

Forest Protection Survey Program

Survey Guideline - Terrestrial Camera Trapping
(V5.0)



Acknowledgements

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Terrestrial Camera Trapping

Context

The target species for terrestrial mammal camera trapping include the Spotted-tailed Quoll, Long-footed Potoroo, Smoky Mouse, Brush-tailed Phascogale, Long-nosed Potoroo, Southern Brown Bandicoot, New Holland Mouse, Broad-toothed Rat, and Swamp Antechinus.

Many other species e.g. Dingo, cat, fox etc may also be observed by terrestrial camera trapping and while not the target of this survey method, these observations are to be reported.

Some of the threatened small mammals detected via camera trapping may not be identifiable to species level. This can be due to a paucity of suitable close-up high-quality images or because some small species can never be identified by camera trap images alone. For example, Common Dunnarts and White-footed Dunnarts can only be distinguished from each other by close physical examination in-hand. Where identification of Dunnarts from photos is uncertain, the surveyor is to record the observation as an interim observation and to record the identification as "Unidentified Sminthopsis" VBA TaxonID 11800. The surveyor is to seek expert taxonomic advice to interpret the photos.

Where small mammals are detected and identification is uncertain (interim), the surveyor will advise the Contract manager. The Contract manager will then determine whether the survey site will require cage or Elliott trapping to confirm the identification of these species.

Objectives

To detect high priority terrestrial mammals using camera traps within, and immediately adjacent to survey sites.

To use camera traps to detect high priority small mammals that may trigger the application of other techniques e.g. Elliott trapping, to confirm the identification of species that can't be identified to species level by images alone (e.g. Dunnart sp.).

Survey effort

Analyse the detection probabilities and habitat for the site and make an assessment of the number of camera trap sites that could be deployed to meet the survey objectives.

For most species a 'camera trap site' consists of two paired camera traps. Up to five 'camera trap sites' (10 cameras) may be installed per survey site depending on survey site size.

Further species-specific requirements are outlined below, but as a guide, for survey sites <30 hectares, two 'camera trap sites' (4 cameras) are recommended to be installed, and for sites >30 hectares, up to 5 'camera trap sites' (10 cameras) may be installed.

The total number of camera traps deployed per survey site will vary according to the size of the survey site, species being targeted, and habitat suitability across the site. Each of these factors must be assessed to determine the appropriate number of camera trap sites to be deployed for a survey site.

Where undisturbed parts of survey sites and adjacent viable habitat are particularly small (e.g. < 20 hectares) and/or where existing special protection zones overlap a significant part of the survey site, fewer than two camera trap sites may be installed.

Camera trap sites are to be placed within survey site boundaries, or immediately adjacent (no further than 50 m outside the survey site boundary) in suitable habitat.

Cameras are to be left in place for up to four weeks/28 nights or three weeks /21 days depending on the target species.

Four different types of camera trap stations may be constructed:

1. Specifically targeting Spotted-tailed Quolls
2. Medium-sized mammals e.g., Long-footed Potoroo
3. Specifically targeting Brush-tailed Phascogale
4. Small mammals e.g., Smoky Mouse

Surveyors are provided with the detection probabilities of the target species for each survey technique. Surveyors are to target their surveys to those species with the highest detection probabilities in each survey site. The species with higher detection probabilities aid in determining the target species most likely to be detected by the survey technique and will thus inform survey parameters such as preferred habitat for survey, bait type, camera settings, etc.

Different types of bait attractant may be used depending on the target species:

- carnivore bait (to attract quolls) consisting of sardines, chicken pieces with fish oil.
- standard mammal bait (to attract herbivores / omnivores / mycophagus mammals) consisting of a mix of peanut butter, rolled oats, golden syrup and truffle oil or pistachio essence (for mycophages).
- Sugar and water solution to attract selected arboreal mammals e.g., Brush-tailed Phascogale.

Cameras will be set to take still images (not video).

Carnivore (predator) and standard mammal herbivore (prey) camera trap stations must be separated spatially by at least 500m unless specified otherwise. Carnivore and herbivore surveys will not be combined within one survey effort. Carnivore and herbivore camera trapping will only be conducted as separate survey efforts, to protect prey species.

At least two visits will be made to each survey site (to deploy and then retrieve cameras) and up to four visits shall be expected if quoll camera trap sites are within 500 m of other camera trap sites and therefore require a separate deployment.

Surveyors are required to record a track log of the area covered from the start to the end within each survey site when setting up cameras. The track log is to be converted to a GIS shapefile and submitted with the shapefile attributes as outlined in the shapefile template provided.

Surveyor requirements

A field survey team of at least two people.

At least one team member experienced in the use of automated "trail" cameras as baited camera traps in wildlife surveys.

Sound, practical knowledge and experience in all aspects of the particular models of survey cameras being deployed.

Understanding of the practical limitations in using camera traps (that are primarily designed to photograph large game animals moving on trails at a distance) for wildlife surveys (detecting small to medium sized animals at small bait stations at close range). It is especially critical that surveyors understand the shape and spread angle of the sensor's detection zone for each model of camera used, in order to aim it correctly.

Attention to detail to ensure that survey cameras are correctly set-up, both in terms of correct internal settings and external physical positioning.

Surveyors may have to buy materials and construct their own bait holder devices.

Be able to recognise potential habitat for the primary target species (i.e. Spotted-tailed Quoll, Long-footed Potoroo, Smoky Mouse and dunnarts) habitat.

Be able to positively and confidently identify mammals in camera trap images.

Equipment for the technique

- Digital or other Camera (with carry case, spare batteries, spare storage card) capable of including georeferencing data with each photo.
- Infra-red cameras
- White flash cameras
- Batteries (that can perform for 3-4 weeks)
- Memory cards
- Card viewer or digital camera (if no inbuilt viewing screen on survey cameras)
- Bungee cord or similar (to attach cameras to trees)
- Cable-locks (or similar locking device if desired)
- Elevated bait holder devices, well aerated (e.g. small custom cages, modified cutlery drainers, PVC pipes with holes, insect/waterproof pipe vents, etc) (devices are NOT to be pegged to the ground)
- Rain covers (for bait holders e.g. stiff plastic, stainless steel termite shields)
- Poles/stakes/fence droppers (as necessary to elevate cameras and bait holders)
- Block hammer / steel mallet (to drive in posts/stakes)

- | | |
|---|--|
| <input type="checkbox"/> Bait - carnivore and/or herbivore/mycophagus bait | <input type="checkbox"/> Small white board and marker / clipboard (with blank paper and texta) |
| <input type="checkbox"/> Attachment devices for bait holders (e.g. wire) | <input type="checkbox"/> 2x GPS |
| <input type="checkbox"/> Attachment tools (e.g. pliers) | <input type="checkbox"/> 2x hand-held compasses |
| <input type="checkbox"/> Camera alignment devices (e.g. plastic/timber wedges, custom mounts) | <input type="checkbox"/> Appropriate spare batteries for all equipment |
| <input type="checkbox"/> 5 m tape measure | <input type="checkbox"/> 2x Camera Trapping Datasheet/forms on 2x electronic-based pro-formas. |
| <input type="checkbox"/> Vegetation clearing equipment (e.g. secateurs, pruning shears) | <input type="checkbox"/> Back-up hard copies of datasheet/forms on waterproof paper on clipboards x2 |

Site Preparation

The general location of the survey sites may be pre-determined (e.g. via desktop assessment or site habitat assessment). Surveyors are responsible for selecting camera trap sites based on identifying the best available habitat on the site for the target species.

Conducting the survey

All camera surveys:

Cameras are to be installed and setup in accordance with the manufacturer's guidelines and the specific directions in this survey guideline.

Ensure that the camera has the correct date and time set.

Use advanced camera settings where possible e.g., high image resolution, multiple pictures per trigger, minimum delay between triggers (without unduly compromising battery life and the unit's ability to function normally for the required survey period).

Ensure that the camera is coded with survey and camera trap site and camera details (e.g. save the first camera photo of small white-board or similar showing Survey site ID/name, camera trap site number and camera number within the survey site).

All cameras are to be set in horizontal orientation facing across the ground (i.e. not set vertically / directly facing the ground).

All baitholders must be elevated to a height to suit the target species (see detail below).

Ideally face the camera approximately south to avoid the rising or setting sun flaring in the lens.

Using the camera's walk test mode, ensure that the camera detects movement either side and in front of the bait station.

Check that the camera is aimed and aligned correctly with the bait station by viewing test images (e.g., using an external image viewer, digital camera). Centre the sensor's detection zone on the base of the bait pole/tree. This may or may not correspond to the centre of the picture frame depending on the model of camera used. The worker must be familiar with this and adjust the alignment accordingly.

Ensure at least 1 m of ground is visible in the test image between the camera and bait so that animals close to the camera are captured. Adjust the height or angle of the camera accordingly.

Remove any vegetation in and around the camera station which may heat up and move in the wind causing the camera to trigger (i.e., false trigger).

Ensure the ground between the camera and bait station is reasonably homogenous to prevent differential heating of some objects (e.g., large rocks vs leaf litter) which could falsely trigger the camera via air movement across the object.

It is advised that camera units be locked against theft.

Record the camera trap's location and mark the camera trap site with flagging tape (this may not be advisable in areas where theft is likely be an issue).

At least six photos of each camera trap are to be taken to show the camera setup, bait station setup, the relationship between the two and the habitat where the trap is setup. Photos may be taken by using the SD card from the camera

trap (in a separate digital camera). These may then be submitted along with the camera trap images when submitting the survey data.

On retrieval of the camera at the end of the survey, approach the camera from the front to trigger the camera so that a time and date-stamped image is saved to determine whether the camera has remained operational for the survey duration. This indicates the end of the sampling period when analysing the camera photos back at the office.

If no more camera surveys are to be conducted at the survey site, then remove all flagging tape.

Camera traps for Spot-tailed Quolls:

Survey from May – August (avoid Spring and early Summer)

2 camera traps per 'camera trap site', traps set 300–500 m apart for 28 days. For survey sites less than 20 ha, use 1 'camera trap site'.

Cameras with infrared flash are recommended but white flash units can also be used.

Standard camera settings:

- Motion sensor On
- Sensitivity High
- 5 pictures per trigger
- No delay between photos e.g., Rapidfire
- Quiet period – No delay (i.e., no delay between successive triggers)

Ensure that the camera is in 24 hr mode (as quolls can be active both day and night).

Bait holder ~ 1 m above the ground, camera sensor ~ 0.5 m above the ground (knee height).

3–4 m between the camera and bait station.

Use a GPS to ensure separation of quoll camera traps from each other i.e., trap stations 300–500 m apart (and 500 m from any other camera trap targeting other species at the same time).

The bait shall be a large fist-sized mass (e.g., chicken drumstick, 2 x opened tins of sardines) inside a well-ventilated holder, preferably protected from the rain.

Pour a small amount of fish oil down the bait tree/pole/stake and around its base to encourage an animal to linger.

Camera traps for medium-sized mammals:

Detection and identification of Long-footed Potoroo, Long-nosed Potoroo, Southern Brown Bandicoot, and other medium sized mammals (other than Brush-tailed Phascogale).

Can conduct surveys at any time of the year (but Autumn is optimal)

Two camera traps per 'camera trap site', traps set approximately 100 m apart within a survey site in suitable habitat for 21 days, up to a maximum of five 'camera trap sites' per survey site.

Cameras with infrared flash are recommended but white flash units can also be used.

Standard camera settings:

- Motion sensor On
- Sensitivity High
- 5 pictures per trigger
- No delay between photos e.g., Rapidfire
- Quiet period – No delay (i.e., no delay between successive triggers)

Ensure that the camera is in 24 hr mode (Southern Brown Bandicoots can be active both day and night)

Bait holder ~ 30 cm above the ground, camera sensor ~ 0.5 m above ground (knee height)

3 m between the camera and bait station

Use a GPS to ensure separation of approximately 100 m between camera traps.

Use a standard mammal bait (peanut butter, rolled oats, golden syrup) that includes a small amount of truffle oil or pistachio essence with a partially fluid 'runny' consistency to hinder desiccation and loss of smell over time.

If tea infusers are used as bait holders (6-8 are recommended) they must be contained within a cage device (as some animals can open them and remove the bait). The ideal tea infusers are perforated, stainless steel, double-spoon type.

Camera traps for Brush-tailed Phascogale:

Camera traps targeting Brush-tailed Phascogale will include the following:

- Up to ten camera traps per survey area with single camera traps mounted at approximately 100m intervals.
- Where habitat suitability is limited, a minimum of five cameras are to be installed. If it is not possible or feasible to install a minimum of five cameras, then the survey is to be abandoned on the basis of unsuitable habitat.
- Cameras are to be mounted 1m above ground on a stake, 1-1.5m away from and aimed directly at the bait station.
- Target areas with
 - Medium to larger diameter Red, Grey or Yellow Box trees
 - trees with smooth or loose fibrous bark e.g. box bark species
 - trees with visible hollows noting hollows could be located anywhere on the tree from the ground up.
 - in areas with sparse understorey and higher litter cover and greater density of logs
 - dry forested slopes rather than gullies
- mount the bait station on the tree trunk 1-2m above ground level.
- bait stations are to be baited with a standard herbivore bait or similar.
- spray the tree trunk 2m above and 1m below, and on the bait station with the sugar/water attractant.

Camera traps for small mammals:

If specifically targeting Smoky Mouse, Swamp Antechinus, White-footed Dunnart, Common Dunnart, New Holland Mouse, Heath Mouse.

Can conduct surveys any time of the year (late-Summer is probably optimal for Smoky Mouse)

2 camera traps per camera trap site, cameras approximately 100 m apart in suitable habitat for 21 days, up to a maximum of 5 camera trap sites per survey site.

Standard camera settings:

- Cameras with white flash only
- Motion sensor On
- Sensitivity High
- 5 pictures per trigger
- No delay between photos e.g., Rapidfire
- Quiet period – No delay (i.e., no delay between successive triggers)

Bait holder ~ 20 cm above the ground (encourages small mammal to climb onto, or reach up for, the bait holder and thus reveal diagnostic identification features such as tail/body length), camera sensor ~ 10-30 cm above ground (shin height)

1.0–1.5 m between the camera and bait

NOTE: The brightness of the white flash can vary between camera models. Because the camera is set close to the bait holder it will be necessary to test the white flash brightness in advance for potential overexposure at close range and reduce intensity if necessary (e.g., via settings, tape over the illuminator, etc).

NOTE: The choice of camera model and the correct aiming of the unit is critical when targeting small animals at close range.

Ensure that the camera trap station is clear of all vegetation, rocks etc down to 2-3cm above the ground (particularly near the bait holder) to prevent any small animals being obscured from the camera.

As the camera is set low to the ground ensure that the sensor has a clear view straight to the base of the bait pole (i.e., that the detection zone is not blocked by a rise/bulge in the ground between the sensor and the bait pole).

Use a GPS to ensure separation of 100 – 120 m between cameras at each survey site.

Use a standard mammal bait (peanut butter, rolled oats, golden syrup) with a partially fluid 'runny' consistency to hinder desiccation and loss of smell over time.

If tea infusers are used as bait holders (6-8 are recommended) they must be contained within a cage device (as some animals can open them and remove the bait). The ideal tea infusers are perforated, stainless steel, double-spoon type.

If Smoky Mouse is detected in a camera trap using Infra-red flash, Surveyors are required to seek confirmation of the identification from taxonomic experts at the Artur Rylah Institute (ARI). Contact details are available on request from fpsp.inquiries@delwp.vic.gov.au.

Data reporting requirements

Data requirements are outlined throughout this guideline and in the datasheet/forms. Complete all required fields on the datasheet/forms for each target observation.

- Record observation data in the datasheet after tagging images using DigiKam in accordance with the camera trap image analysis procedure.
- Record a GPS track log for initial establishment of cameras on the survey site and submit as a Track Log shapefile.
- Record and submit georeferenced photos.
- Please enter the survey details (e.g. times and locations of the survey taking place) into the SurveyDetails page. Use the DataFieldsExplained page to help you enter the correct details.
- Ensure the SiteID is entered correctly according to the survey package and in the format of xxx-xxx-xxxx with no blank spaces.
- Record one record only of the last observation of each unique species for each camera trap in the ObsAttributes page on a separate row.
- A comprehensive list explaining the data entry fields and whether they are mandatory or optional can be found in the DataFieldsExplained.
- Ensure the CommonName field in ObsAttributes is entered correctly using the exact common names as spelt out in the TaxaIDLookup.
- Where identification of Dunnarts from photos is uncertain, the surveyor is to initially record the observation as an interim observation and to record the identification as “Unidentified Sminthopsis” VBA TaxonID 11800. A recommendation may be made to conduct additional Elliott trapping to confirm identification of Dunnarts.
- **Please Note: Surveyors are expected to submit highest quality data. Please ensure you double check your data entry before submitting data. Submitting incorrect or incomplete information will result in a delay to reporting and may impact on the program outcomes.**