthworm large? If YES then:
Deep: *Aporrectodea longa (blackhead worm'* (90-120mm)

OR... is it smaller, and darker along the length of its body? If YES then:
Topsoil: *Aporrectodea trapezoides 'southern worm'* (40-90mm)

NO

Is the earthworm dark green-brown colour?

Is it a long slender earthworm which writhes like a snake when disturbed? If YES then:
Dung: *Amynthas corticis 'snake worm'* (70-180mm)

OR... is it greenish brown, coiling stiffly when disturbed? If YES then:
Topsoil: *Allolobophora chlorotica 'green worm'* (40-70mm)

NO

You have probably found a rare earthworm which is not in the key. Record as unidentified.

NO

Is the earthworm pale along its body with a small yellow tip at the tail? If YES then:

Topsoil: *Octolasion cyaneum 'yellow tail'* (65-180mm)

NO

Is the earthworm pink or grey with a pink head? Is it very common in your sample, with a darker head? If YES then:

Topsoil: *Aporrectodea caliginosa 'grey worm'* (40-100mm)

OR... Does it have a pale pink head and tail with a dark pink-orange saddle? If YES then:

Topsoil: *Aporrectodea rosea 'pink worm'* (25-85mm)

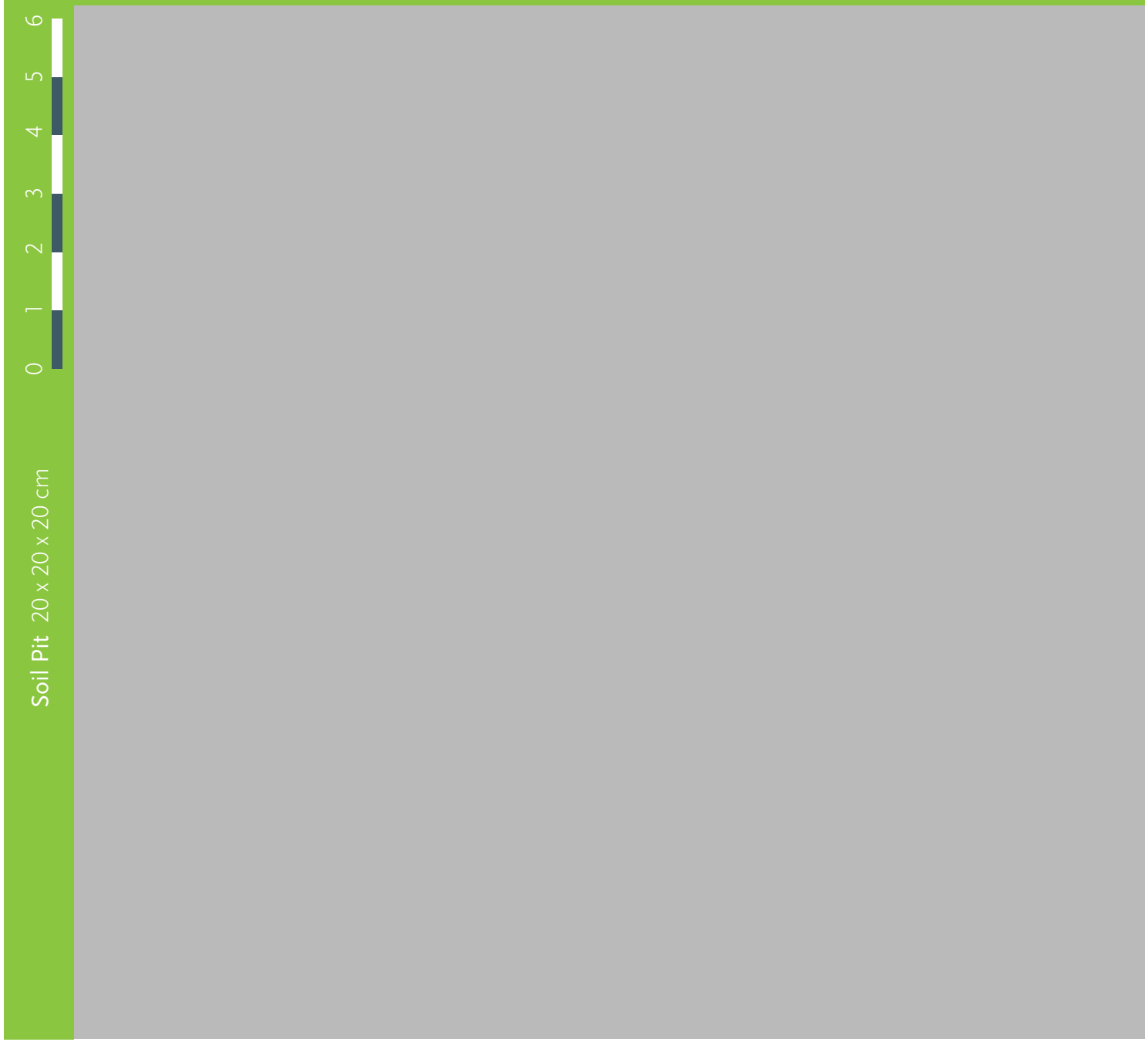
NO

Is the earthworm pink or grey with the saddle quite close to the head end? (Saddle starting before segment 22, compared with after segment 22 in many non-natives.) If YES then:

There are about 200 native species (e.g. *Octochaetus multiporus*) which vary considerably in size and colour. They tend to be found in forests but some are found in low fertility hill country.

Disclaimer: This key may not record all earthworm species, and specialist keys are required for more accurate identification.
Reference: Key modified J. Springett 1985. Photos: R.Gray.

Data Sheet Please place earthworms in the grey box for the photo



Step 4: Record your results

Location

Date

	Total # earthworms
Spade 1	
Spade 2	
Spade 3	
Average	

Tick the type of earthworms found at your location:

Dung and compost earthworms

- ☐ *Lumbricus rubellus* 'dung worm'
- ☐ *Eisenia fetida* 'tiger worm'
- ☐ *Dendrodrilus rubidus* 'bark worm'
- ☐ *Amynthas corticis* 'snake worm'

Topsoil earthworms

- ☐ *Aporrectodea caliginosa* 'grey worm'
- ☐ *Aporrectodea rosea* 'pink worm'
- ☐ *Aporrectodea trapezoides* 'southern worm'
- ☐ *Allolobophora chlorotica* 'green worm'
- ☐ *Octolasion cyaneum* 'yellow tail'

Deep-burrowing earthworms

- ☐ *Aporrectodea longa* 'blackhead worm'
- ☐ *Lumbricus terrestris* 'nightcrawler'

☐ Other

Upload your results online at www.earthworms.nz

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What do my results mean?

Dependant on what your samples showed, you may need to increase your earthworm abundance and/or diversity. There are some basic practices that you could employ to help.

Refer back to the flowchart on page 2 to see if you have low or high abundance and/or diversity.

How to get a healthy earthworm population

Earthworms are active when the soil is wet. In order to increase their populations you need to increase organic matter available (their food) as well as ensure that the physical environment is favourable.

Management practises to increase their abundance may include:

- Increasing soil fertility and pasture production.
- Apply effluent.
- Use of cover crops and organic amendments.
- Avoid compaction. Take extra care during winter when soils are wet and vulnerable to pugging.
- Minimise cultivation.
- Improve drainage if water logging is an issue.
- Reduce moisture limitations.
- A pH range suitable for pastures is appropriate for earthworms.

How to increase your earthworm diversity

Increasing earthworm diversity can be more difficult.

- If abundance is low, try to increase the abundance using the options outlined above.
- If abundance is good, it is likely that the dung or deep-burrowing earthworms are lacking. Try increasing organic matter to the soil.
- If missing ecological groups are found nearby you may need to translocate soil turves from nearby that have the desired ecological groups.

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