# Accounting for Nature Australian Terrestrial Mammal Method

## DOCUMENT DETAILS

**Method Name:** AfN Australian Terrestrial Mammal Method

**Method Reference #:** AfN-METHOD-F-01

**Relevant Environmental Asset Class:** Fauna

**Confidence Levels:** Level 3

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**License fees associated with using this Method:** Open

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## DISCLAIMER

# 1. Introduction

## 1.1. Aim and Scope of this Method

Australia's mammal fauna has suffered a high rate of extinction with 34 species lost since European settlement. Extinctions are not an historic phenomenon - the Bramble Cays Melomys (*Melomys rubicola*) was declared extinct in 2016, and over one hundred mammal species are listed as threatened under the Environmental Protection and Biodiversity Conservation Act 1999. Threatening processes such as habitat loss, invasive species and climate change are driving declines of once-common species across Australian landscapes. There is an urgent need to take action to conserve this important element of our natural heritage. But the ability of land managers to make informed decisions about native fauna management is hampered by a lack of widespread and long-term data on mammal distributions in many areas.

*Eastern barred bandicoot (Perameles gunnii)*

To help address this information gap, Accounting for Nature has developed an Australian Terrestrial Mammal Method that can be applied at a property or project scale across Australia to produce Level 3 Environmental Accounts. The Method focuses on both ground-dwelling and arboreal mammals, with methods presented for surveying both small and medium-large ground-dwelling species. This Method measures species richness, with data aggregated across each assessment unit. This provides a simple but robust indicator of fauna condition at the property/project scale.

AfN believes that mammals should be prioritised for several reasons:

- Australia's mammals have declined dramatically since European settlement and are particularly vulnerable to threatening processes.
- Mammals are a good indicator of overall ecological condition as they are highly sensitive to changes in environmental conditions, threats, and land management practices.
- There is a high degree of public interest and concern for Australian mammals, especially for iconic species such as the koala and Tasmanian devil.
- Wildlife camera surveys provide an inexpensive, simple, and easily replicable method for data collection that make data collection accessible to non-experts.

| | |
|---|---|
| Purpose | The purpose of this method is to enable property owners and organisations to measure the condition of terrestrial mammal fauna and trends in their distribution over time. |
| Application | Australia-wide |
| Scale | Properties or projects ranging in size from 100s to 1000s of hectares. |
| Scope | To measure condition at the property or project scale and long-term trends over time. |
| Target Audience | Farmers, land managers and project managers are the intended audience for this method. This method will require the advice of an AFN Accredited Expert with expertise in mammal ecology and GIS, to assist with sampling design and calculation of reference benchmarks during the planning phase of the Account. |
| Decisions to inform | This method can be used to inform decisions about where to focus conservation effort to protect fauna species. For example, data can be used to target feral animal management if sensitive species are found in an area. |
| Confidence Level/s | Level 3 (Moderate). A Level 3 confidence level applies to Methods that include a limited set of indicators and are likely to have moderate accuracy (≥80%) when measuring the condition of environmental assets and detecting change in their condition through time. |

## 1.2. Justification of Confidence Level

This method has a Level 3 confidence level, as it has the capacity to detect change of at least 20% in mammal species richness on a property ≥ 100 hectares in size. This confidence level is achieved through a high level of sampling effort, targeting ground dwelling and arboreal mammals using multiple cameras, with sampling intensity scaled to property size.

## 1.3. What an Environmental account looks like

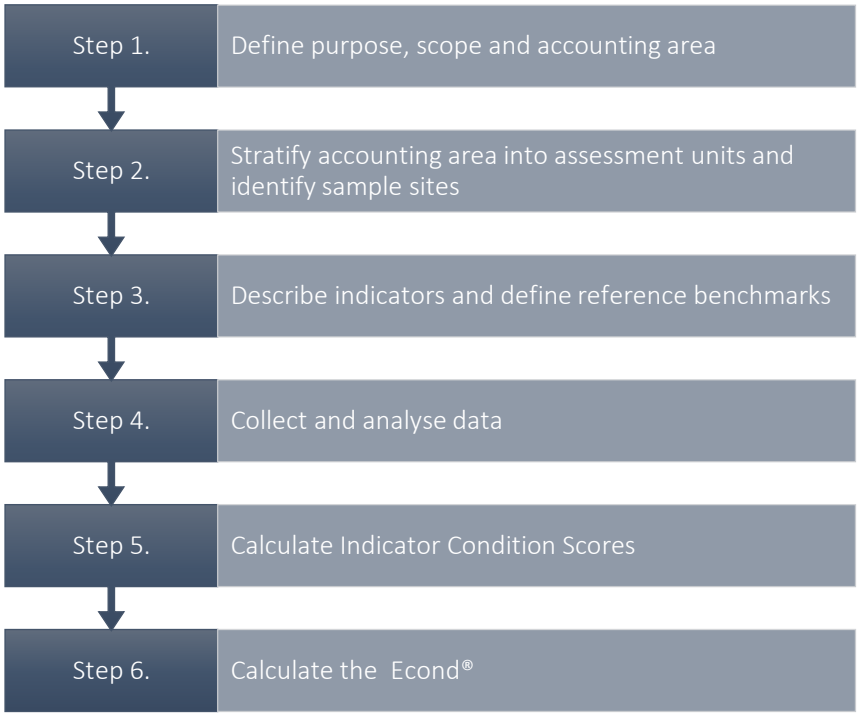
The *Accounting for Nature*® Framework requires accounts to be comprised of three key components for them to be certified:

1. An **Environmental Account Summary** – a public document that summarises the results of the environmental account in a form that is readily communicated to the public.
2. An **Information Statement** – describes in detail the method used and the actions taken to address each of the five steps under the framework including rationale behind asset selection, choice of indicators, Method used, analysis and management of data and calculation of the Econd®.
3. The **Environmental Account** – a database (such as an excel file) that contains all the data described in Asset Tables, Data Tables, and Balance Sheets.
4. An **Audit Report (for 'certified accounts) or an AfN Technical Assessment (for 'self-verified' Accounts)**– both reports verify (to differing degrees) that the Account was prepared in accordance with the approved Methods, the *AfN Standard* and AfN Audit rules.

Upon certification of the account, the Environmental Account Summary and Information Statement will be published on the AfN Environmental Account Certification Registry.

## 1.4. Overview of Process

This method includes the following six steps:




**Note – Expert Assistance**

Both **Step 2** and **Step 3** require expertise in, mammal ecology, GIS and spatial analysis. In most cases it will therefore be necessary for a proponent to engage an AFN accredited expert to assist with these planning stages. However, the field data collection and analysis methods described in **Step 4** have been designed so that landholders can undertake this work themselves.

# 2. Creating the Environmental Account

## Step 1. Define purpose, scope, and accounting area

The preliminary step to developing an Environmental Account is to **describe** the Environmental Account through defining its intended **purpose**, **scope** and **accounting area.**

| | |
|---|---|
| **Purpose:** | Describe the specific purpose of the account. |
| **Scope:** | Describe the scope of the account. This method is suitable for:<br>- *Snapshot* – a one-off assessment of condition of Native Vegetation<br>- *Change over time* – an ongoing assessment of the change of environmental condition through time |
| **Accounting Area:** | Describe the accounting area (include location and size details). Provide a map of the accounting area that shows location and size information.<br>*NB. The accounting area must stay the same for the lifespan of the account. If the accounting area changes (such as a new area to be added, or an area to be removed), then a new account must be developed, or the account, 're-set' and started again with the new accounting area.* |

**Output of Step 1**

- A description of the accounting area including **location** and **size**
- A table describing the **purpose** and **scope** of the account
- A **map** showing the accounting area

## Step 2. Stratify the accounting area and identify sampling sites

### Stratify the accounting area

The accounting area should by divided into assessment units based on management approach (e.g. grazing, conservation area). Within those assessment units, sites should be stratified to ensure that sampling is representative of the habitat types (e.g. vegetation types, rocky outcrops) within that assessment unit. An AFN Accredited Expert with expertise in mammal ecology, monitoring and GIS should be consulted during the initial sampling design phase to ensure that sites are established in a way that will represent the range of potential habitat types and which reflect the ecology of the species that are expected to occur in that locality.

### Select sample sites

*Table 1. Overview of how to select and establish sampling sites within each assessment unit*

| Sampling design | Instructions |
|---|---|
| **Number of sites per assessment unit** | 1 site / 20 ha per assessment unit, up to a maximum of 10 sites per assessment unit. |
| **Site selection** | Sites should be located in areas with practical access, within 250m of a track, if possible, to provide practical access for repeat surveys. However, avoid placing cameras along tracks as these are preferentially used by introduced predators and will bias the results. Most terrestrial mammals are mobile and relatively wide ranging so sites should be established at least 500 m apart (i.e. 1 site per 20 hectares). This avoids spatial autocorrelation of data for more mobile species. However, site spacing will vary depending on the ecosystem being surveyed. In semi-arid and arid ecosystems or on very large properties, a greater spacing between sites will be appropriate and a local expert should be consulted for guidance. |
| **Timing** | Surveys should occur once per year, in the same month. Late-spring to early summer sampling is most likely to detect the full range of species present at a site for most Australian climatic zones because greater food availability increases the activity of most mammal species. |
| **Site establishment** | At least three cameras are set at each site (example given in Figure 1), spaced over an area of up to 2 hectares. The cameras should be set up to target small ground-dwelling mammals, medium-large ground dwelling mammals, and arboreal mammals (where suitable forest or woodland habitat is present). Take time to familiarise yourself with the site and set the cameras where there are signs of animal activity (an AfN Mammal Expert can assist with this if required). For ground dwelling animals, these include animal paths, scratchings and diggings on the ground, and scats. For arboreal animals these include scratching on the barks of trees, feeding marks, hollows, and scats around the base of trees. Camera surveys for small mammals should target the margins of areas with low, dense ground cover, while larger mammals are more easily detected in more open areas. |

| Sampling design | Instructions |
|---|---|
| | For ground-based mammal surveys, cameras should be oriented towards open areas, free of vegetation that can move and trigger the wildlife camera. If no clear sites are present, then the target area can be cleared of herbaceous plants manually. Vegetation should not be cut in protected areas or in areas where threatened plants may occur. An area of 4m x 4m is usually adequate to reduce false triggers from moving vegetation. Each site can be marked with a labelled star picket, which can be used to mount the camera in non-forest vegetation types (Figure 2).<br>Where arboreal mammals are likely to be present, a camera should be located with cameras oriented towards feeding platforms attached to mature trees (Figure 3). |

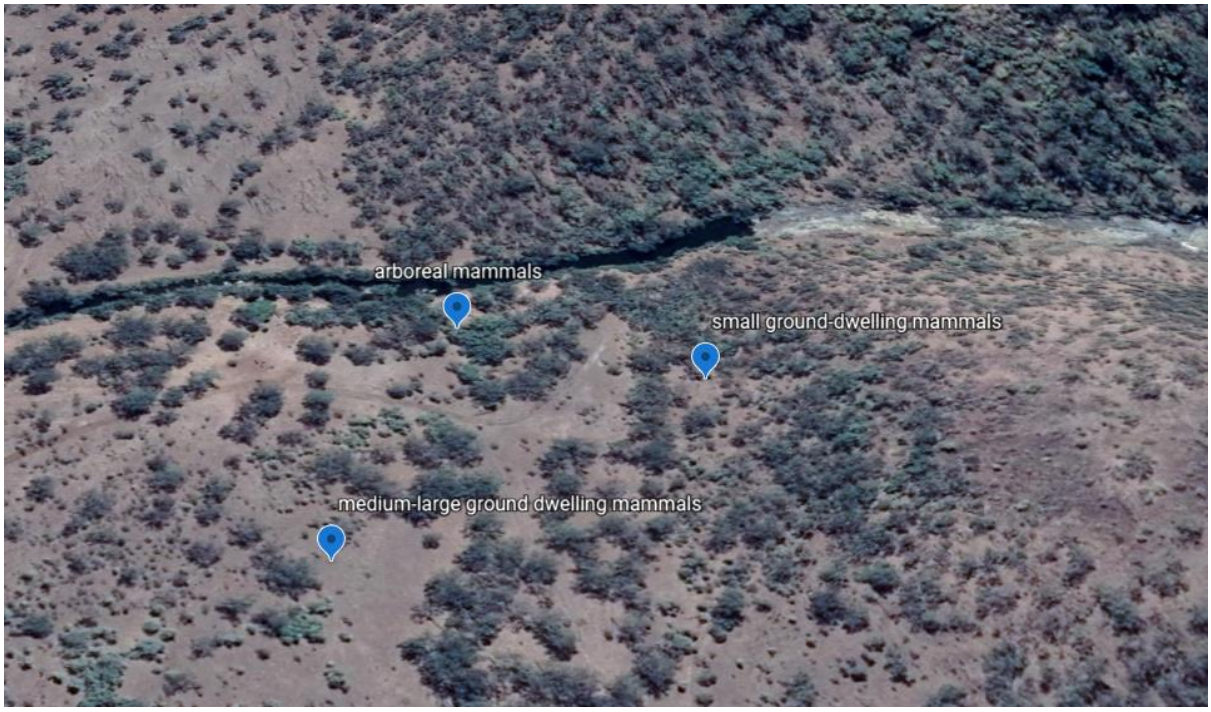



Figure 1. A typical site, with three cameras deployed to target mammals across a range of micro-habitat types. In this example, a camera has been located in taller riparian forest adjacent to the Burnett River. Smaller ground dwelling mammals are surveyed in an area where low, dense shrubs and tussock grasses provide good cover, while larger mammals are surveyed in more open vegetation. There is practical access to the site via a farm 4WD track.

### Output of Step 2

- A map and table showing the **stratification** of the accounting area and identifying assessment units
- A map and table with central coordinates of each **sample site** within the accounting area.

## Step 3. Describe environmental indicators and determine reference benchmarks

### Indicators

This Method measures species richness, with data aggregated within each assessment unit and then across the entire project area. This provides a simple but robust indicator of fauna condition at the property/project scale.

| | |
|---|---|
| Species richness | - Data is collected at each site from at least three cameras deployed over an area of up to 2 hectares. A species list is produced for each site.<br>- A species list for each assessment unit is then produced by aggregating the data from each of the sites within that unit (up to 10 sites).<br>- A condition score for species richness is calculated as the total number of species observed as a percentage of the number of species expected to occur in that assessment unit based on the pre-1750 reference benchmark of fauna species distributions, see below.<br>- This provides a simple yet robust measure of the condition of each assessment unit. |

### Australian-wide mammal reference benchmark mapping

Reference benchmarks are available as an Australia wide GIS layer – *Australian Mammal Pre-1750 Distribution* – which AFN will provide upon request by a project proponent.

- The GIS layer contains data on the distribution of 230 terrestrial mammal species across Australia's 85 IBRA Bioregions (Thackway and Cresswell 1995).
- It has been adapted from a database of the pre-European distribution of Australian native mammals produced by Burbidge et al (2008) based on sub-fossil, historic and contemporary sources.

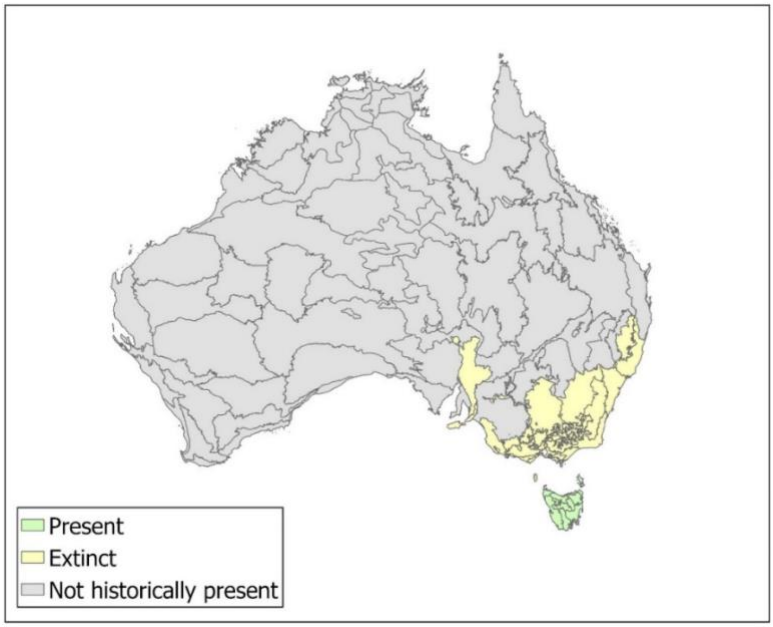



Figure 2. Example species distribution map – the present and pre-1750 distribution of the Eastern Quoll (*Dasyurus viverrinus*) in IBRA6 bioregions (adapted from Burbidge et al. 2008).

Account-scale reference benchmarks (to be undertaken by an AFN accredited fauna expert)

1. The AFN Expert determines a list of potential species within the property or project area, by querying the *Australian Mammal Pre-1750 Distribution* GIS layer.
2. The list of potential species is refined to a list of expected species using the following sources of information:
   - The AFN Expert's knowledge of the ecology and historic range of each species
   - Presence of suitable habitat within the project area
   - Guidance from key references, especially
     - The Action Plan for Australian Mammals 2012 (Woinarksi et al 2012, eBook available)
     - The Mammals of Australia (Van Dyck and Strahan 2008)
     - Atlas of Living Australia
   - Consultation with other experts
3. The expert assigns each expected species a weighting as follows

| Very likely present | Possibly present | Unlikely to be present |
|---|---|---|
| 1 | 0.5 | 0 |

4. *Expected Richness* for the project area is calculated as the sum of weighted values for expected species.
5. If an unexpected native mammal is detected by the survey, then it is added to list of expected species for the project area, and expected richness is adjusted prior to calculation of the Econd®.

Output of Step 3

- A table describing the **environmental indicators** to be measured in the account
- A table that includes the **Reference Benchmark value** for the project area – essentially a list of species expected to occur at that location, derived from a query of the GIS layer and refined by expert opinion

## Step 4. Collect and analyse data

### Data collection

Wildlife cameras have revolutionised monitoring of wildlife. Wildlife cameras use an infra-red sensor to detect the movement of an animal and trigger the camera. The following three field methods are used to survey for small ground-dwelling mammals, medium-large ground dwelling mammals and arboreal mammals.

### Ground-dwelling mammal survey

| *Equipment* | *Time required* | *Camera settings* | *Expertise* |
|---|---|---|---|
| Wildlife camera and strap, duct tape, steel post, wooden bracket, fish oil | Up to 30 minutes per set-up | - Date and time set<br>- 3 photos per trigger<br>- 45 second trigger delay<br>- Image size: low | No expert knowledge or skills required |

1. The camera is mounted on a tree or fencepost at a height of 1.3m, with the camera oriented horizontally towards the target area.
2. Where no suitable mounting is available, the camera may be attached to a wooden bracket, mounted on a tree or steel fence post at a height of 1.3m, angled towards the ground (see figure 3). If necessary, tape is used to make the camera secure.
3. A scent lure (fish oil and/or peanut oil) is applied directly to the platform. Fish-oil is widely available at fishing stores and is attractive to both carnivores and herbivores.
4. The time and date stamp should be set. The camera should be programmed to take three still photos per trigger with a 45 second delay between triggers.
5. The camera is left in situ for a survey period of 10 days. If possible, check the camera after 2 days to see that it is working, and that moving vegetation is not causing false triggers. The camera may be left in place for a longer period if logistics require, but images taken after the 10-day survey period should not be included in analyses.

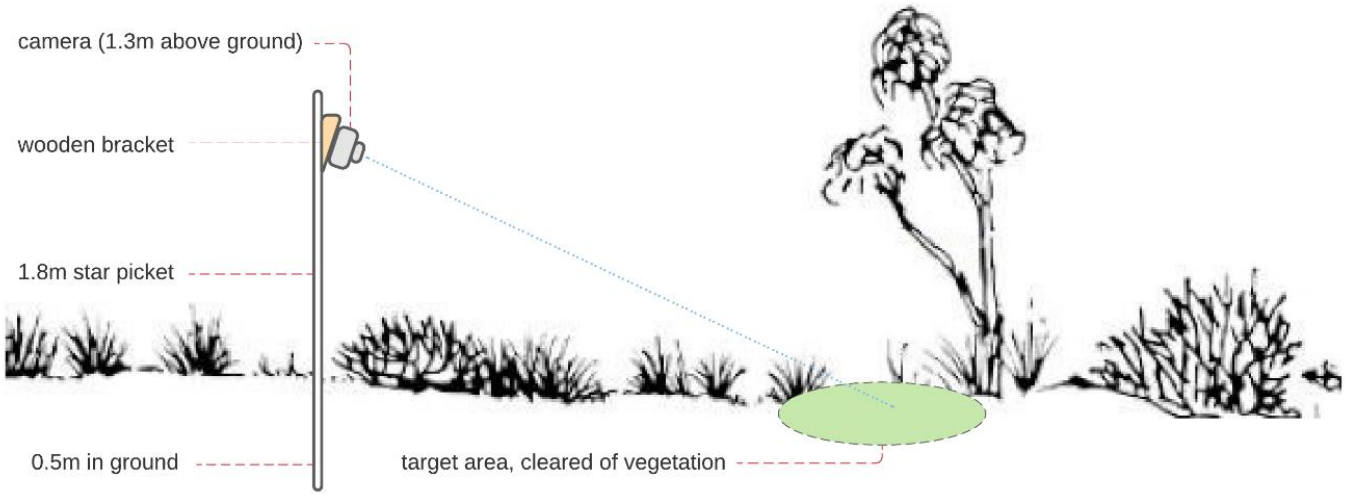



Figure 3. Monitoring site setup for medium-large ground dwelling mammals

### Small ground-dwelling mammal survey

| *Equipment* | *Time required* | *Camera settings* | *Expertise* |
|---|---|---|---|
| Wildlife camera and strap, duct tape, steel post (star picket), galvanised right angle bracket, bolts, fish oil | Up to 30 minutes per set-up | - Date and time set<br>- 3 photos per trigger<br>- 45 second trigger delay<br>- Image size: low<br>- Flash power: low | No expert knowledge or skills required |

1. The camera is mounted on the base of a tree or fencepost at a height of 0.5m, with the camera oriented towards the target area.
2. Where no suitable mounting is available, the camera may be mounted on a wooden bracket attached to a steel fence post at an approximate height of 0.5m. If necessary, tape is used to make the camera secure. Orient the camera at an angle pointing downwards to the ground (see Figure 4), aiming at a target area 2m across that has been cleared of vegetation.
3. A scent lure (fish oil and/or peanut oil) is applied directly to the target area of ground. Fish-oil is widely available at fishing stores and is attractive to both carnivores and herbivores.
4. The camera is left in situ for a survey period of 10 days. If possible, check the camera after 2 days to see that it is working, and that moving vegetation is not causing false triggers. The camera may be left in place for a longer period if logistics require, but images taken after the 10-day survey period should not be included in analyses.

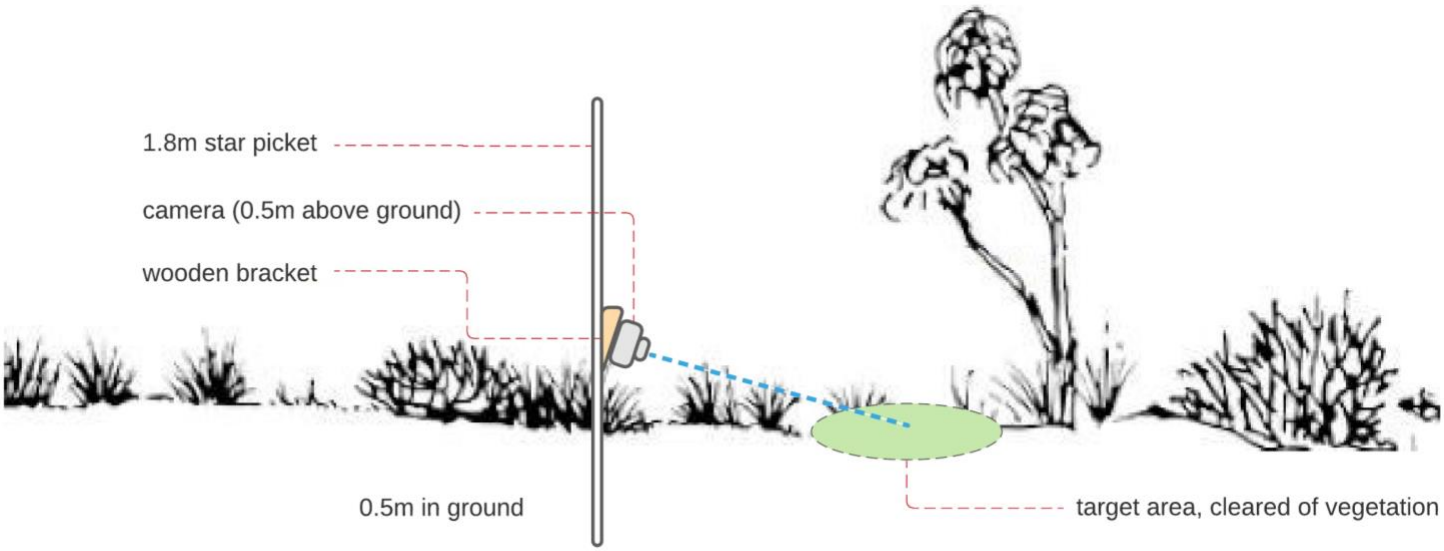



Figure 4. Camera setup for small ground-dwelling mammal survey

Arboreal mammal survey (where suitable forest/woodland habitat is present)

| *Equipment* | *Time required* | *Camera settings* | *Expertise* |
|---|---|---|---|
| Wildlife camera and strap, duct tape, steel post, wooden bracket, feeding platform, right angle bracket, screws, cordless drill, fish oil and/or maple syrup | Up to 30 minutes per set-up | - Date and time set<br>- 3 photos per trigger<br>- 45 second trigger delay<br>- Image size: low<br>- Sensitivity: medium | No expert knowledge or skills required |

1. The camera is mounted on a tree or attached above a wooden bracket on steel fence post at an approximate height of 1.2m. If necessary, tape is used to make the camera secure.
2. Orient the camera at an angle parallel to the ground (see Figure 5), facing towards a mature, hollow bearing or flowering tree if possible. Look for signs of scratching on the bark and droppings at the base of the tree.
3. A feed station comprising a 30cm x 30cm plywood platform is attached to a tree using galvanised screws and a right-angle bracket at 1.3m to 1.5m in height.
4. A scent lure (fish oil and/or maple syrup) is applied directly to the platform. Fish-oil is widely available at fishing stores and is attractive to both carnivores and herbivores.
5. The camera is left in situ for a survey period of 10 days. If possible, check the camera after 2 days to see that it is working, and that moving vegetation is not causing false triggers. The camera may be left in place for a longer period if logistics require, but images taken after the 10-day survey period should not be included in analyses.

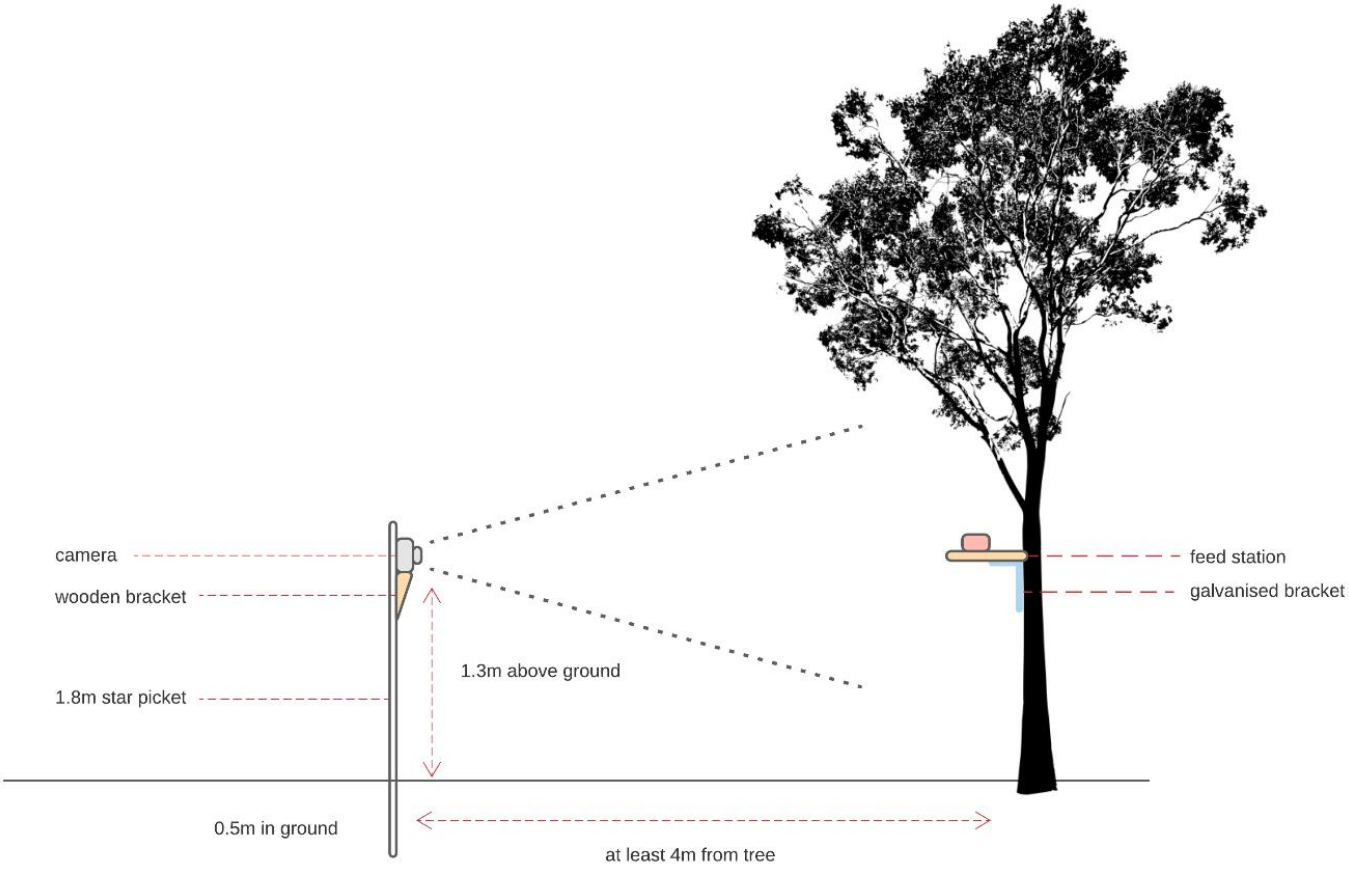



Figure 5. Camera setup for arboreal mammal survey

### Fauna identification

Wildlife cameras produce a prolific amount of raw data in the form of thousands of images of fauna (and moving vegetation). The most significant amount of time spent on a fauna survey is spent identifying the animal species present at a site. A basic level of analysis is undertaken for a Level 3 environmental account, with a simple species list recorded for each site based on a review of the images by an expert or trained person (ideally the landholder themselves). Significant work is being done at present to automate the identification process through image recognition software and machine learning algorithms, but while these technologies are in the development phase manual methods are still required to identify animals.

| *Equipment* | *Time required* | *Expertise* |
|---|---|---|
| Computer, wildlife field manual | 1-2 hours per site | Wildlife ecologist or trained person |

1. Download the images from the wildlife cameras SD card to a folder on a file server for long-term storage.
2. Label the folder with the site name and survey date.
3. Open the folder of images for a site and review every image, recording a list of all species observed at that site in the *Australian Terrestrial Mammal Survey Spreadsheet.*
4. Fill in the survey metadata in the survey spreadsheet.
5. Move on to the next folder of images and continue until all sites have been completed.

### Data management

Wildlife cameras produce raw data in the form of hundreds or thousands of images containing fauna. Maintaining long-term wildlife monitoring datasets can therefore require significant data storage capacity. A file server with a cloud-backup is recommended. A wildlife specific cloud storage and analysis platform such as Wildlife Insights (www.wildlifeinsights.org) is ideal. Only store images of wildlife to reduce data storage requirements. Once classified using image-tagging software, metadata including date, species and site id are extracted into a table of survey data, which is best stored in a spreadsheet or database.

### Output of Step 4

- A **data table** (e.g. a spreadsheet) containing species observations for each monitoring site
- A **folder** (preferably stored on the cloud) containing all photographs of animals. Image metadata tagged with species name and date recorded, subfolders labelled according to the site and year.

## Step 5. Calculate Indicator Condition Scores

Australian terrestrial mammals are mobile and may occur naturally at low densities, which makes them a difficult to reliably detect at a property or project scale, even with a high level of survey effort. Mammal surveys are prone to false-negatives - a failure to detect a species at a site does not necessarily mean that it is not present in that area. To compensate, this Method combines the survey data from multiple sites into an aggregate list of species observed in an assessment unit. While this generates a more robust indicator of the condition of fauna on a property, a consequence of this aggregation is that the spatial resolution of the data is decreased to assessment units rather than sites.

### Species richness indicator condition score -calculated per assessment unit

Data analysis requires a basic level of GIS expertise as reference data will need to be extracted for each assessment unit from the *Australian Terrestrial Mammals Pre-1750 Distribution* GIS layer.

1. *Expected Richness* is calculated for the property as per the instructions in **Step 2, pages 7-8.**
2. *Observed Richness* is calculated as the sum of observed species recorded per assessment unit.
3. An Indicator Condition Score (ICS) is derived for each assessment unit by calculating *Observed Richness* as a percentage of *Expected Richness* (i.e. *Observed Richness* / *Expected Richness* x 100)
4. The ICS are then aggregated using an area weighted average of every assessment unit to give a whole of account area ICS.

### Alternative methods for analysis

AFN recognises that more rigorous and sophisticated methods for analysis such as occupancy modelling are available for analysing species observation data (e.g. Stanley and Royle, 2005). However, our intention in this instance is to keep the analysis process as simple as possible so that non-specialists are able to analyse and interpret the data. Also, occupancy modelling typically requires a much higher degree of sampling effort (i.e. many more sites) than may be feasible for many landholders and project coordinators.

### Worked Example 1 – Aggregating species observation data for an assessment unit

Table 1 on the next page contains a worked example that demonstrates how data is aggregated from site surveys to the assessment unit.

- In this example, the assessment unit is an area of grassy woodland managed for conservation. It is a relatively small area (40 hectares), so two sites are established (i.e. one site per 20 hectares), as per the sampling design instructions on page 5.
- At each of the two sites, three wildlife cameras are installed to survey for arboreal mammals, small ground-dwelling mammals, and medium-large ground dwelling mammals.
- The cameras are left in situ for 10 days, after which they are collected and the data downloaded to the landholder's computer.
- An online image tagging platform called Wildlife Insights is used to identify and tag the wildlife images and a species list is produced for each camera at each site (see Table 1).
- An AFN Accredited Expert, working with the landholder, produces a list of expected species native to the assessment unit, by querying the *Terrestrial Mammals Pre-1750 Distribution* GIS layer, removing two species because no suitable rocky habitat is available on this property. Observed Richness is calculated i.e. the weighted sum of expected species (see *Step 2, pages 7-8)*
- An aggregate species list is produced for the assessment unit and *Observed Richness* is calculated (i.e. the weighted sum of observed species).
- An indicator condition score for the assessment unit is calculated as the percentage of observed to expected species (introduced species and native species outside their natural range are excluded).

*Short-beaked echidna (Tachyglossus aculeatus)*

**Output of Step 5**

- A **Data Table** (e.g. a spreadsheet) containing all the data (including calculated Indicator Condition Scores)

| REFERENCE | | | OBSERVATION DATA | | | | | | | | | ECOND |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Expected species | Weighting | Expected species richness | Site 1 | | | Site 2 | | | Aggregated List | Weighting | Observed species richness | Indicator Condition Score |
| | | | Cam 1 - Arboreal | Cam 2 - Ground (med-large) | Cam 3 - Ground (small) | Cam 1 - Arboreal | Cam 2 - Ground (med-large) | Cam 3 - Ground (small) | | | | |
| Common brushtail possum | Very likely 1 | 18.5 | Common brushtail possum | Eastern grey kangaroo | Eastern chestnut mouse | Common brushtail possum | Eastern grey kangaroo | Common planigale | Common brushtail possum | 1 | 15.5 | 83.8 |
| Greater glider | Very likely 1 | | Greater glider | Whiptail wallaby | Narrow nosed planigale | Greater glider | Red-necked wallaby | Yellow-footed antechinus | Greater glider | 1 | | |
| Feathertail glider | Very likely 1 | | Feathertail glider | Rufous bettong | | Sugar glider | Swamp wallaby | Pebble-mound mouse | Feathertail glider | 1 | | |
| Sugar glider | Very likely 1 | | Black rat (introduced) | Cat (introduced) | | Koala | Rufous bettong | House mouse (introduced) | Sugar glider | 1 | | |
| Koala | Very likely 1 | | | | | | Short beaked echidna | | Koala | 1 | | |
| Eastern grey kangaroo | Very likely 1 | | | | | | Dingo | | Eastern grey kangaroo | 1 | | |
| Whiptail wallaby | Very likely 1 | | | | | | Rabbit (introduced) | | Whiptail wallaby | 1 | | |
| Red-necked wallaby | Very likely 1 | | | | | | | | Red-necked wallaby | 1 | | |
| Swamp wallaby | Very likely 1 | | | | | | | | Swamp wallaby | 1 | | |
| Rufous bettong | Possible 0.5 | | | | | | | | Rufous bettong | 0.5 | | |
| Short beaked echidna | Very likely 1 | | | | | | | | Short beaked echidna | 1 | | |
| Dingo | Very likely 1 | | | | | | | | Dingo | 1 | | |
| Northern quoll | Very likely 1 | | | | | | | | Eastern chestnut mouse | 1 | | |
| Brush-tailed phascogale | Possible 0.5 | | | | | | | | Narrow nosed planigale | 0.5 | | |
| Eastern chestnut mouse | Very likely 1 | | | | | | | | Common planigale | 1 | | |
| Narrow nosed planigale | Possible 0,5 | | | | | | | | Yellow-footed antechinus | 0.5 | | |
| Common planigale | Very likely 1 | | | | | | | | Pebble-mound mouse | 1 | | |
| Yellow-footed antechinus | Possible 0.5 | | | | | | | | | | | |
| Pebble-mound mouse | Very likely 1 | | | | | | | | | | | |
| Fawn-footed melomys | Possible 0.5 | | | | | | | | | | | |
| Common ringtail possum | Very likely 1 | | | | | | | | | | | |

Table 1 – Worked Example One – Aggregating Observation Data from the Site to the Assessment Unit

## Step 6. Calculate the Econd®

The Econd® is an index between 0 and 100, where 100 describes the 'ideal' or 'undisturbed' reference condition of an environmental asset, and 0 indicates the asset is completely degraded. For this method, the Econd for a project area is calculated as the area-weighted average of assessment units. If there is only one assessment unit then the Econd calculation will be the same as the Indicator Condition Score (see Step 4 on the preceding pages).

### Worked Example 2 – Aggregating indicator condition scores for each assessment unit to produce a property Econd® for mammals

Table 2 below shows how the final Econd® for terrestrial mammals is calculated for the property. The same hypothetical property is used for this example. In total there are three assessment units: grassy woodland used for conservation (from example one), grassy woodland used for intensive grazing, and tall open forest used for occasional grazing. The final Econd® for the property is calculated as the area weighted average of each assessment unit. While assessment unit one is in the best condition, its relatively small extent means that it contributes less to the overall Econd® for the property.

| Assessment Unit | Expected Richness | Observed Richness | Unit ICS | Assessment Unit Area | Area Weight | Area Weighted Score (ICS x Area Weight | Econd® |
|---|---|---|---|---|---|---|---|
| 1 | 18.5 | 15.5 | 83.8 | 50 ha | 0.08 | 6.7 | 45.7 *= sum of area weighted scores* |
| 2 | 18.5 | 7 | 37.8 | 475 ha | 0.66 | 24.9 | |
| 3 | 18.5 | 10 | 54.1 | 188 ha | 0.26 | 14.1 | |

Table 2. Aggregating data from assessment units to calculate an Econd® for the whole property.

*Brush-tailed rock wallaby (Petrogale penicillata)*

Output of Step 6

- A **data table** (e.g. a spreadsheet) containing all the raw data for each indicator for each sample, including the calculations for the ICS and Econd®.
- A **summary table** showing the Econd® scores.

## 3. Compile Environmental Account and submit for certification

Your AFN accredited expert can guide you through this process. For your account to be certified, it must be independently audited or self-assessed and must comply with the *Accounting for Nature® Standard*, which outlines the criteria that must be satisfied. An environmental account may incorporate multiple Environmental Assets (e.g. terrestrial mammals, freshwater and native vegetation), and always needs to include the following information:

- Environmental Account summary;
- Information Statement,
- Environmental Account; and;
- Audit Report or AfN Technical Assessment.

The data collection and analysis procedures outlined in steps five to eight should be repeated at regular intervals (a minimum of every five years or where Base Year recalculation is required, as specified under the *Accounting for Nature®* Framework) to establish a trend over time. Ideally, surveys should occur annually, even if accounts are only certified once every five years.

*Grassy woodland at Goondicum Station in Central Queensland*

# 4. References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