



Ecological Field Monitoring Protocols Manual

Using the Ecological Monitoring System Australia

Photopoints Module – COMPACT CAMERA PROCEDURE ONLY

Citation

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Version

Readers are advised that all modules of the Ecological Field Monitoring Protocols Manual regularly undergo revision. Readers should check the website emsa.tern.org.au/documents to ensure they are viewing the current version.

Version 2

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Acknowledgements and contributors

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Key components of this module were developed, written, and field tested by the TERN Ecosystem Surveillance team, including by Julia Bignall, Beth Cox, Ellen Kilpatrick, Mark Laws, Kimberly McCallum, Rhys Morgan, Tamara Potter, and Carly Steen. Technical components, including the development of the accompanying app, were developed by the team, including Luke Derby, Matthew Barty, Jin Zhou, Ho Hai Huy Vo, Walid Al Naim, Muhammad Khan, and Michael Doroch. Aspects of the protocols that have been built on by this project are the result of the extensive and ongoing body of work conducted by the TERN Ecosystem Surveillance team, as part of TERN's field-based ecosystem monitoring program. A full list of team members who have contributed is available on the TERN eSupport Services website.

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Main front cover photograph: photopoint photo from TERN plot NSANAN0001, Mount Kaputar National Park, NSW, surveyed March 2021.

Version control

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The version history of this module is identified below. The version history of the Ecological Field Monitoring Protocols Manual, the methods and data implications, both historical, current and future interpretations of data, are available from the TERN website. Enquiries should be directed to tern@uq.edu.au.

Version	Date	Version update overview
1	20 November 2025	First published version

4 Compact camera panorama protocol

4.1 Field collection

4.1.1 Pre-requisites

Pre-requisites for completing this protocol:

- The plot must be established using the Plot Layout and Selection Module prior to conducting the Compact camera panorama protocol. The centre of the plot must be marked with a star dropper.

4.1.2 Time requirements

The time to complete the photopoints using the Compact protocol will vary depending on the user skill level and experience using the camera. The density of the vegetation will influence the time taken to locate the centre post. As a general guide, for each plot:

- Allow 1 hour before the survey to pack the required equipment and check everything is functional, batteries are charged and the appropriate memory/SD cards are clear and correctly formatted.
- Allow 20 minutes to take the equipment to the centre post, mark out the triangle, and set-up the tripod, and attach the camera to the tripod.
- Allow 10 minutes to take the three panoramas.
- Allow 10–20 minutes to pack up the tripod and tape measures, and store equipment safely.

4.1.3 Personnel requirements

Number of personnel and skills:

- Photopoints are best conducted with two personnel but can be conducted by just one.
- Surveyors should be familiar with and experienced in the operation of the camera. If surveyors are not confident, time should be dedicated to practising, using instruction manuals, and seeking advice before conducting this protocol.
- Taking photos does not involve interference with wildlife. Therefore, scientific permits and wildlife ethics approvals are unlikely to be required but always check with your local authority. Access permissions are required.

4.1.4 Equipment

The following equipment is required to take the photo panoramas:

- Compact camera with a 15 megapixel or greater sensor, ideally with a zoom lens 24 mm+. If your camera allows the aperture to be adjusted, use the DSLR camera protocols instead.
- Operational manual for the camera
- Memory cards (either SD or compact flash depending on the camera requirements), minimum 8 GB capacity per plot
- Tripod that enables the camera to be set to a height where the centre of the lens sits at 1.3 m, ideally with a built-in bubble spirit level to ensure the camera is level
- Coloured tape (or similar) for marking the star dropper (any colour)
- 5 m tape measure
- 3 tent pegs (ideally) or 3 clothes pegs
- Mobile device (tablet/phone) with the Monitor app installed.

For installing or re-positioning the centre post (refer to Plot Selection and Layout Module):

- GNSS, such as a Trimble R1 or DA2 receiver, a hand-held GPS or device built-in GPS (least preferred), capable of achieving <30 cm accuracy
- Star dropper (1.8 m in length, so it can be positioned to a height of 1.3 m)
- Fence post driver or mallet (for positioning the star dropper) (should have been completed as part of the Plot Selection and Layout Module).

4.1.5 Instructions and procedures

Pre-survey preparation

1. Before commencing the Compact camera panorama protocol, familiarise yourself with your camera before the field survey commences, and take the camera manual into the field with you for reference if needed. The procedures below provide information on the recommended settings to which you should set your camera to if it allows:
 - If adjustable, set the focal length to the widest setting (ideally 24 mm as per the DSLR protocol).
 - If adjustable, set the ISO to 100 (if not adjustable, leave in full auto setting).
 - If adjustable, set the camera to take RAW image file types, (or RAW+JPEG) format (not just JPEG). Use JPEG only if RAW is not an option.
 - If available, turn on grid lines to help keep the camera horizontal (on flat ground at least) when a tripod is not being used.
 - Ensure the date and time are correct.
 - Set the photo quality to the highest available.
2. Ensure the camera memory card has at least 8 GB spare capacity.
3. If you do not have a tripod/tripod mount on the camera, determine where on your body 1.3 m from the ground is – this is the height you will aim to hold the compact camera lens at whilst taking the panoramas.
4. Determine if the plot has been established in the past using the Plot Layout and Selection Module. Confirm if the centre post was positioned at the time. If not, ensure you have a star dropper (and fence post driver or mallet) with you when you travel to the plot and be prepared to follow the Plot Layout and Selection Module to mark the centre post used for the photopoint accurately.

Arriving at the plot and taking the photos with the compact camera

1. Ensure the Plot Selection and Layout Module has been completed to mark out the plot boundary and centre post, and define the current plot and visit in the Monitor app. Keep in mind that, ideally the centre post should be at the precise centre of the plot. However, the post can be adjusted to account for trees, and rocky terrain that does not enable the post to be positioned. See the *additional guidelines* below.
2. Traverse to the centre of the plot and locate the centre post.
3. Open the Monitor app and select the Photopoints Module and the Compact camera panorama protocol.
4. Install a plot centre post if one is not in position. Confirm the *plot centre post location* and that the *post is positioned* (checkbox). Remember to stand immediately next to, or over the post, to ensure accuracy.
5. Mark out the photopoint equilateral triangle and mark the star dropper using the instructions in Appendix 1. Press the help button to display the equilateral triangle and see the location of the three photopoint positions.
6. Mount the camera on the tripod (if available, if your compact camera does not have a tripod mount, you will need to hold the camera at 1.3 m, and ensure it is rotated carefully).
7. Adjust the tripod so the height of the middle of the camera lens is 1.3 m above ground level.
8. Position the camera at photopoint position 1, due south of the star dropper (see Figure 2), and adjust the tripod so the camera sits horizontally and the 360° photographic sweep will be in a consistent horizontal plane (check the bubble in the tripod if it has one).
9. Check the field of view to ensure the lens is set to the widest possible. Do not zoom in.
10. If the camera allows, set the ISO to 100 (refer to your camera manual).

11. The app will be open on Photopoint Position 1. Record the location of the photopoint to generate a unique QR code for the photopoint.
12. The QR code for the first photopoint will be displayed along with the information associated with it, including the *plot name*, *visit start date*, *photopoint position*, and *latitude* and *longitude*.. The screen also displays the *date* and *time* of the device as a visual reference.
13. Once the photopoint 1 QR code is displayed, with the camera set to auto, hold the Monitor app screen displaying the photopoint 1 QR code, half-pressing the shutter button first to ensure the app screen is in focus.
14. Take the device out of the shot, and face the camera directly at the centre post. Focus on the vegetation/area behind the post, not the actual post. You want the post to be slightly blurry, but the background to be in focus. Take the first photo of the sequence.
15. Continue the panorama sequence. Ensure the camera remains level, with the same proportion of sky to ground is maintained as in the previous photo. Check each image for clarity:
 - Is it appropriately focused?
 - Is it appropriately portioned?
 - Is it appropriately overlapped with the proceeding photo?
 - Is there solar glare?
 - Are there people or equipment in the background?
16. Delete any photos that are not ideal, and re-take the photo.
17. Take a sequence of photos to cover the 360° panorama rotating the camera in a clockwise direction, finishing back looking at the centre post. Ensure a minimum 50% overlap between successive photos. The full 360° panorama should require around 20–30 photos, depending on your camera.
18. Move the tripod and camera to photopoint position 2, ensuring the height remains at 1.3 m from the ground to the centre of the lens and that the camera body is immediately above the peg you placed out earlier at 1.45 m from the star dropper.
19. On the Monitor app, press *next point* to display photopoint position 2. Record the location of the photopoint to generate a unique QR code for the photopoint.
20. Take the series of photos from photopoint position 2. The first photo in the sequence should be looking directly at the post, and then the rest of the panorama continues around in a clockwise direction.
21. Move the tripod and camera to photopoint position 3, ensuring the height remains at 1.3 m from the ground to the centre of the lens.
22. On the Monitor app, press *next point* to display photopoint position 3. Record the location of the photopoint to generate a unique QR code for the photopoint.
23. Take the series of photos from photopoint position 3. The first photo in the sequence should be looking directly at the post, and then the rest of the panorama continues around in a clockwise direction.
24. When you have completed the full 360° panorama from photopoint position 3, on the app, complete the photopoints survey components, review the summary of collected data and queue the collection for submission.
25. Turn the camera off, and remove the camera from the tripod. Pack up the equipment.
26. Download the photos to a field laptop if necessary to free up space on the memory card.

4.1.6 Additional guidelines

Field collection

- At the start of each survey, check the camera settings to ensure the correct date and time. Date and time may be used to cross-reference photos against the app data.
- If the camera has the ability, ensure GPS location settings are enabled (optional setting, and not a requirement).
- The photo sequences should be taken between 10 am and 4 pm (where possible) to minimise sun and shadow effects on the photos and to ensure good illumination. It may be appropriate to take photos outside these times

if there is reasonable light, and the light is diffused (i.e. consistent cloud cover). Overcast conditions are favourable.

- In some communities where the vegetation is dense or where the landscape prohibits a clear field of view at the plot centre or the ability to position the star dropper (i.e. due to a large boulder right at the plot centre, the photopoint star dropper may be relocated off-centre. See Appendix 1 for instructions. This should be no more than 5 m from the actual centre point, and you must confirm the plot centre post location in step 4.
- In communities where the vegetation is very dense, take representative photos in cardinal compass directions (in the sequence of due north, east, south, west) of the community as a reference for the plot.
- Avoid taking photos with people in the background.
- Ensure that there are no items obstructing the photo (e.g. fingers).
- Ensure that you have removed the bag containing the camera or any other field gear is removed from view.
- Ensure that there is no flagging tape remaining on the star dropper.

Catering for sloping ground – when the horizon is not horizontal

- Taking a series of photos to form a panorama is difficult when the plot is on sloping ground. The following adjustments are recommended and take note these do take some practice.
 - Instead of holding the camera straight, firmly locked onto the tripod for the entire sweep, loosen the knob to allow the camera some movement (be careful the camera does not fall off). Instead of trying to follow a would-be flat horizon, adjust the sideways angle of the camera. Another way is to visualise that you are trying to aim at keeping the camera looking towards the trees in the background at the height of 1.3 m. Adjust the angle of the camera so that you are looking at the 1.3 m mark, rather than moving higher up the trunk or lower down the trunk.

Post-field survey

- Photos must not be edited, cropped, or have watermarks or filters applied.
- File names should not be re-named from the default camera name assigned.
- Properties/EXIF metadata of the photos should not be edited, i.e. date, time and GPS locations (if applicable), should not be altered with, however, additional data may be added.

4.2 Post-field survey tasks

4.2.1 Data curation

- When back in the office, back-up the images from the memory cards for long-term storage and processing to a server of your choosing.
- Images should not be deleted from memory cards until they have been checked that they have been backed up successfully.
- It is good practice to keep an additional back-up of the images (e.g. cloud storage, external hard drive) until electronic delivery of the receiving server.
- Once all images are backed up and checked, a good practice is to clear all memory cards, preferably by formatting. This ensures that memory cards are working correctly and prevents full cards from being reloaded into cameras in future surveys.
- Arrange for electronic delivery of the images to the receiving server (see the Submitting EMSA Digital Media information sheet).
- This will involve linking the project administration data and photopoint survey data to the images via the project, plot name and memory card number.

We at TERN acknowledge the traditional owners and their custodianship of the lands on which TERN operates. We pay our respects to their ancestors and their descendants, who continue cultural and spiritual connections to country.

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