



Ecological Field Monitoring Protocols Manual

Using the Ecological Monitoring System Australia

Plot Description Module -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 ems.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 based at The University of Adelaide. Additional to the authors, the following team members made contributions to the project: Ellen Kilpatrick, Mark Laws, Kate Matthews, Tamara Potter, Rhys Morgan, David Peacock, and Carly Steen. Technical components, including the development of the accompanying app, were developed by the team led by Andrew Tokmakoff, including Luke Derby, Matthew Barty, Jin Zhou, Ho Hai Hoy 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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The information contained in this document comprises information and instructions for implementing ecological monitoring field surveys. The reader is advised that TERN has made best efforts to ensure instructions are comprehensive enough to fulfil the tasks required to the standards required at the time of publication. All field surveys must be carefully planned to ensure the safety of personnel is paramount and that the required scientific permits and wildlife licences are obtained from the appropriate jurisdictions and conditions strictly adhered to. Such requirements may go above and beyond those listed in this manual. TERN, including the project personnel, are excluded from all liability to any person for the consequences, including but not limited to all losses, damages, costs, expenses, and any other compensation arising directly or indirectly from using this publication (in part or in whole) and any information or material contained in it.

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Main front cover photograph: Mount Remarkable, South Australia

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@adelaide.edu.au.

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

1 Enhanced protocol

1.1 Field collection

1.1.1 Pre-requisites

Pre-requisites for completing this protocol:

- Become familiar with the standard terminology and definitions in the Yellow Book and NVIS Australian Vegetation Attribute Manual.

1.1.2 Time requirements

Survey time requirements will vary depending on the experience of personnel and their familiarity with the landform, land surface and vegetation of the project area. As a general guide:

- Allow 15–45 minutes to collect and record the information.

1.1.3 Personnel requirements

Number of personnel and skills:

- One person is required to complete the Plot Description Module.
- Personnel should be familiar with definitions of landform, land surface and vegetation attributes, including but not limited to landform patterns and elements, lithology, vegetation growth stages and vegetation structural formation. Reference material, including the Yellow Book is recommended.
- Personnel should be familiar with and experienced in identifying major vegetation groups and the growth stage of a system. If personnel are not confident, time should be dedicated to practising, using field reference guides, and seeking advice prior to conducting this protocol.
- The Plot Description Module does not involve interference with vegetation (no sampling is required) or wildlife. Therefore, scientific permits and wildlife ethics approvals are unlikely to be required but always check with your local authority. Access permissions will likely be required.

1.1.4 Equipment

- Mobile device pre-loaded with the Monitor app
- Yellow Book (and/or soil and landform reference charts)
- NVIS Australian Vegetation Attribute Manual (and/or vegetation reference charts)
- Compass (or a suitable app)
- Clinometer (or a suitable app)
- Rangefinder (or suitable app/equipment).

1.1.5 Instructions and procedures

1. Ensure the Plot Selection and Layout Module has been completed to mark out the plot boundary and define the current plot and visit in the Monitor app.
1. Select the Plot Description Module and then the Enhanced protocol.
2. Considering the entire 1 ha plot, complete all landform and land surface fields using the Yellow Book, Appendix 1 and app info buttons for reference:
 - *Slope (degrees)* – measure the slope in degrees using a clinometer, compass or suitable app. The number recorded should be between 0° (level) and 90°.
 - *Slope (class)* – automatically generated from a list of eight values when *slope (degrees)* is entered (refer to Appendix 1 for further explanation on how this is calculated).

- *Aspect* – measure the downslope direction (orientation) of the slope if it is uniform across the plot using a compass or suitable app. The number recorded should be between 0° (level) and 360° (due north). If slope is not uniform across the plot select the *not uniform* checkbox.
 - *Relief* – select the category that describes the difference in elevation between the high and low points of the land surface from the dropdown list.
 - *Modal slope* – select the most common class of slope occurring in the landform pattern from the dropdown list.
 - *Landform pattern* – select from the dropdown list.
 - *Landform element* – select from the dropdown list.
 - *Outcrop lithology* – select the lithology type from the dropdown list if confident. If not confident, record either metamorphic, sedimentary or igneous (optional field).
 - *Coarse fragments lithology* – select the two most common lithology *types* from the dropdown list if confident. If not confident, record either metamorphic, sedimentary or igneous. Record the *size* and *abundance* from dropdown list (optional field).
 - *Nearest infrastructure* (to the plot) – select from the dropdown list. If other, record the type of infrastructure in the comments (optional field).
 - *Proximity* – record the distance in metres from the plot centre to the nearest infrastructure.
 - *Land-use* – select from the dropdown list (optional field). See the Australian Land Use and Management classification system (ABARES 2016).
3. Considering the entire 1 ha plot, complete all vegetation fields using the Yellow Book, Appendix 2 and app info buttons for reference:
- *Growth stage* – select from the dropdown list (early regeneration, advanced regeneration, mixed age, mature phase, senescent phase).
 - *Fire history* – select if known and enter the *year* of the most recent burn.
 - *Structural formation* – select from the dropdown list. Determine using the growth form, height and cover of the tallest dominant stratum (Appendix 2).
 - *Homogeneity measure* – record the distance in metres from the plot centre to the nearest edge of the vegetation association you’re sampling. If too far to determine, record the distance that the vegetation association can still be seen (maximum 1000 m).
 - *Plant species life-stage* – record up to 10 plant *species* that are at an important *life-stage* at the time of the survey (budding, flowering, immature fruit, mature fruit, recently shed). If flowering is selected, select if there is a *mass flowering event* across the plot. Recommended if not undertaking the Floristics Module during the current visit (optional field).
 - *Site disturbance* – select from the dropdown list.
 - *Introduced plant species impact* – record notes on any impacts observed. Recommended if not undertaking the Cover Module during the current visit (optional field).
4. Record any additional information about the physical features of the plot in the *comments* (optional field).
5. Complete the Enhanced protocol when all landform and land surface and vegetation fields have been recorded.
6. Check the summary of the data and then queue the collection for submission.

1.1.6 Additional guidelines

Landform and land surface

- Lithology information can be sourced from relevant spatial datasets for the region. This information should be reviewed before the field survey and a copy taken to the field to assist with the lithology classification.
- Contour maps and spatial imagery can assist in determining outcrop lithology if it is difficult to determine within the field.

Measuring slope using a clinometer

- Measure slope from the most representative point within the plot.
- If slope is measured down the slope, aspect can be recorded from the same position.
- Slope incline or decline can be measured but it should always be recorded as a positive value.
- If a clinometer is not available, slope can be measured with a compass (some compasses are also fitted with a clinometer) or a suitable app (e.g. Simple Inclinometer, Inclinometer).
- Using a clinometer, stand so you are facing directly up or down the slope. If there is no slope, the measurement is 0.
- Keep both eyes open and align the clinometer cross hairs with the target point in the distance. To minimise the influence of micro-relief on the slope reading, the slope measurement should be taken across a distance of at least 20 m.
- The clinometer should be angled so a consistent height above the ground is maintained (i.e. measure eye level of another field member standing at least 20 m away or an object that is approximately the same height above the ground as eye level).
- Two scales appear through the clinometer lens (degrees and percent). Record slope in degrees.
- Slope class information can help determine landform element.
- Theil Sen estimator can be used to calculate slope if surveyors are familiar with this method.

Recording aspect using a compass

- Aspect is the direction in degrees that a slope faces, measured in the downslope direction.
- Stand so you are facing directly down the middle of the slope and record the compass bearing (1–360°).
- If there is no slope, then the aspect will be 0. If you are facing due north then the reading will be 360°.

Vegetation

- Completion of the Floristics Module and Cover Module can assist in correctly determining the structural formation within the plot. If these modules are being undertaken, it is recommended that they are completed prior to undertaking the Plot Description Module.
- Structural formation is determined using the growth form, cover characteristics and height range of the tallest dominant stratum in the plot (see Appendix 2).

Homogeneity measure

- The homogeneity measure is defined as a record of the visual estimate (in metres) of the shortest distance from the plot centre to a vegetation association different to the one that you are sampling in (White et al. 2012).
- Where there is uncertainty in estimating the homogeneity measure, be conservative in estimating the distance (it is better to underestimate the distance to ensure homogeneity).
- Where it is not possible to directly observe the distance to a different association (e.g. goes over dune crest), estimate the furthest distance that you are sure is within the same association (i.e. as far as you can still see the vegetation association from the point you are standing). If working in large homogeneous areas, existing field mapping and use of the vehicle odometer may assist with this.

1.2 Post-field survey tasks

1.2.1 Sample curation

No samples are collected directly as part of this module. However, plant specimen vouchers collected in the Floristics Module will be used to verify assigned field names used in the plant species life-stage and mass flowering event fields in this module.

2 Standard protocol

2.1 Field collection

2.1.1 Pre-requisites

Pre-requisites for completing this protocol:

- The Enhanced plot description protocol must have been completed upon the first visit to the plot. The Standard protocol is only applicable for plot revisits.
- Become familiar with the standard terminology and definitions in the Yellow Book and NVIS Australian Vegetation Attribute Manual.

2.1.2 Time requirements

Survey activity time estimates will vary depending on the experience of the personnel, their familiarity with the project area and the degree of change to vegetation within the project area. As a general guide:

- Allow 15–30 minutes to collect and record the required information.

2.1.3 Personnel requirements

Number of personnel and skills:

- One person is required to complete the Plot Description Module.
- Personnel should be familiar with and experienced in identifying major vegetation groups and the growth stage of a system. If personnel are not confident, time should be dedicated to practising, using field reference guides, and seeking advice prior to conducting this protocol.
- The Plot Description Module does not involve interference with vegetation (no sampling is required) or wildlife. Therefore, scientific permits and wildlife ethics approvals are unlikely to be required but always check with your local authority. Access permissions will likely be required.

2.1.4 Equipment

- Mobile device pre-loaded with the Monitor app and a mapping or field GIS app
- Yellow Book and/or soil and landform reference charts
- NVIS Australian Vegetation Attribute Manual and/or vegetation reference charts
- Compass (or suitable app)
- Clinometer (or suitable app)
- Rangefinder (or suitable app/equipment)

2.1.5 Instructions and procedures

1. Ensure the Plot Selection and Layout Module has been completed to mark out the plot boundary and define the current plot and visit in the Monitor app.
2. Select the Plot Description Module and then the Standard protocol.
3. Select the *revisit reason* (phenological event, seasonal change, major disturbance, climatic event, ongoing monitoring) or input a custom value.
4. The information previously recorded for the plot can be viewed by selecting *past records*.
5. Considering the entire 1 ha plot, complete the following landform and land surface fields if they have changed from the previous survey using the Yellow Book, Appendix 1 and app info buttons for reference:
 - *Nearest infrastructure* (to the plot) – select from the dropdown list. If other, record the type of infrastructure in the comments (optional field).

- *Proximity* – record the distance in metres from the plot centre to the nearest infrastructure.
 - *Land-use* – select from the dropdown list (optional field). See the Australian Land Use and Management classification system (ABARES 2016).
6. Considering the entire 1 ha plot, complete all vegetation fields using the Yellow Book, Appendix 2 and app info buttons for reference:
- *Growth stage* – select from the dropdown list (early regeneration, advanced regeneration, mixed age, mature phase, senescent phase).
 - *Fire history* – select if known and enter the *year* of the most recent burn.
 - *Structural formation* – select from the dropdown list. Determine using the growth form, height and cover of the tallest dominant stratum (Appendix 2).
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 - *Site disturbance* – select from the dropdown list.
 - *Introduced plant species impact* – record notes on any impacts observed. Recommended if not undertaking the Cover Module during the current visit (optional field).
7. Record any additional information about the physical features of the plot in the *comments* (optional field).
8. Complete the Standard protocol when all vegetation fields have been recorded.
9. Check the summary of the data and then queue the selection for submission.

2.1.6 Additional guidelines

Vegetation

- Completion of the Floristics Module and Cover Module can assist in correctly determining the structural formation within the plot. If these modules are being undertaken, it is recommended that they are completed prior to undertaking the Plot Description Module.
- Structural formation is determined using the growth form, cover characteristics and height range of the tallest dominant stratum in the plot (see Appendix 2).

Homogeneity measure

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- Where there is uncertainty in estimating the homogeneity measure, be conservative in estimating the distance (it is better to underestimate the distance to ensure homogeneity).
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2.2 Post-field survey tasks

2.2.1 Sample curation

No samples are collected directly as part of this module. However, plant specimen vouchers collected in the Floristics Module will be used to verify assigned field names used in the plant species life-stage and mass flowering event fields in this module.

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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