



Australian Government

Department of Sustainability, Environment,
Water, Population and Communities



Biodiversity Fund

Ecological Monitoring Guide



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Front cover (L–R): Gravillea (Andy Heaney), Ecological field monitoring 1 (Andy Heaney), Box gum grassy woodlands (Andrew Tatnell)

Back cover (L–R): Ecological field monitoring 2 (Andy Heaney), Ecological field monitoring 3 (Andy Heaney)



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Glossary

| | |
|------------------------------|--|
| Bare ground | Ground that does not support living vegetation, cryptogams or exposed rock. |
| Canopy | The structural layer of foliage of the overstorey or midstorey in a forest, woodland, shrubland or heathland community at full development for a vegetation type. |
| Crown Type | The percentage of the ground that would be shaded by a vertical projection of foliage, branches and other life forms in the overstorey. |
| Cryptogams | Mosses, lichen, algae, ferns. |
| Department | The Australian Government Department administering Biodiversity Fund grants. |
| Exotic species | A plant or animal species that is not indigenous to any part of Australia. |
| Ground cover | The percentage cover of all elements of the ground layer. |
| Ground layer | The lowest layer of vegetation generally comprised of grasses, sedges, forbs, herbs, prostrate shrubs or seedling trees. |
| Midstorey | The middle layer of a vegetation community usually consisting of shrubs and small trees that grow below the canopy of the overstorey. Midstorey must meet a height threshold for each vegetation type. |
| Organic litter | Detached wood or leaf matter lying on the ground. |
| Overstorey | The tree canopy in a forest or woodland community. Overstorey must meet a height threshold for each vegetation type. |
| Plot | Quadrat within which ecological attributes are sampled in the field. Standard dimensions are 20 metres x 20 metres. |
| Project area | The area your project covers. |
| Project site | The site where you are undertaking activities within your project area. Some project areas and sites may be the same. |
| Projected crown cover | The proportion of the ground covered by the vertical projection of the tree crown, or more simply, the width of the tree crown. |
| Recruitment | Regeneration of plants following seed fall and germination and includes seedlings, saplings and other advanced regrowth. |
| Transect | A linear sampling unit at a predetermined start point, using a predetermined compass bearing that is established using a 50 m tape. |
| Treatment site | A site that is located in vegetation within which a specific intervention or activity is being carried out. |



Abbreviations

| | |
|-------------|---|
| CT | Crown Type |
| MVG | Major Vegetation Groups within the NVIS |
| NVIS | National Vegetation Information System |
| PCC | Projected crown cover |



INTRODUCTION

The Biodiversity Fund is an ongoing program within the Australian Government's Clean Energy Future Plan that will provide \$946.2 million over its first six years to support land managers to undertake projects that establish, restore, protect or manage biodiverse carbon stores.

The Biodiversity Fund creates an unprecedented opportunity to establish and manage biodiversity throughout Australia's unique landscapes and in the process develop new market opportunities for ecosystem services.

The Biodiversity Fund will improve the resilience of Australia's unique species to the impacts of climate change, enhance the environmental outcomes of carbon farming projects, and help land managers protect carbon and biodiversity values on their land.

The Biodiversity Fund is supporting projects that reduce Australia's carbon pollution and improve the resilience of our ecosystems to the impacts of climate change. The Government is doing this by investing in activities that establish, restore and manage biodiverse carbon stores throughout Australia.

This Guide draws on common survey methods used in each state of Australia. While field officers may have used similar methods in the past it is important that this Guide be closely followed to ensure specific Biodiversity Fund measures are collected consistently across all projects.



Purpose

The *Biodiversity Fund Ecological Monitoring Guide* will assist you to collect biodiversity related field data and record it for reporting purposes. This process will allow the department to determine the trend in condition of your Biodiversity Fund project and the program as a whole. **All projects valued at or over \$500,000, with the exception of Round one projects, are required to participate in monitoring using the Guide.** Round one projects valued at or over \$500,000 are encouraged to implement the Guide's methodology and submit their data. Recipients under the threshold will be required to answer different questions during the reporting process, if these recipients also want to use the Guide and submit their data they are welcome to do so.



OVERVIEW

This Guide describes how to establish your biodiversity monitoring sites in your project area, how to set up a transect and plot or series of transects and plots, and how to record data on vegetation cover and exotic fauna. Before you begin this monitoring, you should read this Guide to understand what is required. Please ensure you have the correct equipment, follow the desktop steps, record data on the field sheets provided at the back of this Guide, noting that multiple copies may be required. You will then transfer

data to the electronic versions which will be provided online. A video explaining how to undertake this monitoring is available at www.environment.gov.au/cleanenergyfuture. Table 1 outlines what methods are required to be measured for each Biodiversity Fund theme.

Setting up your transects and plots the first time may take up to three hours while monitoring and recording data should take approximately one to two hours.



Table 1: You must ensure you complete all the activities listed in the table below for each Theme.

| Monitoring Activity | Theme 1 Revegetate | Theme 2 Restore | Theme 3 Exotic species |
|--|-----------------------|--------------------|---------------------------|
| Desktop identification of vegetation type | ✓ | ✓ | ✓ |
| Locating your transect start point in the field | ✓ | ✓ | ✓ |
| Establish your transects and plots in the field | ✓ | ✓ | ✓ |
| Measuring native and exotic ground cover | ✓ | ✓ | ✓ |
| Recording evidence of exotic fauna | ✓ | ✓ | ✓ |
| Over/mid-storey PCC—native and exotic vegetation | ✓* | ✓ | ✓ |
| Crown type—native overstorey vegetation | ✓* | ✓ | ✓ |
| Species diversity | ✓ | ✓ | |

* *It is unlikely there will be any significant data to record depending on how fast your vegetation grows however, you must record zero if there is no data to record.*



WHEN TO UNDERTAKE MONITORING AND SUBMIT DATA

Annual reporting requirements include the need to submit information on ecological data. The monitoring described in this Guide should be undertaken at the appropriate time as described below:

- North of the Tropic of Capricorn—April to June.
- All other parts of NT, Qld and WA, and SA—August to November.
- Northern NSW (north of Newcastle)—August to November.
- ACT, Vic, and southern NSW (other than alpine zones)—October to December.
- Mainland alpine zones (above 1600 metres), and Tas—November to December.

The data you record in the field will be transferred to electronic field sheets, which will be supplied by the Department. When completing your mid-year or annual report templates a space will be provided to upload the field sheets. Projects north of the Tropic of Capricorn will submit field sheets with their **annual report** while all other projects will submit theirs with the **mid-year report**.

Equipment

The following list of equipment is required to undertake the Guides monitoring in the field:

- 50 metre tape: Required to establish the transect, this tape is left in place during monitoring.
- 20 metre tape: Required to establish the plot.
- Compass: Required to determine your transects bearing and to establish the plot.
- GPS device (if available): Required to record start point latitude and longitude.
- 45° set square or clinometers: To determine tree height.
- Flagging tape: May be required to help identify boundaries of the plot.
- Seven marker pegs, per transect/plot and a hammer.
- Sampling staff or 1 metre ruler: Required for detection of exotic fauna evidence and measuring native and exotic ground cover.
- Sighting tube or a toilet paper roll (roughly 10 cm long and 4 cm diameter): Required to measure crown type.
- Field sheets: Found at the back of this Guide. You may need multiple copies of each field sheet.
- Botanical field guide/s relevant to your region and vegetation type: May assist in determining native or exotic vegetation for ground cover and species diversity measures.



MONITORING APPROACH

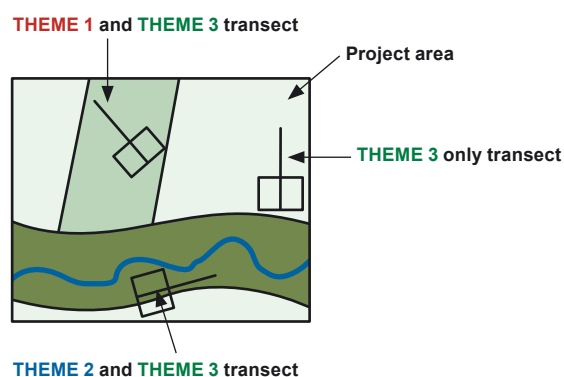
THEME 1, THEME 2, THEME 3

The transects for your project will be at least one 50 metre straight line starting from a predetermined start point and run along a compass bearing. Each transect will also require a plot, a 20 metre by 20 metre square with the transect running through its centre, see Figure 1. As described below and in Figure 1, you may need to establish more than one transect and plot in your site depending on which themes or activities you are undertaking.

- If your project includes a **THEME 1** or **THEME 2** or **THEME 3** activity, you will only need to establish one transect and plot in the site.
- If your project includes a **THEME 1** and **THEME 2** and **THEME 3** activity where none of the activities overlap on the same site, you must establish three transects and plots in each of the sites.
- If you are undertaking **THEME 1** and **THEME 3** activities that overlap on the same site, or **THEME 2** and **THEME 3** activities that overlap on the same site you only need to establish one transect and plot as long as they are within the area where you are undertaking revegetation and exotic species management activities or restoration and exotic species management activities.

- If your treatment site has **THEME 1** and **THEME 2** activities you must establish two transects and plots because these two themes should not be undertaken on the same site.

Figure 1: The number of transects and plots you will have to complete depends on which theme based activities you are doing on which site.



If your project has, multiple sites you will need to select the site most indicative of the project's work to carry out biodiversity monitoring. Projects will need to establish monitoring transects and plots based on the project area. These details are:

- <10 ha 1 transect and plot
- 10—100 ha 2 transects and plots
- > 100 ha 3 transect and plots



Desktop identification of vegetation type

THEME 1, THEME 2, THEME 3— Use Site Details sheet to record vegetation group

Before you begin any fieldwork, you should review *Appendix A—indicative height thresholds for major vegetation sub-groups* and ensure you know which vegetation group your project fits within. A mapping tool will be available online to do this.

Locating your start points in the field

THEME 1, THEME 2, THEME 3— Use Site Details sheet to record start points

You should locate your transect and plot in an area that is most representative of your Theme 1, 2, or 3 site. To do this you must establish and record a start point at least 50 metres away from the edge of your project area to ensure edge effects will be limited. The further away from the edge of the site you place your start point the better. You should record the location of your start point using a GPS, mapping program on a portable device such as a tablet, or simply by inserting a marker peg for future surveys.

Once you have established your start point you should record a compass bearing which will be the line of your transect. You must ensure that an entire transect and plot will fit within the site selected.

Establishing your plots and transects in the field

THEME 1, THEME 2, THEME 3— Use Site Details sheet to record compass bearing, site number

At your start point, you should insert a marker peg and appropriate identification that can allow the point to be easily located for future surveys.

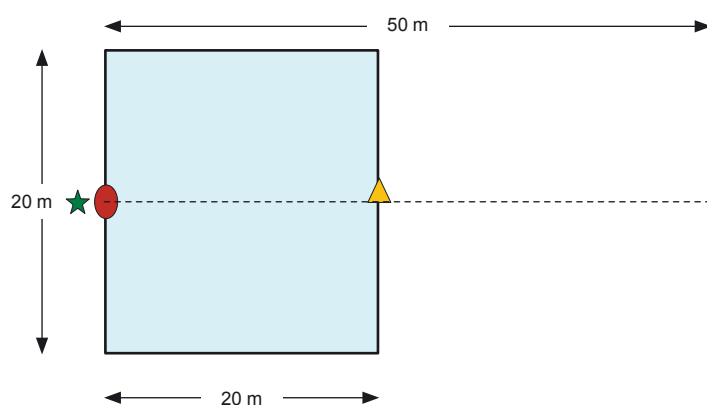
From the start point measure 20 metres with your 50 metre tape along the defined compass bearing. Be aware that a metal marker peg may interfere with your compass bearing. At the 20 metre point, insert an alignment marker peg. This will assist you in ensuring the transect is set up along the appropriate bearing.

Continue to run the 50 metre tape along the established bearing past the alignment marker and place a third marker peg at the end of the tape. You now have your transect established as shown in Figure 2. If possible, leave these markers in place to allow for easy set up on future surveys. Ensure you check these have not been tampered with before beginning future surveys.

Mark out your 20 metre x 20 metre plot as shown in Figure 2. The transect runs through the centre of the plot. Mark the plot sufficiently (e.g. highly visible flagging tape at 5 m intervals in densely vegetated areas) along each side to ensure you are able to easily discern where the plot ends during monitoring.



Figure 2: Establishing a transect and plot



| Sampling unit | Attributes measured |
|-------------------|---|
| ★ Photo point | Point from which plot was located and oriented, and from which plot image is recorded 5 metres back behind reference point |
| ● Start point | Reference marker post with ID tag attached |
| ▲ Alignment Point | Alignment marker positioned 20 metres from reference point along the transect |
| □ Plot | Species diversity, survivability |
| ---- Transect | Native and exotic crown cover Native and exotic groundcover Crown type Organic litter Cryptogram Rock Bare ground Exotic fauna |

Measuring native and exotic ground cover

THEME 1, THEME 2, THEME 3— Use Field Sheet 1

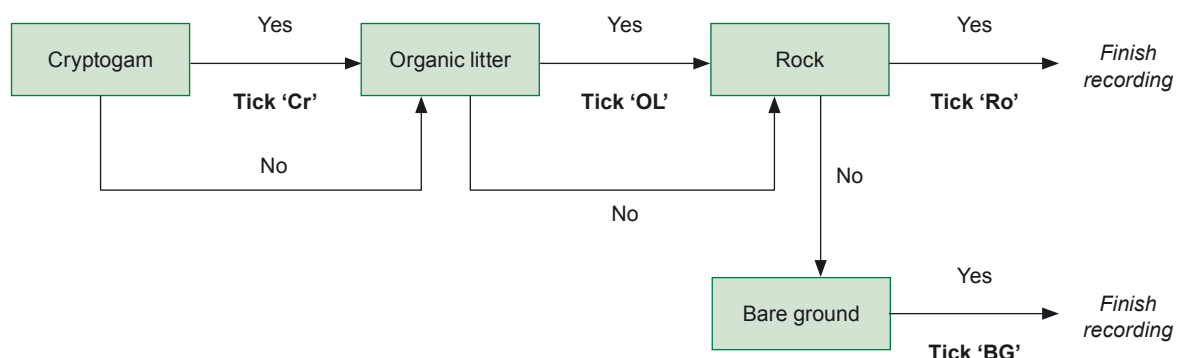
At each meter along the 50 meter transect, beginning at 1 and ending at 50, take a sampling staff or a one-meter ruler and hold it vertically next to the tape with the bottom resting on the ground. If the staff touches a native plant (indigenous or naturalised native) and/or an exotic plant, at a height between 0 and 1 metre record the number and type of plants touched. Species is not necessary just if the plant is native or exotic. For example, if the staff touches one *Acacia*, record it in the “Na” column as “1”.

- If the sampling staff touches a fern, record it as a cryptogam.

- If the staff clearly does not touch a living plant at ground level, so at the base of the ruler, follow the logic in Figure 3 and record one, two or three of the following ground layer elements: cryptogam (e.g. moss, lichen), organic litter, exposed rock, or bare ground.
- If you intersect open water (e.g. flooded wetland or a temporary pond), record its presence and the ground cover (using the logic in Figure 3) that is evident to the best of your ability.

Sampling any vegetation community should be avoided immediately following locally heavy rains or floods. Record all ground cover data on Field Sheet 1.

Figure 3: The logic below will guide you on recording ground cover





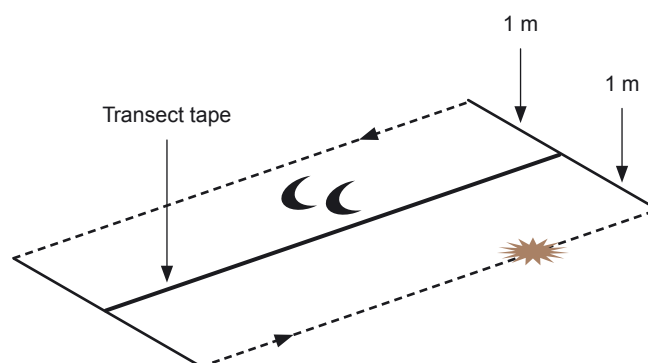
Recording evidence of exotic fauna

THEME 1, THEME 2, THEME 3—Use Field Sheet 2 to record exotic fauna

To record presence of exotic fauna you will need to identify their evidence one meter either side of the transect. To do this, stand at 0 metres (start point) and hold the sampling staff or 1 metre ruler in front of you at right angles to the transect and parallel to the ground, ensuring one end of the staff is lined up with the transect. Walk the length of the transect and record any evidence of exotic fauna. When you reach 50 metres, turn around and repeat the process on the other side of the transect from 50 metres to 0 metres, as shown in Figure 4.

You should record evidence of exotic fauna tracks, scats (poo), warrens, diggings or other traces, including those that are partly within the 1 metre threshold, in the 'exotic' section of Field Sheet 2. A field guide such as *Tracks, Scats and Other Traces* (Triggs, 2005) may help in identifying evidence of exotic fauna. If possible, remove the evidence you have recorded to ensure you will record fresh evidence the next time you do a survey.

Figure 4: Measuring exotic animal evidence



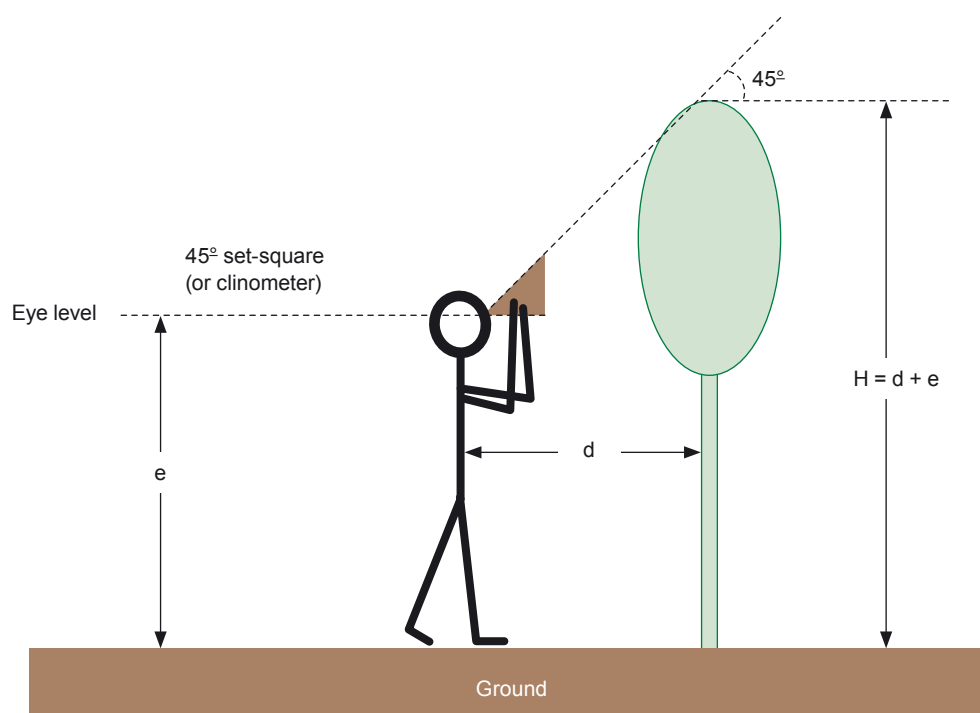
Measuring overstorey and midstorey projected crown cover—native

THEME 2, THEME 3. *If your transect is in a **THEME 1** site (revegetation site), it is unlikely you will have any significant data to record however you must record zero if there is no projected crown cover.—Use Field Sheet 3 to record projected crown cover*

If you are within a vegetation type that normally comprises a native overstorey, you will need to measure its projected crown cover (PCC). This includes all native overstorey species including naturalised natives (i.e. native vegetation outside

its natural range) along the transect that achieve the minimum height threshold for your vegetation type. You will need to refer to Appendix A to check what the thresholds are for your National Vegetation Information System (NVIS) Major Vegetation sub-group. Do not include overstorey plants that are shorter than this, and do not include tall midstorey plants if the vegetation type possesses a distinctive midstorey. If you are unsure whether a plant meets the native overstorey species threshold you will need to estimate its height using a set square or clinometers as shown in Figure 5. In the Figure 5 example, assume the eye level of the person is 1.8 metres and they are 5 metres from the tree. The height of the tree is therefore 5 m + 1.8 m = **6.8 metres**.

Figure 5: Measuring tree height (Height = eye level + distance from tree)

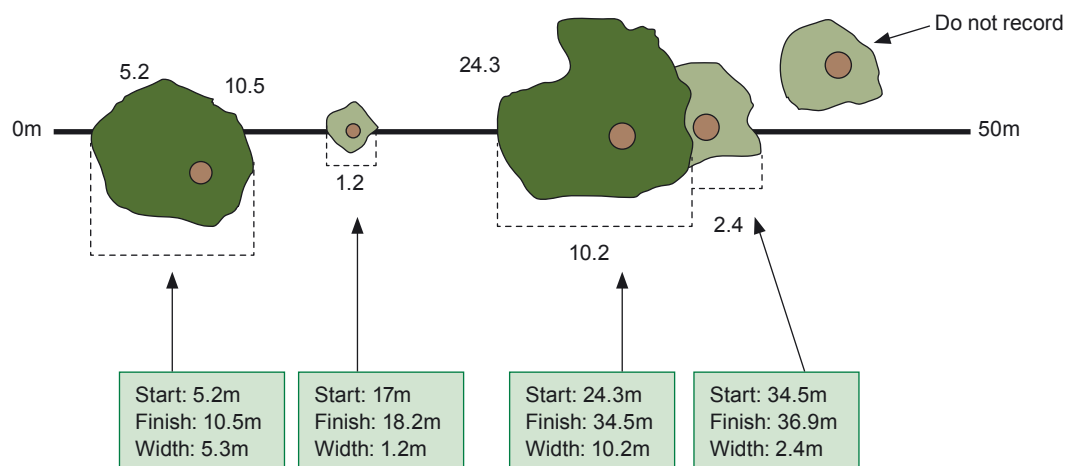




Ensure you measure the heights of trees that appear to be close to the overstorey height threshold to determine whether they need to be sampled. To do this you should stand a long way back from the tree next to the transect tape, hold the set square at eye level and walk towards the tree until the top point of the set square is aligned with the top of the tree. Measure the distance between you and the tree and add it to the height of your eye level above the ground to determine tree height.

To estimate PCC, walk along the transect tape and record all distances along it that the living canopy canopy of all native overstorey plants start and end directly above the tape. You should record the distance from where the tree overlaps the transect to where it finished overlapping, not necessarily the actual width of the tree. Figure 6 illustrates this process. Enter data on Field Sheet 3. Repeat the process for native midstorey plants if applicable.

Figure 6: Measuring projected crown cover along a 50 metre transect



Note: that if the canopies of trees overlap you should measure the width of the tallest tree and begin counting the shorter tree where the taller tree finishes as illustrated above. The PCC for the transect is calculated using the widths, for example: $5.3 + 1.2 + 10.2 + 2.4 = 19.1 \text{ m} / 50 = 0.382 \times 100 = 38.2\%$. This process should be repeated for midstorey species.



Measuring overstorey and midstorey projected crown cover—exotic

THEME 2, THEME 3. *If your transect is in a **THEME 1** site (revegetation site), it is unlikely you will have any significant data to record however you must record “zero” if there is no projected crown cover.—Use Field Sheet 3 to record exotic PCC*

The process described for measuring native PCC is repeated for the exotic overstorey and midstorey PCC, if applicable. Enter data on Field Sheet 3.

Record crown type (CT) of native overstorey native

THEME 2, THEME 3. *If your transect is in a **THEME 1** site (revegetation site), it is unlikely you will have any significant data to record however you must record “zero” if there is no projected foliage cover.—Use Field Sheet 4 to record CT*

Locate up to 10 points along the 50 metre transect that are each at least 3 metres apart and at which the native overstorey canopy is directly overhead. The results from the projected crown cover monitoring will help to determine these points. Ensure that at each point no clear sky can be seen around the edge of the canopy when viewed through a sighting tube. The tube will have a similar diameter and length to a toilet roll. Two or more points on the transect may be positioned under the canopy of the same tree, as long as the points are spaced at least 3 metres apart.

As with the projected crown cover method it is important that you only include trees that achieve the overstorey height threshold for your NVIS Major Vegetation Sub-Group as shown in appendix A.

At each point, record the distance along the transect from the start point. Then record the CT at that point by looking vertically upwards through a sighting tube and estimating cover by reference to the printed field chart in Appendix B. Record the result on Field Sheet 4.

Record plant species diversity

THEME 1, THEME 2, THEME 3.
—Use Field Sheet 5 and 6

All overstorey, midstorey and groundcover species, both native and exotic, will be recorded in the plot.

To record species diversity walk the plot from side to side ensuring you cover the whole plot recording all native and exotic species encountered on Field Sheet 5. **Only record each species identified in the plot once.** Record each native species as Species 1, Species 2, Species 3 etc. Continue this numbering for each new native species identified. For exotic species, follow the same methodology but label each new species identified as Exotic 1, Exotic 2 etc and also record on Field Sheet 5. You may need to take multiple copies of Field Sheet 5 into the field. If known, record the common and botanical names of the exotic species identified on Field Sheet 6.



Transect integrity

Ensure you are accurate and thorough when establishing each transect and recording data because future surveys will rely on previous survey data to show change.

Data management

The information you submit in your midyear and end of year report will be consolidated with data from other Biodiversity Fund projects. The department will be able to measure the contribution your project is making toward the Biodiversity Fund goals. This will enable the department to regularly report progress of the Biodiversity Fund.

References

Triggs, B. (2005). *Tracks, scats and other traces: a field guide to Australian mammals*. Oxford University Press.

APPENDIX A—INDICATIVE HEIGHT THRESHOLDS FOR MAJOR VEGETATION GROUPS

| NVIS Major Vegetation Group | NVIS Major Vegetation Subgroup ¹ | Height thresholds (m) | | |
|---------------------------------------|--|-----------------------|-----------|--------------|
| | | Overstorey | Midstorey | Ground layer |
| Rainforests and Vine Thickets (MVG 1) | Temperate rainforests | >15 | 1–15 | <1 |
| | Tropical or sub-tropical rainforests | >20 | 1–20 | <1 |
| | Dry rainforests | >5 | 1–5 | <1 |
| | Vine thickets | >2 | 1–2 | <1 |
| Eucalypt Tall Open Forests (MVG 2) | Eucalyptus tall open forest with a dense broad-leaved and/or tree-fern understorey (wet sclerophyll) | >20 | 1–20 | <1 |
| | Eucalyptus tall open forest with a fine-leaved shrubby understorey OR Eucalyptus tall open forests and open forests with ferns, herbs, sedges, rushes or wet tussock grasses | >20 | 1–20 | <1 |
| Eucalypt Open Forests (MVG 3) | Eucalyptus open forest with a shrubby understorey | >10 | 1–10 | <1 |
| | Eucalyptus open forest with a grassy understorey | >10 | 1–10 | <1 |
| Eucalypt Low Open Forests (MVG 4) | - | >5 | 1–5 | <1 |
| Eucalypt Woodlands (MVG 5) | Eucalyptus woodlands with a shrubby understorey OR Eucalyptus woodlands with a chenopod or samphire understorey | >10 | 1–10 | <1 |
| | Eucalyptus woodlands with a grassy understorey OR Eucalyptus woodlands with ferns, herbs, sedges, rushes or wet tussock grassland OR Eucalyptus woodlands with a hummock grass understorey | >10 | 1–10 | <1 |
| Acacia Forests and Woodlands (MVG 6) | Brigalow (<i>Acacia harpophylla</i>) forests and woodlands | >10 | 1–10 | <1 |
| | Other Acacia forests and woodlands | >8 | 1–8 | <1 |
| | Mulga (<i>Acacia aneura</i>) woodlands and shrublands +/- tussock grass +/- forbs OR Mulga (<i>Acacia aneura</i>) woodlands and shrublands with hummock grass | >5 | 1–5 | <1 |



| NVIS Major Vegetation Group | NVIS Major Vegetation Subgroup ¹ | Height thresholds (m) | | |
|--|---|-----------------------|-----------|--------------|
| | | Overstorey | Midstorey | Ground layer |
| Callitris Forests and Woodlands (MVG 7) | Callitris forests and woodland (Eastern occurrences) | >10 | 1–10 | <1 |
| | Callitris forests and woodlands (mallee, arid and semi-arid occurrences) | >4 | 1–4 | <1 |
| Casuarina Forests and Woodlands (MVG 8) | Casuarina and Allocasuarina forests and woodlands | >8 | 1–8 | <1 |
| | River Oak forests and woodlands | >15 | 1–15 | <1 |
| Melaleuca Forests and Woodlands (MVG 9) | Melaleuca open forests and woodlands | >8 | 1–8 | <1 |
| Other Forests and Woodlands (MVG 10) | Banksia woodlands OR Leptospermum forests and woodlands OR Other forests and woodlands | >10 | 1–10 | <1 |
| | Tropical mixed species forests and woodlands | >10 | 2–10 | <2 |
| Eucalypt Open Woodlands (MVG 11) | Eucalyptus open woodlands with a grassy understorey OR Eucalyptus open woodlands with shrubby understorey | >8 | 1–8 | <1 |
| | Eucalyptus low open woodlands with tussock grass OR Eucalyptus low open woodlands with hummock grass OR Eucalyptus low open woodlands with a shrubby understorey OR Eucalyptus low open woodlands with a chenopod or samphire understorey | >4 | 1–4 | <1 |
| Tropical Eucalypt Woodlands/ Grasslands (MVG 12) | Tropical Eucalyptus forests and woodlands with a tall annual grassy understorey | >10 | 2–10 | <2 |
| Acacia Open Woodlands (MVG 13) | Mulga (Acacia aneura) open woodlands and sparse shrublands +/- tussock grass OR Mulga (Acacia aneura) open woodlands and sparse shrublands with hummock grass | >2 | 1–2 | <1 |
| Mallee Woodlands and Shrublands (MVG 14) | Mallee with hummock grass OR Mallee with a tussock grass understorey OR Mallee with a dense shrubby understorey OR Mallee with an open shrubby understorey | >4 | 1–4 | <1 |
| Low Closed Forests and Tall Closed Shrublands (MVG 15) | Low closed forests or tall closed shrublands (including Acacia, Melaleuca and Banksia) | >4 | 1–4 | <1 |

| NVIS Major Vegetation Group | NVIS Major Vegetation Subgroup ¹ | Height thresholds (m) | | |
|---|---|-----------------------|-----------|--------------|
| | | Overstorey | Midstorey | Ground layer |
| Acacia Shrublands (MVG 16) | Acacia (+/- low) open woodlands and sparse shrublands with a shrubby understorey OR Acacia (+/- low) open woodlands and sparse shrublands with chenopods OR Acacia (+/- low) open woodlands and sparse shrublands +/- tussock grass OR Acacia (+/- low) open woodlands and sparse shrublands with hummock grass | >2 | 1–2 | <1 |
| | Other Acacia tall open shrublands and shrublands | >4 | 1–4 | <1 |
| Other Shrublands (MVG 17) | Melaleuca shrublands and open shrublands OR Casuarina/ Allocasuarina shrublands (C. equisetifolia, A. littoralis, A. verticillata) OR Other shrublands | >3 | 1–3 | <1 |
| | Lignum shrublands and wetlands | n/a | >1 | <1 |
| | Other sparse shrublands and sparse heathlands | n/a | >1 | <1 |
| | | | | |
| Heathlands (MVG 18) | Heathlands | n/a | >1 | <1 |
| Tussock Grasslands (MVG 19) | Temperate tussock grasslands | n/a | n/a | <1 |
| | Mitchell grass (Astrebla) tussock grasslands and Blue grass (Dichanthium) and tall bunch grass (Chrysopogon) OR Other tussock grasslands | n/a | n/a | <1 |
| Hummock Grasslands (MVG 20) | Hummock grasslands | n/a | n/a | <1 |
| Other Grasslands, Herblands, Sedgeland and Rushlands (MVG 21) | Sedgeland, rushes or reeds OR Wet tussock grasslands with herbs, sedges or rushes, herblands or ferns OR Other grasslands | n/a | >1 | <1 |
| | Saline or brackish sedgeland or grasslands | n/a | >0.5 | <0.5 |
| Chenopod Shrublands, Samphire Shrublands and Forblands (MVG 22) | Saltbush and/or Bluebush shrublands | n/a | >1 | <1 |
| | Mixed chenopod, samphire +/- forbs | n/a | >0.5 | <0.5 |
| | | | | |

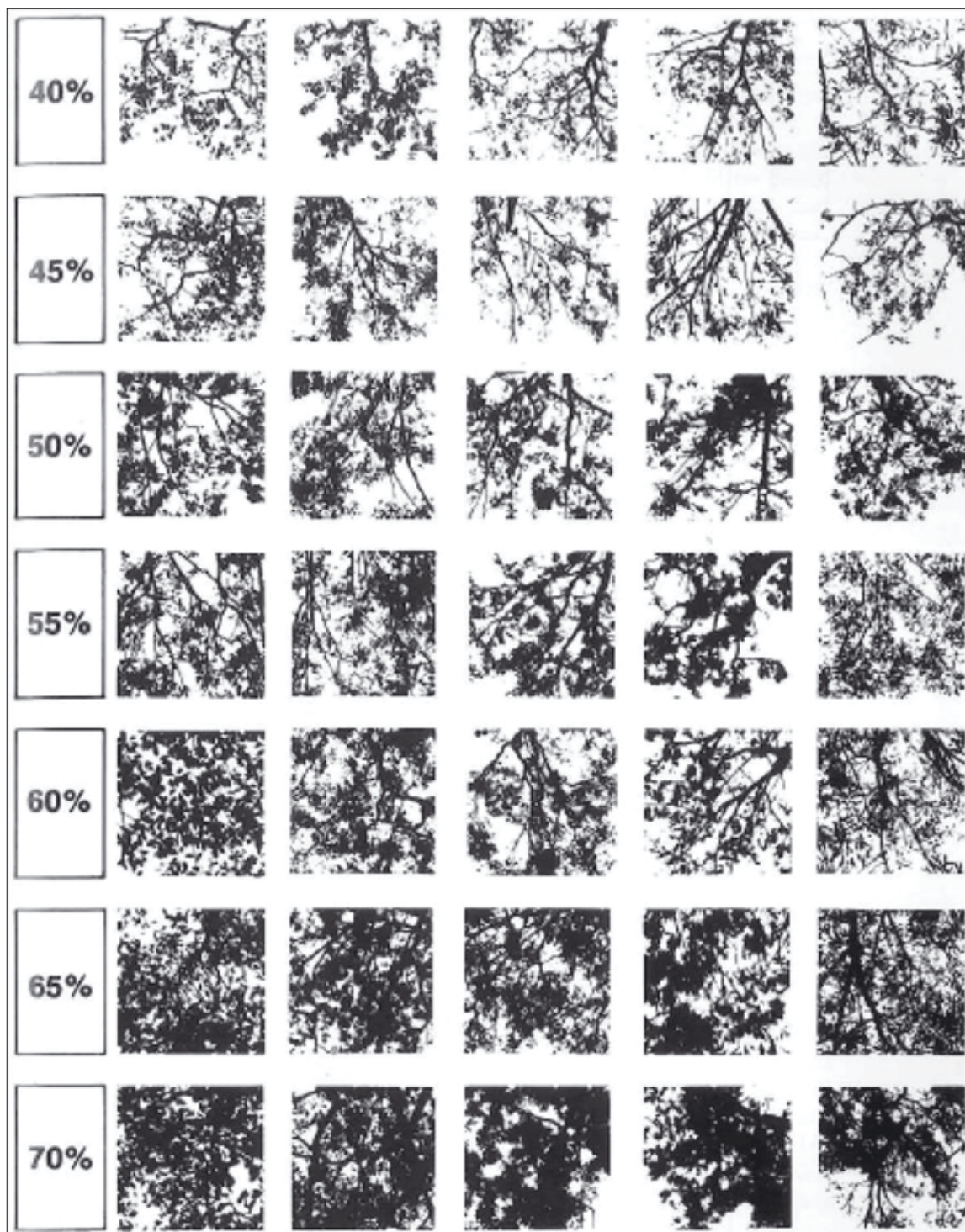


| NVIS Major Vegetation Group | NVIS Major Vegetation Subgroup ¹ | Height thresholds (m) | | |
|---|---|-----------------------|-----------|--------------|
| | | Overstorey | Midstorey | Ground layer |
| Mangroves (MVG 23) | Mangroves (northern) | >5 | 0.5–5 | <0.5 |
| | Mangroves (southern) | >2 | 0.5–2 | <0.5 |
| | | | | |
| Other Open Woodlands(MVG 31) | Callitris open woodlands OR Melaleuca open woodlands OR Other open woodlands | >4 | 1–4 | <1 |
| | Casuarina and Allocasuarina open woodlands with a shrubby understorey OR Casuarina and Allocasuarina open woodlands with a chenopod shrub understorey OR Casuarina and Allocasuarina open woodlands with a tussock grass understorey OR Casuarina and Allocasuarina open woodlands with a hummock grass understorey | > 4 | 1–4 | <1 |
| Mallee Open Woodlands and Sparse Mallee Shrublands (MVG 32) | Open mallee woodlands and sparse mallee shrublands with a dense shrubby understorey OR Open mallee woodlands and sparse mallee shrublands with a sparse shrubby understorey OR Open mallee woodlands and sparse mallee shrublands with a tussock grass understorey OR Open mallee woodlands and sparse mallee shrublands with a hummock grass understorey | >4 | 1–4 | <1 |

1 Adapted from NVIS Major Vegetation Subgroups version 4.1
(<http://www.environment.gov.au/erin/nvis/publications/pubs/mvs-preferred.pdf>)

APPENDIX B— CROWN TYPE COVER VISUAL REFERENCE CARD

Different leaf shapes shown in separate columns arranged from large to small.
Most Australian vegetation is between 40 and 70% foliage cover.



Site Details

(Complete this sheet for each site sampled)

| |
|--|
| Recorder: _____ |
| Project ID: _____ |
| Date: _____ |
| Site number: _____ |
| Start point latitude: _____ and Longitude: _____ |
| Compass bearing: _____ |
| Themes addressed at site (1,2,3): _____ |

Field Sheet 1: Ground cover

Na = native plant; Ex = exotic plant; OL = organic litter; Cr = cryptogram; BG = bare ground;
Ro = rock; W = water

| Point (m) | Na | Ex | Cr | OL | BG | Ro | W |
|-----------|----|----|----|----|----|----|---|
| e.g | 1 | | 2 | | | | |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
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| 45 | | | | | | | |
| 46 | | | | | | | |
| 47 | | | | | | | |
| 48 | | | | | | | |
| 49 | | | | | | | |
| 50 | | | | | | | |
| Total | | | | | | | |

Field Sheet 2: Evidence of exotic fauna

[illegible]

Field Sheet 3: Overstorey and midstorey projected crown cover

Only complete this part if the vegetation type has a distinctive canopy and/or midstorey

Transect (projected crown cover—overstorey species)

| Native overstorey | | | Exotic overstorey | | |
|-------------------|---------------|-----------------|-------------------|---------------|-----------------|
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |

Transect (projected crown cover—midstorey species)

| Native overstorey | | | Exotic overstorey | | |
|-------------------|---------------|-----------------|-------------------|---------------|-----------------|
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |
| Start (m) _____ | End (m) _____ | Width (m) _____ | Start (m) _____ | End (m) _____ | Width (m) _____ |

Field Sheet 4: Crown Type

Only complete this part if the vegetation type has a distinctive overstorey

| | Distance along transect (m) | CT (%) |
|----------------|-----------------------------|--------|
| Tree canopy 1 | | |
| Tree canopy 2 | | |
| Tree canopy 3 | | |
| Tree canopy 4 | | |
| Tree canopy 5 | | |
| Tree canopy 6 | | |
| Tree canopy 7 | | |
| Tree canopy 8 | | |
| Tree canopy 9 | | |
| Tree canopy 10 | | |

Field Sheet 5: Species Diversity

[illegible]

Field Sheet 6: Exotic species

List common and / or botanical names, if known, of exotic species identified in the plot.

[illegible]

