

Checking for Change

A practical guide to checking whether sites newly managed for conservation are on track to improve

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This guide and associated indicator factsheets, datasheets and instructional videos are all available at the 'Checking for Change' BioCollect website, where data can also be entered and stored. Visit: <http://tinyurl.com/checking4change>

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Introducing Checking for Change

Why use this approach to check for change?

How will you know whether your work to improve the environmental condition of sites is actually making a difference? Whether you are managing grazing to increase native plant diversity, replanting a shrub layer, and/or controlling weeds, it's important to know whether you are on track, and knowing that sooner rather than later can help you adjust your management.

However most monitoring at the moment focuses on reporting which management actions are performed, not what they achieve in terms of improving the environment.

When we try to ask whether improvement is really happening, most currently used are unlikely to be able to reveal an answer unless used for decades, and they often involve hours of detailed data collection.

The indicators we share in this Guide will let you know if you're on track over much shorter timeframes (2 to 6 years). They are easy to use, provide simple accurate data and are based on the latest science. You can use our BioCollect website <http://tinyurl.com/checking4change> to enter, store and share data so we can all learn about improvement on properties, within regions, across states – even nationally.

Checking for Change will complement more detailed, longer-term monitoring methods and allow more people to participate in monitoring – including individual land managers, schools, and community groups.

Many of the indicators are common components of longer-term monitoring approaches but the way the information is collected has been modified to make it simpler and easier for 'citizen scientists' to do. The Checking for Change approach can thus help managers and funders of environmental management do more monitoring of real outcomes and quickly learn whether they are on track or need to keep experimenting with their management.

Changing focus – looking down beneath the trees

When we check a site we often look at the big picture – do the trees look healthy, is it weedy, are shrubs re-growing? However, because improvements often happen at ground level first (even below the plants, down in the soil), the indicators in Checking for Change involve observing the ground layer – including leaf litter, bare ground, and even the bugs living there – not just the plants. By shifting your focus down, you can more effectively track a site's progress in the early years after you have changed management.



Assessing tree health in box gum woodlands



Native Common Buttercups (Ranunculus lappaceus)



Getting close to it all and discovering the native orchid amongst the grasses

Checking for change typically requires a shift in perspective from looking up at the trees (above left) down to the soils, grasses and wildflowers in the ground layer (above right and below)

What are the indicators?

There are 4 simple, easy-to-use indicators which do not require the ability to identify any plants or animals. These are:

Not Bare Ground

- the amount of ground that is **not bare** because it is covered with plants, leaf litter, mosses, fallen timber, rocks, animal dung etc.

Litter Depth

- how deep the leaf litter layer is

Litter Break-down

- the degree to which the litter is broken down and starting to become soil

Plant Types

- the number of different types of plants

There are two extra indicators and a more detailed version of Plant Types for people who have some plant and bird identification skills:

Cover of Native Perennials

- how much ground is covered by native perennial (long-lived) plants

Bird Types

- the number of different types of birds in the site

Native Plant Types

- the number of different types of native plants (a version of 'Plant Types' above)

Lastly, there is one indicator that we are still learning about. It's easy to use and any information you collect could help us understand how much it might be a sign of improvement:

Number of Bugs

- number of bugs found on the ground, including in the litter

The science behind the indicators

The indicators in this handbook have been designed to detect change in ecological condition within just 2 to 6 years after altering management for conservation purposes. They were originally developed and tested by CSIRO for the Box Gum Grassy Woodlands of south-eastern Australia but are likely to be useful in a range of grassland, woodland and open forest systems. They are not likely to be suitable for rainforests, heaths, or wetlands.

Through prior research, all of the features that the indicators measure have been shown to be different between high quality woodlands and those in poorer condition. Thus, we can be confident that changes in these indicators represent actual *improvement*, not just change.

In the research that motivated this Guide, we specifically tested whether these indicators would improve following a change to a conservation management regime. The usefulness of the indicators was tested after two years following a change in

management and then at six years following the change in management.

We also tested whether the indicators were easy to measure by land managers themselves and whether they yielded data that was as accurate as the data collected by ecological experts – and, the good news is, it was very similar!

Some of the indicators are not new and are already used in more detailed monitoring programs. But we modified the way the information is collected to make them more suitable for use by a wide range of people, not just experts.

Only the indicators that either fully or mostly met these criteria are included in this Guide.

For more detailed information on the science, please see the companion guide '**Checking for Change: the science behind practical monitoring of ecological improvement**' (available under the Resources tab at our website: <http://tinyurl.com/checking4change>).

TECHNICAL NOTE for professionals:

This Guide is written to enable a wide variety of people with different skill levels to participate in monitoring improvements in ecological condition. Yet the indicators themselves and in most cases the specific ways in which they are measured have been rigorously tested using a before-after-control-intervention (BACI) experimental design and formal statistical analysis over two time periods in the box-gum grassy woodlands of south-eastern Australia. For in-depth information on the peer-reviewed science, please see the companion guide '**Checking for Change: the science behind practical monitoring of ecological improvement**' (available under the Resources tab at our website: <http://tinyurl.com/checking4change>).

Who is this Guide for?

Land Managers

Most of these methods have been selected and designed to be used by people with no specialist knowledge and limited time. There are three additional indicators available for land managers with a moderate level of plant and bird identification skills. Thus, land managers themselves can use this Guide to track conservation improvements on their own properties. It can also help managers identify opportunities to innovate and try new management approaches to give a better result (for example mulching, planting, or reducing kangaroo grazing).

Schools and Community Groups

Schools and community groups are increasingly looking for opportunities to participate in 'citizen science'. The non-technical nature of our indicators means that they can be used and understood by most people. Using these indicators at a number of sites (e.g. across a Landcare

district, in a rural/regional school district, or in a series of newly established urban parks) can give the benefit of learning about regional-scale improvement. Schools or volunteer groups can work with organisations such as those listed below to find multiple sites to work on.

Non-Governmental Organisations

Non-governmental organisations (NGOs) like Greening Australia work with private land owners to restore and manage sites for environmental improvement. They are often looking to improve their processes, so the early detection of improvements (or problems) can help make that goal of 'adaptive management' a reality. There is also often a desire to involve land managers in monitoring and the use of our indicators can foster collaboration between NGOs and the individual land owners and managers they work with.



Natural Resource Management Organisations

Natural resource management (NRM) organisations work within regions and may help private land owners restore and manage sites for environmental improvement, usually through education/extension services or through funding management agreements. Parks managers also often work to restore or improve areas within parks that are degraded. Checking for Change could help support adaptive management in these circumstances. By using these methods across multiple sites, these indicators could also provide highly cost-effective ways of reporting on program-level outcomes within the time frame of a funding or management program and its reporting, thus helping to meet increasing accountability requirements.

State and Federal Governments

State and federal governments run environmental improvement programs and also provide funding for NGOs and regional NRM organisations to run such programs. These indicators could be encouraged by, or become part of, mandated reporting for these programs.

Currently, as most mandated reporting is focused on the management activities themselves, these types of simple methods to achieve *outcomes*-based reporting can potentially improve the accountability of publicly-funded programs.

State and federal governments are also responsible for State of the Environment reporting and are looking for simple yet quantitative ways to gain insights into environmental condition at larger scales. These simple monitoring approaches can provide widespread on-ground data collection to complement the remotely sensed and modelled data typically used at these other scales.

TECHNICAL NOTE for professionals:

This Guide is written in plain English, with active voice to make the methods accessible to many potential users. As a result, it doesn't conform to the style that might be expected of a professional monitoring guide. But the indicators and methods are based on traditional transect and point-intercept sampling techniques so they are suitable for use by experts and professionals including field officers, park managers, and ecological consultants. Because the Checking for Change indicators eliminate the extensive effort required to assess ecological variables that are not expected to change very quickly, Checking for Change may in fact provide a particularly cost-effective alternative for professionals in situations where short-term improvement needs to be assessed. To judge that for yourself, please see the companion guide 'Checking for Change: the science behind practical monitoring of ecological improvement' (available under the Resources tab at our website: <http://tinyurl.com/checking4change>).

Does this approach work with other monitoring methods?

If there is no monitoring or measurement of improvement/outcomes currently being undertaken, these methods provide a way to do it simply and cost-effectively for the first few years after a change in management.

However, what if other monitoring methods are currently being used? Remembering that the Checking for Change indicators are specifically designed to show change in the first 2-6 years, it means there are a few possible options:-

Add the indicators to your longer term monitoring scheme

If time and resources allow, add the Checking for Change approaches to a longer-term more detailed monitoring scheme to see what they can tell you specifically about short-term change in that broader monitoring context.

Use Checking for Change first

Use the Checking for Change indicators for about the first 6-8 years after a change in management, and then switch to the more detailed monitoring methods that are expected to show change after longer time frames. Remember to collect baseline data at the start (before or soon after a change in management) using the more detailed monitoring methods too, but then don't spend the time and money collecting those detailed data again until your Checking for Change program is over (6-8 years).

Do long-term monitoring opportunistically, across programs

Checking for Change fits within the time frames of most funding programs and management agreements. Long-term monitoring may be more aspirational with lack of clarity about how it will be funded. Thus, Checking for Change can be incorporated as the formal monitoring approach for a program and resourced as part of that program. Longer-term, more detailed monitoring could then be applied more opportunistically as funding allows.

What about photo points?

Land managers are often encouraged to monitor by using photo points – photos taken from the same point repeatedly over time. These are very useful for *illustrating* long-term change. Unfortunately, photo points cannot demonstrate that change is due to conservation management, adequately show short-term improvements, or provide data for larger regional or state assessments. Thus, don't hesitate to take photos alongside Checking for Change to provide a visual record, but do not consider photos from photo points to provide useful monitoring data.

Using in tandem with longer-term indicators

To ensure all of these choices are viable options, the Checking for Change indicators have been designed to be collected along a 50m 'survey line', which is also used in most longer term monitoring approaches. Thus, the preparation required to use Checking for Change also supports the transition to, or simultaneous use of, other monitoring methods.

How to use this Guide

If the Introduction to Checking for Change above has convinced you to give the indicators a try, here are some tips for how best to use the rest of this Guide.

1st

- **First, simply look through the Guide** so you are more familiar with the overall process, its objectives and your options for indicators. You will need to choose which indicators you want to use during the 'Preparation' step, so it's wise to learn a bit about them first.

2nd

- **Read through the 'Preparation' section in detail** - Preparation is critical as it helps you establish exactly where and how you will be collecting and interpreting the information. It then supports your use of the indicators for years to come so a bit of extra time spent at the start will be well worth it in the long run.

3rd

- **Complete your Preparation work** - This involves selecting your sites, setting up your survey lines, choosing which indicators you will use, planning your surveys, and gathering your supplies.

4th

- **Use our Indicator Factsheets and Data Sheet to support you in collecting the information on your chosen indicators in spring** - Each indicator is shown on a separate page so you can print (and laminate) separate pages and thus take only the information you need out into the paddock with you. Data sheets are also provided at the end of this Guide to make it easy for you to record the information.

5th

- **As soon as possible after you have collected the information, follow the instructions in 'Making Sense of the Numbers' to know what they are telling you about improvement (or not) at your site(s)**. This will involve a small amount of simple maths and graphing on gridded paper (or more if you have the capacity). This may seem like the most foreign part of the process to you, but it is absolutely critical for learning from the information you collect. These results can be entered into the project's BioCollect website to make interpretation easier and help build a bigger regional picture of improvement.

Preparation

Choose a ‘control’ site to match your conservation site

One of the most critical aspects of detecting improvement in sites managed for conservation involves also collecting the information on sites that are *not* managed for conservation – ‘control’ sites.

This may be rarely done especially since it seems like twice as much work, but it actually provides the most important insights. This is because nature changes all the time in response to local and seasonal conditions. For example, when rainfall has been good, many more plants will pop up in spring to flower and seed, and the opposite is true after particularly low rainfall. Thus, if we only collect information at management sites, we can be misled and accidentally interpret natural seasonal changes as successes or failures of management.

To get a clear understanding of whether management is resulting in improvement of a site, we need to compare each management site with a ‘control’ site (one that is continuing to be managed for other purposes, not primarily for biodiversity conservation) and do so over time. What we actually expect to see is an increasing *difference* between the managed site and the ‘control’ site over time.

How to match your conservation site with a ‘control’ site

You will need to select one control site for every site being managed for conservation that you are trying to monitor (or see note to professionals).

You will need to collect information using the Checking for Change indicators at BOTH of the sites.

To choose a control site, find another spot on the same property or on an adjacent property that:

- was historically managed similar to the way the conservation site was in the past
- is going to continue to be managed as it was historically (more or less)
- has the same basic grass and tree types (hint: if you aren’t sure, just make sure it’s not in a different part of the landscape such as on a hillslope when the conservation site is on a valley bottom)

TECHNICAL NOTE for professionals:

If you are using Checking for Change across many sites being managed for conservation as part of a larger program, it may be possible to have fewer control sites than a strict one-to-one matching. The key thing is to ensure that the set of control sites capture the amount and nature of the variation present across conservation sites and that sample sizes will be sufficient for statistical analysis. In general, we recommend no less than half as many control sites as conservation sites.



Select a control site that roughly matches the past management and current condition of your conservation site. For example, in these images, a conservation site on the lower flats with little tree cover should be matched with a control site on the flats as well. A conservation site on the mid-upper slopes should be matched with a control site on the mid-upper slopes with similar tree cover. (bottom image © Mark Jakobsons)

Set up your survey lines

The information needs to be collected along one 50-metre-long survey line in your conservation site and one 50-metre-long survey line in your control site, like the one in the photo-diagram to the right. In each site, select a point at which to start your survey line that is inside the site rather than at its edge. Try to be at least 30 metres away from the edge, and preferably 50 metres away. Install a star picket or dropper (or similar permanent marker) at this beginning point of the survey line. Walk 50m in a straight line through the site and install



another star picket or similar marker at this end point of the survey line.

It's best to use a tape measure or rope already measured out to 50m, but you can also estimate the distance with your own steps or paces if you know how far you normally step. Your markers at the beginning and end will need to stay in place over time and be easily found again. Each time you collect information on the indicators, you will walk a straight line between these markers. These types of survey lines are often referred to as 'transects'.

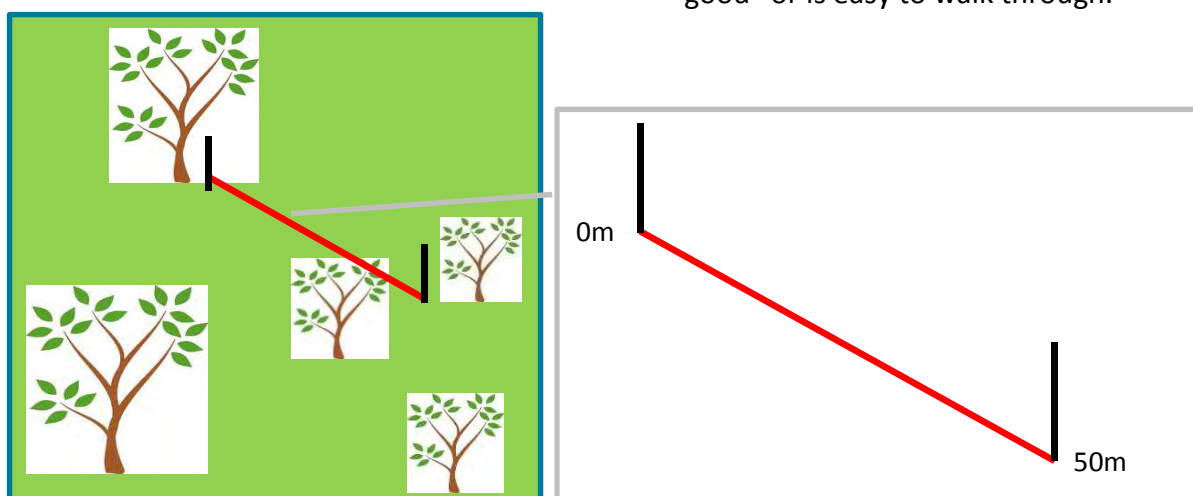
You will want to record the latitude and longitude of the beginning point of your survey line (Step 0). This is particularly true if you plan to use our BioCollect site to record and share your data (which we strongly encourage because that is how your data can most easily be stored and made helpful at larger scales). BioCollect requires the latitude and longitude in decimal degrees. Further instructions can be found in the section 'Recording and Sharing Data using BioCollect'.

Representing your site - where should the survey line be set up?

Each 50 metre survey line should run through a 'representative' part of each site (see diagram below). This means that you should run it through a part of your site that has everything in about the same relative amounts as you have across the whole site. Look at and think about the whole site in order to consider its overall characteristics. Look at individual elements such as groundcover, shrubs, and trees – both their abundance and the spacing between them.

For example much of the sheep wheat belt from Queensland, through New South Wales and into Victoria, was covered by Box Gum Grassy Woodlands and there is often a mix of regrowth and older remnants, a sparse shrubby layer, and a ground layer varying from exotic annual grasses to a good cover of native perennial (long lived +2 years) grasses and native wildflowers.

The 50 metre survey line selected should contain those key elements of the site (see the diagram). For example, avoid selecting an area with the only patch of shrubs and the one big old tree or because it "looks good" or is easy to walk through.



Stylised diagram showing a 50m survey line running through a 'representative' part of the site – with a bit of a big tree, a bit more of a small tree, and mostly grass.

Pick your indicators

Select which of the Checking for Change indicators you wish to use

You can use any or all of these indicators, depending on your preferences and levels of expertise (for example identifying native perennial grasses, all native plants, and/or recognising different birds). In general, the more of the indicators you use, the more complete a picture you will get. If your time is extremely limited and you want to use just a subset of the indicators, we suggest using at least three.

You should use the same indicators each time you collect information/conduct a 'survey' and don't change indicators partway through your monitoring. Thus, it's important to make your key decisions now.



Have a think or a chat about how many and which indicators you will use – in general using more indicators will provide a more complete picture but if your time is very limited make sure you use at least three

Confirm the order in which you will measure your indicators

When using multiple indicators, you want your sequence of measurements to be quick and efficient. Also, you don't want to accidentally damage your ability to get useful data (for example by trampling back and forth along the survey line before trying to count bugs in the leaf litter).

If you choose to use all the indicators, specific instructions for collecting all the data in one pass down your 50m survey line can be found after the factsheets, in the section 'Using Multiple Indicators'. If you are choosing to use only some of the indicators, look at the guidance in 'Using Multiple Indicators' to consider the most efficient way to tackle the set you have chosen.



To make sure your measurement of indicators is quick and efficient you will find some useful tips by reading the 'Using Multiple Indicators' section

Plan when to survey and how to record and understand the numbers

When is the best time to collect the information?

Typically in south-eastern Australia monitoring is undertaken in spring when annual plants are present. Thus, it is probably most useful to collect information on each of these indicators in late spring, at about the same time each year. Information should be collected from your conservation site and your control site (by the same person) within a few days of each other in fine weather conditions. Your work should preferably be done in the morning if you are using the **Bird Types** indicator.

So for example, you might plan to collect your information on two consecutive mornings (one for the conservation site and one for the control site) sometime in the second half of October each year. The amount of time required each year will depend on how many indicators you choose to work with, but each site should take less than 1 hour once you are there and set up.

How often should you collect the information?

Just one survey is needed each year, but it should preferably be done by the same person each time. Some of the Checking for Change indicators have been shown to be most effective within just the first 2-3 years after a change in management while others continue to be helpful at least until 6 years after a change in management (and possibly longer). These differences are described on the factsheets for each indicator. The number of years you collect data may therefore differ depending on the indicators you have chosen, or depending on reporting

responsibilities or your own motivation and curiosity. We suggest you collect the information a minimum of three times (at the start of a change in management, one year after, and two years after) so you will be able to start to see trends over time (see 'Understanding the numbers').

Recording the information

Most of the information is collected for multiple 'sample points' along the survey line and later summarised for the whole site. Thus, it is particularly useful to have a formal data sheet that you take out in the paddock with you to write down all the numbers (or ticks to indicate 'yes') and then summarise them at home. We have provided a sample data sheet at the end of this Guide that can be printed and used each time.

Understanding the numbers

Each of the indicators includes a description of how to calculate a single summary number for the site based on the information collected. In most cases, this is an average or a simple percentage.

The key to assessing whether your conservation site is improving is to look at changes in the numbers over time at *both* the control site *and* the conservation site and look for a better trend at the conservation site. More detailed information about using simple graphs to make this easy is provided in the section 'Making Sense of the Numbers'. Just be sure to plan a small amount of time after collecting the information each year to do these simple calculations, share the information on our BioCollect website, and update your graphs.

Gather your equipment

It will be useful to have a small box prepared with the few items you need, which you can then store and use again each year. You will need:

- A permanent marker, grease pen or small strip of duct tape to put marks at the tips of each of your boots
- A pen or pencil
- A ruler (best if it has a pointy end – can make one using a chopstick or similar)

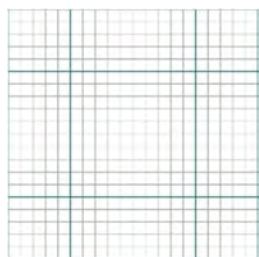
A chopstick can be turned into a homemade pointy-ended ruler, which is easier to push into leaf litter to measure its depth.



- Factsheets for the indicators you are using (preferably laminated)
- Datasheets on a clipboard or in a notebook



- Graph paper (or at least lined paper) to help make sense of the numbers by plotting and comparing your results (or software like Excel for advanced users)



Optional supplies

- rope or measuring tape to run between the two end markers to create a more precise survey line that could be easier to walk
- gloves to protect your hands from spider bites if measuring **Number of Bugs**
- binoculars to help you see birds if counting **Bird Types**



- A GPS or GPS enabled mobile phone to confirm the latitude and longitude of the start of your survey line (see the section 'Recording and Sharing Data using BioCollect')

Your planning and preparation is now complete and you should be ready to 'Check for Change'.

Indicator Factsheets

The following pages contain the factsheets for each of the Checking for Change indicators with two pages per indicator. Print the pages for the indicators you have chosen to use. If you are able to laminate them, they will be more durable for using each year in the paddock. Here is a summary, showing the order in which the factsheets are presented:

First the 4 simple, easy-to-use indicators which do not require the ability to identify any plants or animals:

Not Bare Ground

– the amount of ground that is **not** bare because it is covered with plants, leaf litter, mosses, fallen timber, rocks, animal dung etc.

Litter Depth

– how deep any leaf litter layer is

Litter Break-down

– the degree to which the litter is broken down and starting to become soil

Plant Types

– the number of different types of plants

Then the two extra indicators and a more detailed version of [Plant Types](#) above for people who have some plant and/or bird identification skills:

Cover of Native Perennials

– how much ground is covered by native perennial (long-lived) plants

Bird Types

– the number of different types of birds in the site

Native Plant Types

– the number of different types of native plants (a version of above 'Plant Types')

Lastly, there is one indicator that we are still learning about. It's easy to use and any information you collect could help us understand how much it might be a sign of improvement:

Number of Bugs

– number of bugs found on the ground, especially in the litter

Not Bare Ground

What is 'Not Bare Ground'?

This indicator is the percentage of points where you look at the ground and do NOT find it bare – it has anything but bare soil, such as plants (including mosses and lichens), leaf litter or rocks. It may seem odd to focus on NOT bare ground rather than bare ground, but this ensures this indicator can be interpreted in the same way as all the others in 'Making Sense of the Numbers'.

Why is 'Not Bare Ground' important?

Plants and litter help to hold soil and soil moisture in place and litter helps to return nutrients back to the soil. So when the soil is bare, it is not getting those benefits.

Some bare soil is to be expected in Australian woodland systems to provide opportunities for new plants to establish and for wildlife to forage in. However if the amount of bare ground is high and/or is increasing over time, your soil development and function is in decline. This may be

because there are not enough ungrazed live plants to create litter in the first place, or because litter is being blown and washed away through erosion.

How long does it take to measure?

Less than 10 minutes per site

When is it useful?

0 - 6+ years after change in management

How do I measure it?

Mark the toe of each boot with a marker pen or narrow strip of tape then start at the beginning of your survey line. Take steps toward the end marker of the line that are approximately 1 metre apart (so you should aim to take about 50 steps in total along the line). At each step, record whether there is NOT bare ground directly under the mark at the tip of your boot (by making a tick mark in the box on the data sheet if you see anything except bare ground).



When litter is sparse, you need to be precise about recording what you find directly under the mark on your boot – in this picture, it could be bare ground or it could be leaf litter

At the end, to record the summary value for the whole site, calculate the % of Not Bare Ground by adding up the number of ticks where there was something present instead of bare ground, dividing by the number of steps you took, and multiplying by 100.

So if you recorded 10 ticks and took 50 steps, the % of Not Bare Ground would be $10/50 \times 100 = 20\%$.

Remember, if you use the Checking for Change BioCollect website to record and share your data (see 'Making Sense of the Numbers'), some of these calculations will be done for you.

Tips for success

Look directly at the very small bit of ground exactly under the mark on the toe of your boot. If the mark is a bit wide, you might consider focusing on just the left or right edge of it to point to a very specific spot on the ground. If this is bare, even if there is leaf litter just a tiny distance away, do not put a tick mark on the data sheet.



Although there is leaf litter just to the left of the white mark at the toe of this boot, and some grass leaves to its right, the mark itself is directly above bare ground and so will be recorded as such and thus a tick mark will NOT be recorded on the data sheet.

Litter Depth

What is 'Litter'?

Plant litter is any non-attached piece of a plant lying in contact with the ground. Mostly plant litter consists of stems, twigs and leaves from grasses and trees but occasionally includes bark and other plant material from the site. Litter Depth is a measure of how thick the layer of litter is.



This leaf litter primarily consists of eucalypt leaves

Why is Litter Depth important?

As plant litter builds up and decomposes, it contributes to soil health by returning nutrients back to the soil. Depth is important because the amount of plant litter (deeper = more) affects how much carbon, nitrates and other nutrients are going back into the soil. It also helps to provide habitat for bugs that aerate the soil and thus allow water to filter down where it can be absorbed by the roots of plants.

How long does it take to measure?

Approximately 10 minutes per site

When is it useful?

0 - 6+ years after change in management

How do I measure it?

Mark the toe of each boot with pen or strip of tape and start at the beginning of your survey line. Take steps toward the end marker of the line that are ~1 metre apart (so you should aim to take about 50 steps in

total along the line). At each step, check to see if there is litter directly under the mark at the tip of your boot. If so, measure how deep it is by gently pushing a ruler all the way through the litter until it hits the firmer soil layer. (This is why a pointy-ended ruler of some sort is helpful – easier to push through.) Record how thick the litter layer is at that step to the nearest half-centimetre by writing the number in the box on the data sheet.



This leaf litter at the tip of the boot consists of a mixture of grass, twigs, bark and eucalypt leaves

At the end, you need to calculate the average Litter Depth for the whole site. Do this by adding all the numbers you recorded and divide by the number of times you found litter to measure. So if you recorded 3, 8, 2, 4, and 2 centimetres along your survey line, the average litter depth would be 19 centimetres (3+8+2+4+2) divided by 5 measurements = 3.8cm.

Remember, if you use the Checking for Change BioCollect website to record and share your data (see 'Making Sense of the Numbers'), some of these calculations will be done for you.



When measuring Litter Depth, put your ruler (or chopstick marked with centimetres and half-centimetres) straight down into the litter then read the depth to the nearest half-centimetre. In this picture on the right hand side this litter is 3cm deep. If you like to check that the measuring stick is sitting on the top of the soil surface you can gently move the litter aside to check

Tips for success

Look directly at the very small bit of ground exactly under the mark on the toe of your boot. If the mark is a bit wide, you might consider focusing on just the left or right edge of it to point to a very specific spot on the ground. If there is litter there, try to measure its depth, even if it's just half a centimetre. You can also try practicing a few times first, as it's a bit fiddly to feel when you have pushed all the way through the litter and hit the soil.

Litter depth can change fairly rapidly due to short-term factors like the recent weather. So don't be too concerned if you find litter depth at your sites decreases, as well as increases, at different times – what matters is the trend compared to your control site.