Native Vegetation Council Rangelands Assessment Manual

July 2020

Government of South Australia

Native Vegetation Council

Natural Resources

Contents

1 Quick Reference Guide

PRE-SURVEY

1. **Identify the area to be assessed (Block).** This is the area proposed to be cleared or established as an SEB.

2. **Design the survey and estimate time needed for field assessment.** Use aerial imagery and additional information (e.g. *Grazing gradient* layer available on NatureMaps) to divide the area into representative units (Sites). Identify roads and tracks to access the Sites and potential Sample Point locations. The aim of the desktop assessment is to reduce the time required in the field. However, desktop information should be used as a guide and modified if watering points, paddock layout, landscape and/or vegetation are different in the field.

3. **Label Sites.** Assign a label for each Site according to the procedure: A, B, C for Paddocks; 1, 2, 3 for Distance from water point; and hyphenated ending from the designated landscape types in Table 1 (e.g.-RH for a Range/Hillslope). Example Site labels: A1-PU, A1-DL, B2-RH.

FIELD ASSESSMENT

4. **Determine location to place a Sample Point in each Site.** Sample Points should be as representative as possible of the Site. Access will often be the main determinant of Sample Point locations, but try to distribute them across the Block (in each Site) as widely as possible.

5. **Take a GPS waypoint and representative photo.** Fill out the Sample Point location and description details, including the vegetation association structural description (e.g. *Atriplex vesicaria/Maireana astrotricha* very open low shrubland).

6. **Undertake a 'traverse' of the Sample Point.** This should be a rambling loop of approximately 1 hectare (you can adjust based on the density of vegetation, so as to ensure a reasonable sample is achieved).

   - Record the woody perennial and long-lived species you see on the traverse and note each individual's **utilisation state** (make a tally in each utilisation category). The tally is used to generate the proportion of states in which each species was present.
   - Record the **age class** for perennial species while walking around (i.e. particularly if sub-adult cohorts are spotted in addition to adult plants, record M (mixed) for the age class).
   - Be observant of physical and biotic disturbance indicators and exotic species cover.

   When the traverse is complete, look over the Sample Point and complete the utilisation details for each species.

7. **Record details of biotic and physical disturbances**. Also, identify the vegetation strata present/absent and estimate cover of exotic species.

8. **Record the occurrence of additional threatened species and introduced species** at the Sample Point (or anywhere within the same Site) on the back of the *Sample Point Datasheet*. This is for species that have not already been recorded on the front of the datasheet, as they may not be woody perennial and long-lived species.

   Complete the datasheet on-site (it should take approximately 20-30 minutes for each Sample Point).

REPORTING

9. **Complete the Rangelands Scoresheet.** Enter the Sample Point data or *NatureMaps* satellite data. The remaining cells contain formulae and will populate automatically. Refer to Appendices for additional help.

10. **Submit the Rangelands Assessment scoresheet, plant lists and associated information to the NVC or delegate.** The scoresheet and data must be provided electronically so that species lists can be uploaded to the BDBSA.

2 Introduction

The Native Vegetation Council (NVC) Rangelands Assessment Manual has been developed for the purpose of assessing native vegetation systems in the arid zone of South Australia.

The NVC Rangelands Assessment method is suitable for assessing vegetation systems within the following NRM Board regions:

- SA Arid Lands (SAAL) excluding Port Augusta City Council and the Flinders Ranges Council
- Alinytjara Wilurara (AW).

To assess vegetation in the agricultural region of South Australia (i.e the EP, GA, H&F, KI, LC, M&R and N&Y Landscape Management Regions plus Port Augusta City Council and the Flinders Ranges Council), the Bushland Assessment method or the Scattered Tree Assessment method should be applied.

The NVC Rangelands Assessment method has been developed for vegetation assessments undertaken for the Native Vegetation Council (NVC), including clearance or regulation application areas, potential and established Significant Environmental Benefit (SEB) offset areas and Heritage Agreements.

The main users of the method are NVC Approved Consultants, who are provided with training through the Native Vegetation Branch (NVB). Natural Resources SAAL staff and Pastoral Assessment Officers may also be able to assist with field assessments.

2.1 How the method works

Each area to be assessed (i.e. each application area) is termed a 'Block', which is divided into stratified **'**Sites'. Each Site relates to a vegetation association found within the Block. Vegetation associations are based on landform types, paddocks and at increasing distances from watering points (i.e. grazing gradient). In each Site, a number of **'**Sample Points' are established by the person undertaking the assessment.

Three components of the biodiversity value of the Site are measured and scored:

a) Vegetation Condition (including a measure of land condition)
b) Conservation Value
c) Landscape Context.

The three component scores are combined to provide 'Unit Biodiversity Score' (per ha) and then multiplied by the size (hectares) of the Site to provide a 'Total Biodiversity Score' for each Site, and then the overall Block.

2.2 Background of the Rangelands Assessment

The new method aligns the assessment of vegetation (and land) condition with the 'Rangelands Assessment Method' (RAM) developed by Natural Resources South Australian Arid Lands (NR SAAL) for the rapid assessment of pastoral properties in sheep and cattle country, but is adapted for native vegetation assessments in arid rangelands throughout South Australia.

Parts of the Rangelands Assessment method align with the Bushland Assessment method used in the agricultural regions of South Australia (Native Vegetation Council, 2015)[1]. However, due to differences in plant communities, the nature and extent of clearance in the agricultural region compared to the pastoral region and other landscape characteristics, the Bushland Assessment method was not directly transferable to the rangelands.

[1] Native Vegetation Council (2015*). Bushland Assessment Manual*. Native Vegetation Management Unit, July 2015.

3 Preliminary Office Procedure

Given the large scale of activities that occur in the rangelands, stratifying the landscape into homogeneous units is often difficult and time consuming. To assist with this process, the Rangelands Assessment method has been designed to allow the use of GIS (Geographic Information System) tools. Vegetation compositions in the arid zone are largely driven by landform features, such as ridges, slopes or flats, which influence water redistributions in the landscape. Vegetation condition, however, is mainly driven by pastoral use (history of stock grazing). Information is available to assist with the division of the landscape based on these features before going into the field. In particular, the ***Grazing Gradient*** layer is available on NatureMaps. In addition to this information, the landholder should be consulted to glean any more recent information that may affect the vegetation condition (hence the likely stratification required) such as additional water points installed for pastoral activities or other uses (e.g. evaporation ponds associated with developments).

The NatureMaps layers allow for the segmentation of the landscape based on the likely level of stock grazing impacts. The *Grazing gradient* is determined by the location of natural waters and artificial water points and the spatial arrangement of paddocks. *Grazing gradients* are also based on landscape topography to account for variable movement of stock in different parts of the landscape (e.g. stock will not move as far if travelling uphill). Therefore, the distance from a watering point within a paddock is used as a predictor of grazing impacts (typically sheep graze within 5 km of a watering point and cattle within 8 km). *Grazing gradient* bands are 0-3 km, 3-5 km 5-8 km, 8-16 km and 16-24 km from a watering point. However, these are not necessarily linear distances on the ground as they have been adjusted for topography.

Several **landform types** have been identified in the rangelands of South Australia based on soils, substrates and topography. Landform types include features such as ranges and hill slopes, rocky outcrops, drainage features, clay pans, plains and dunes (Table 1). Imagery of the application area can be accessed through NatureMaps (if resolution is poor, locate the best freely available imagery). Use the imagery to delineate likely landform types that can be used to stratify the application area and verified when on site. Any landforms not included in the landform classes may be added as a separate Sample Point and labelled appropriately.

Application areas that may be difficult to stratify with this process (such as narrow linear areas with numerous small sections of various landforms, grazing gradients and condition types) may simply use broad landform categories or vegetation types, if known, to stratify the application area into 'Sites'. This is appropriate providing sample points are placed in locations that represent the condition of the 'Sites'. Additional sample points and 'Sites' must be installed where condition is noticeably different.

The NVC encourages users of this assessment method to consider if activities could impact sites of indigenous significance. Please refer to the **Department of State Development's Aboriginal Affairs and Reconciliation** for further information.

EXAMPLE

Below is an example of an application area which is 3,382 hectares in size. The steps set out how the application area is stratified using desktop analysis. If the application is in an area not subject to pastoral use, the first two steps do not apply.

Step 1. Divide the application area (Block) into the different paddocks.

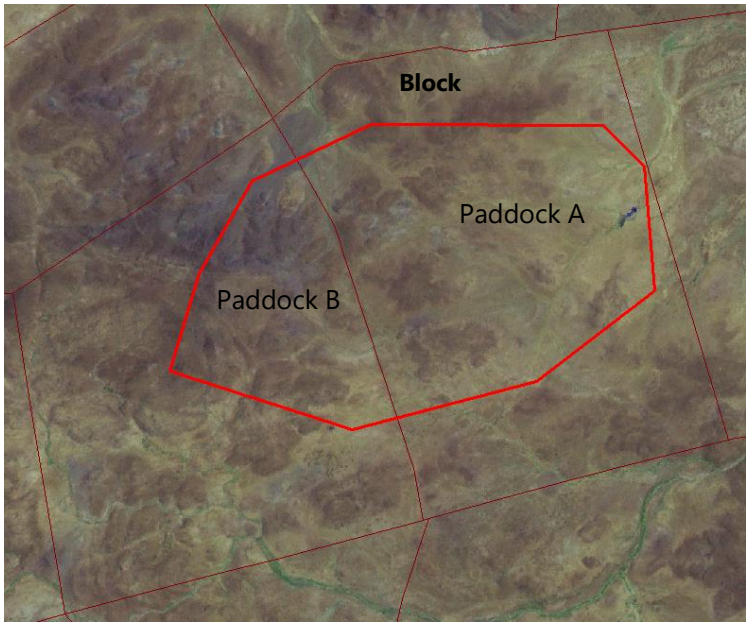

Figure 1: Example of an application area (Block, red lines) separated into two paddocks using the Pastoral paddocks *layer on NatureMaps.*

Step 2. Divide each paddock into distance bands from each watering point based on the *Grazing gradient* layer.

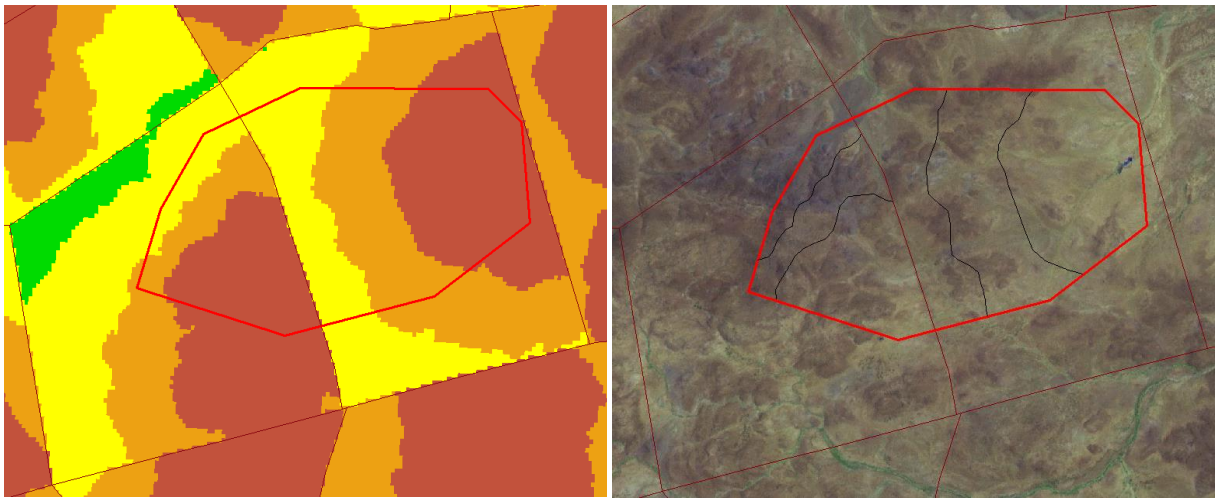

Figure 2: Paddocks divided into pastoral waters grazing gradients with increasing distance from the watering point shown in coloured bands (red = 0-3 km, orange = 3-5 km, yellow = 5-8 km, green = 8-16) using the Grazing gradient *layer on NatureMaps.*

Step 3. Divide the grazing gradients by the landform types seen in the imagery.

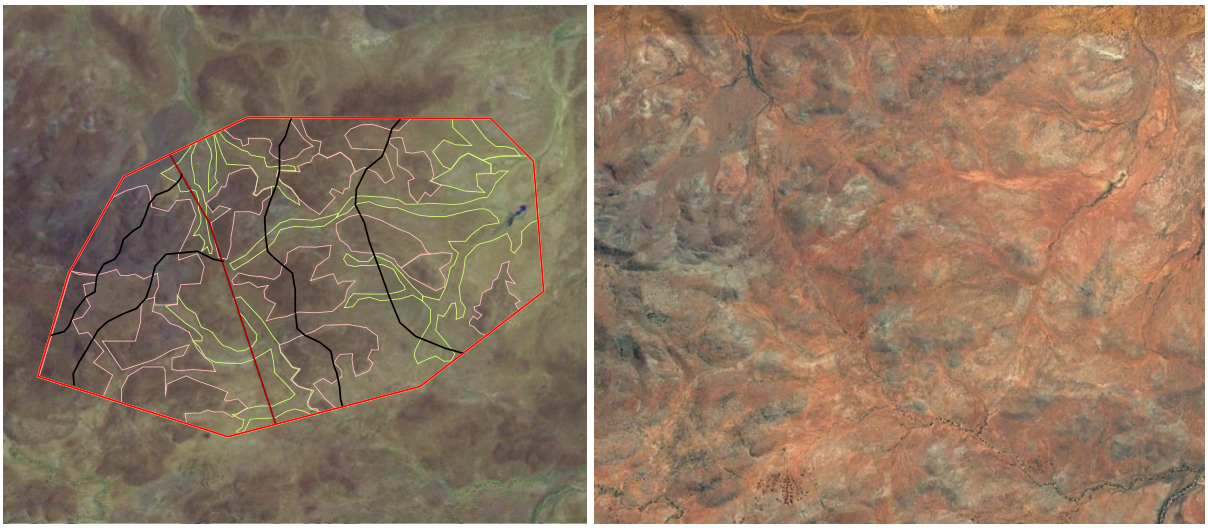

Figure 3: The Pastoral paddock *and* Grazing gradient *areas are divided into distinguishable landform type boundaries, shown here as red and green polygons using satellite imagery on NatureMaps (left) and other freely available imagery of the same area (right) to help with accuracy.*

View any further information you can find to verify and refine the stratification, such as aerial photography and native vegetation mapping and species records.

It is also important to overlay known tracks on the Block (from NatureMaps layers or topographic maps, as well as landholder input), as these will determine access and hence the location of Sample Points in each Site. A walked survey route should not exceed 5km from the vehicle, but several sites could be done along such a loop.

SAMPLE POINT LABELS

Label each Sample Point in the Block. The Sample Points should be labelled in this order:

- A, B, C for the each *Pastoral paddock*
- 1, 2, 3 for each *Grazing gradients* (starting with 1 for the band closest to the water point)
- the hyphenated labels that correspond to landform type shown in Table 1.

Table 1: Landform types

Landform type	**Sample Point label**
Ranges and hill slopes	-RH
Breakaways	-B
Outcrop (rocks)	-O
Drainage lines/floodouts	-DL
Swamp	-S
Clay pans and salt lakes	-CS
Plain – level	-PL
Plain – undulating	-PU
Dune field	-D
Springs/Mound springs	-SP

The Sample Points would have a hierarchy similar to that presented in Figure 4, in an attempt to sample 'Sites' that are representative of the vegetation associations and conditions present. The landform features can often be discerned from the imagery (and other information for the area) however some labels assigned during the desktop assessment may need to be changed during the field visit if they are not what was expected.

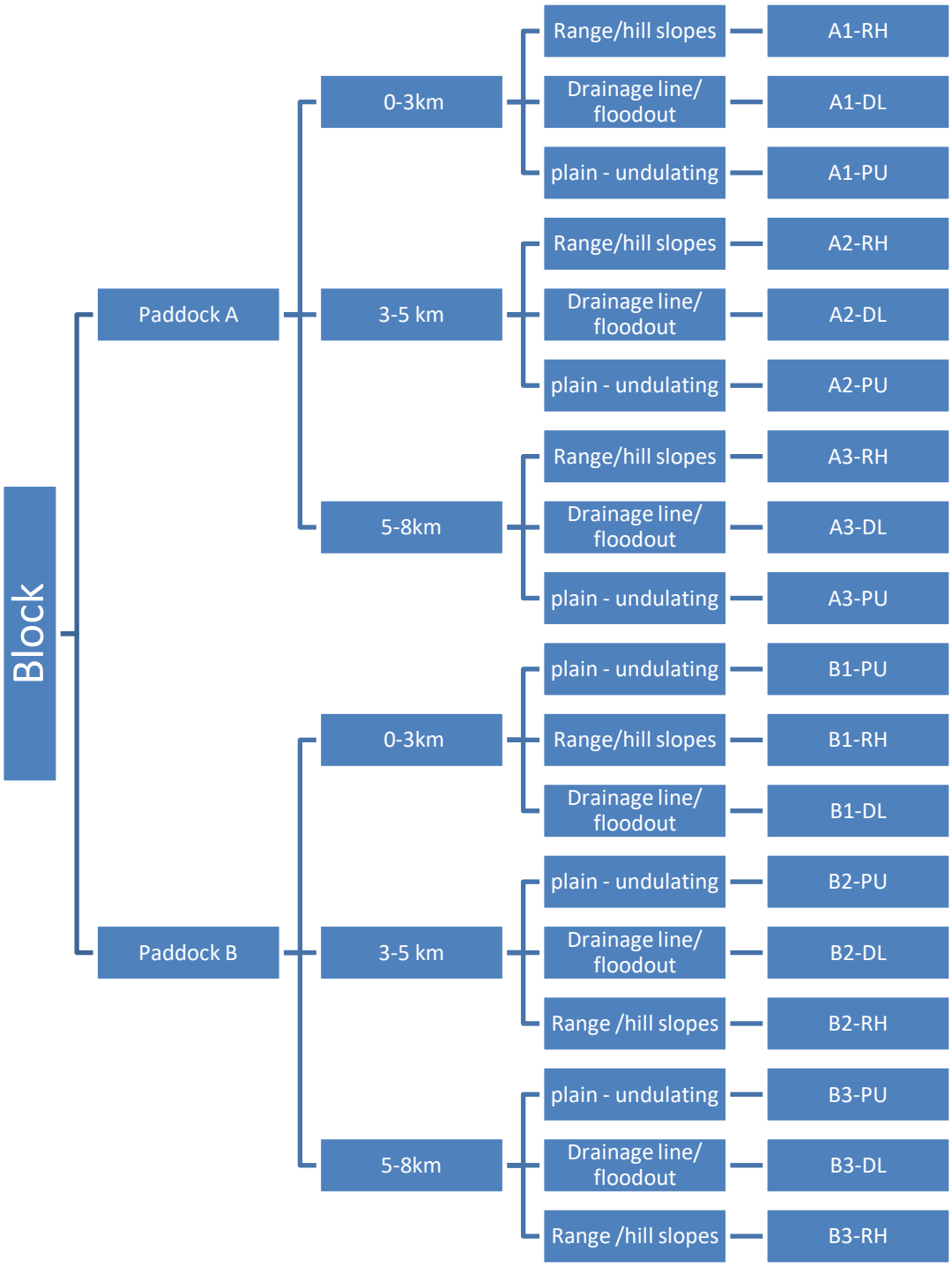

Figure 4: Labelling hierarchy for Sample Points in the example Block. Note that not all grazing gradient bands will contain all landform types

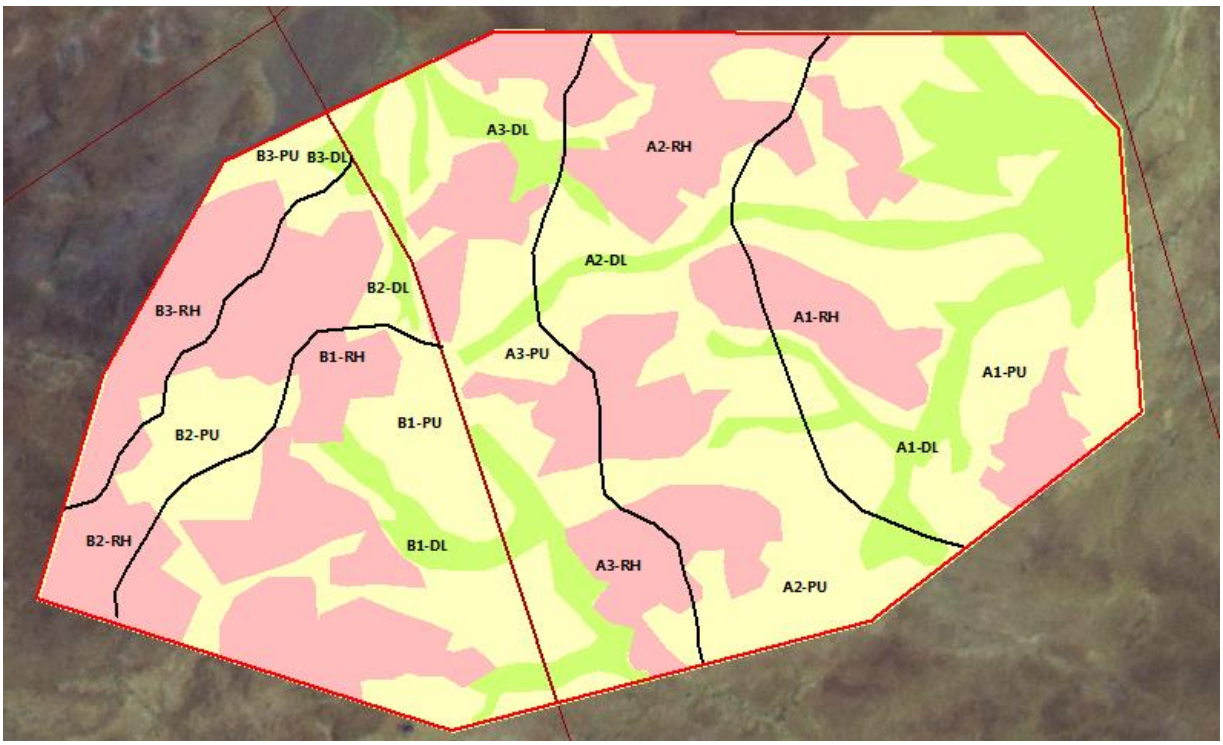

Figure 5: The application area is divided into Sites (likely vegetation associations). The Sites form the basis of the on ground survey design and guide the placement of the Sample Points.

This stratification process will assist in planning potential vegetation communities to be sampled, the number of sample points that are likely to be assessed and indicate the time to be spent in the field. However, the exact number of Sample Points required may be modified during the field visit. In the example shown in Figure 5, the desktop assessment process has resulted in 18 Sample Points with appropriate labels, which aim to sample the different 'Sites'. Depending on what is encountered during the field work, you may decide to move the Sample Points within the Sites according to access, or you may decide to increase or decrease the number of Sample Points. If you encounter an additional landform type, it can be added with an appropriate Sample Point label. Note that if more than one Sample Point is required in a Site (i.e. if the Site is larger than 500 ha or there is some variation within the Site) the Sample Points must be labelled separately (e.g. A2-PU1 and A2-PU2) and the results averaged for the Site.

In rangeland environments, access can be slow and difficult, so be prepared to be flexible once in the field. Ideally, all obviously different land and vegetation types detectable on the imagery should be visited at three disparate locations (i.e. as evenly spaced out as possible).

Prior to undertaking the field inspection, review or undertake one or more of the following: a BDBSA search, Environment Protection and Biodiversity Conservation (EPBC) Protected Matters search, Atlas of Living Australia[2], NatureMaps and the SAAL Biodiversity Strategy[3] and AW NRM Plan[4] to identify if any threatened species or communities could be present. Their presence will need to be verified in the field.

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2 Atlas of Living Australia - contains information on all the known species in Australia, aggregated from a wide range of data providers: museums, herbaria, community groups, government agencies, individuals and universities.

3 Department of Environment and Heritage and South Australian Arid Lands Biodiversity Strategy, DEH and SAAL NRMB – six volumes including regional priority actions and conservation priorities for the six bioregions http://www.naturalresources.sa.gov.au/aridlands/plants-and-animals/native-plants-and-animals

4 DEWNR (2011). Alinytjara Wilurara (AW) Regional Natural Resources Management (NRM) Plan – includes State of the region and Strategic Plan http://www.naturalresources.sa.gov.au/alinytjara-wilurara/about-us/our-regions-plan

4 Field Procedure

4.1 Equipment

You will need the NVC Rangelands Assessment Manual, datasheets (electronic or hard copy), pencil, GPS, camera, large scale aerial photograph mapped into Sites, and plant bags for collecting voucher specimens if identification is unknown.

4.2 Determining locations of Sample Points in an application area (Block)

When in the field, the following activities need to be undertaken:

1. **Verify that the application area has been appropriately stratified into Sites**

   In each paddock, verify whether the watering point/s and fences have been mapped accurately on the *Grazing gradient* layer. If a given watering point or its fences were not mapped appropriately, estimate the distance from each watering point and modify the Sites accordingly. Note that the *Grazing gradient* layer considers more than just distance from watering point (Hobbs 2015) but this single measure will suffice if additional watering points are identified in the field. The intent is to survey areas of higher to lower grazing pressure which may be evident in the field.

   Confirm the topography in the Block matches the landforms layer as determined in the office. Make adjustments to the Sites if clear discrepancies exist.

2. **Select the locations for Sample Points**

   At least **one** Sample Point will need to be completed within each stratified Site. The exact number of Sample Points needed may not be evident until you are in the field, especially:

   - in areas not subject to a pastoral lease (where watering points may not be mapped)
   - on pastoral properties where the fences and/or watering points have been recently changed
   - where there are wetlands, lakes or watercourses.

   More than one Sample Point per stratified Site is required if the vegetation groups are highly variable or if a stratified Site is particularly large. As a general guide, there should be at least one Sample Point per 1000 ha within a stratified Site.

   The Sample Point should be located in an area that is as representative as possible of the vegetation types and conditions in the different Sites (e.g. avoid edges and roads if possible) and should only cover one vegetation group and landscape type.

   For large Blocks, Sample Points should not be located closer than **1 km** to an artificial watering point because it is likely that the vegetation close to a watering point will be subject to high levels of grazing and/or trampling and will not be representative of the broader vegetation condition. Vegetation near natural water features such as creeks and springs should be sampled and not necessarily avoided as they will dictate specific vegetation types that need to be represented in the survey. As grazing pressure will typically be higher at natural water features, these Sites must be separated from similar vegetation without water features.

4.3 Completing the Rangelands Field Assessment

4.3.1 Background to the field assessment

The field assessment focuses on woody perennial plants that persist in the landscape, as woody perennial plants are present regardless of season or recent rainfall. Dominant perennial grasses that define the vegetation group, including Sandhill Cane-grass (*Zygochloa paradoxa*), Swamp Cane-grass (*Eragrotis australasica*) and Spinifex (*Triodia* spp.) are also a focus because they provide similar functional roles with respect to structure. Other longer-lived perennial grasses and sedges should be recorded where the butt of a plant exceeds 30 mm in diameter on entering the ground. Note that if a long-lived perennial grass species is heavily grazed or in an extended dry period, it may not be possible to identify to genus or species, but it can still be recorded at a higher taxonomic level.

The field assessment measures utilisation of the perennial vegetation and landscape function as indicators of vegetation condition. In addition to the perennial species list (front of datasheet), you should record on the back of the datasheet any **threatened**, **exotic** or **other species of note** (whether perennial or not). Threatened, exotic or other species of note seen in the same Site but outside of a Sample Point should also be added to the back of the datasheet and noted appropriately.

The assessment of landscape function examines factors that influence the area's capacity – or, more importantly, an area's inability – to support a range of annual and ephemeral species (as well as perennials). For example, a stony plain with small clay pans, numerous gilgai and few perennial species may be expected to support an abundance and diversity of annual and ephemeral species in a favourable season; and may essentially be regarded as **intact**. Whereas an eroded or disturbed scald with few perennial species present is not expected to be as functional and productive in a favourable season. Hence the assessment has the ability to capture the value of intermittently 'bare' areas that are intact and functioning, as opposed to a degraded and dysfunctional area, and rate those intact areas more appropriately regardless of their state at the time of the survey.

4.3.2 Undertake the field assessment

To complete the field assessment use the Sample Point Datasheet (Appendix A), follow the steps below and refer to the relevant explanations in section 4.3.3 for assistance. On average, a Sample Point is expected to take 20-30 minutes to complete, including the 10 minute 'traverse' (see Step 7 and Figures 6 and 7).

The following process must be used at each Sample Point:

Step 1. Arrive at a Sample Point identified during the desktop assessment. If no woody perennials or perennial tussock grasses are evident move the Sample Point to where they occur (usually the nearest run-on or drainage depression).

Step 2. Select a location to place the Sample Point that is representative of the Site. Observe the characteristics of the vegetation and note the impact of infrastructure such as tracks, fence lines and other potential sources of atypical disturbance on the vegetation. If disturbance impacts are seen, move to a more suitable area. Examples of disturbance impacts include desiccated vegetation on a downslope from a road or associated erosion gully, and the effects of fence lines.

PLEASE NOTE: if the survey area is small, simply undertake the field assessment within the limits of the survey area.

Step 3. Record the GPS location and take a photo in a direction that best captures the bulk of the vegetation community being sampled, does not include the access track, and minimises sun glare. Record the photo number and direction of the photo on the datasheet.

Step 4. Look over the area to be traversed and select the appropriate landscape type, surface soil textures and surface characteristics (see 4.3.3.2).

Step 5. Record the general plant community by describing the vegetation association in terms of dominant species and structure, e.g. *Atriplex vesicaria/Maireana astrotricha* very open low shrubland (see 4.3.3.3).

Step 6. Record the vegetation stratum present across the area to be traversed by selecting 'present' or 'absent' for: Tree/Shrub >3 m, Shrubs 1-3 m, low shrubs <1 m and/or hummock grasses, perennial tussock grasses with basal area >30 mm (50 cent coin) (see 4.3.3.4.).

Step 7 (the TRAVERSE). Begin recording perennial plant species and walk through the area to be included, closely visiting as many of the patches containing trees and shrubs that are within 200m of the start point. Where vegetation is uniformly distributed, a loop out to 150 m from the photo should adequately cover enough individuals of most species on which to base the assessment (see Figure 6 and 7). Average time spent on a traverse should be 10-15 minutes. Therefore, in species-diverse, densely-vegetated areas the size of the loop can be smaller. In sparse patchy landscapes, loops may need to cover more ground and be more linear.

Step 8. On the traverse write down all perennial species, assessing utilisation state for the visible individuals of each species (see 4.3.3.5). As each individual is encountered and assessed, score the appropriate field (intact, modified or over-utilised) next to the species name. This tally will be used to generate the proportion of states in which each species was present at the Sample Point, which, in conjunction with species palatability, is used to generate a single utilisation score for the Site. Also, whilst on the traverse, be observant of physical and biotic disturbance indicators. Maintain a running tally for trees and tall shrubs (>3 m tall) with palatable perennial plants underneath the canopy versus those without (score appropriate data fields and see 4.3.3.6).

Step 9. Once the traverse is completed, review the species information and add the appropriate age class code for each species.

Step 10. Assess the approximate size and extent of areas of bare soil that have an unproductive crust or consist of exposed subsoil. Where bare patches are >100 m in continuous area, estimate if the sum of such patches cover more or less than 50% of the area traversed, and tick the appropriate box (see 4.3.3.6).

Step 11. If working along a drainage line, estimate the proportion of channels sampled that are destabilised (vegetation, if present, will be highly disturbed and channel banks deflated) and select appropriate category > or < 50%.

Step 12. Use the species list on the back of the datasheet to record any additional annual, ephemeral, threatened or exotic species of note in the area.

Step 13. Review data collection to ensure all relevant fields have been completed. In total, each Sample Point is expected to take 20-30 minutes maximum. Move to next Sample Point.

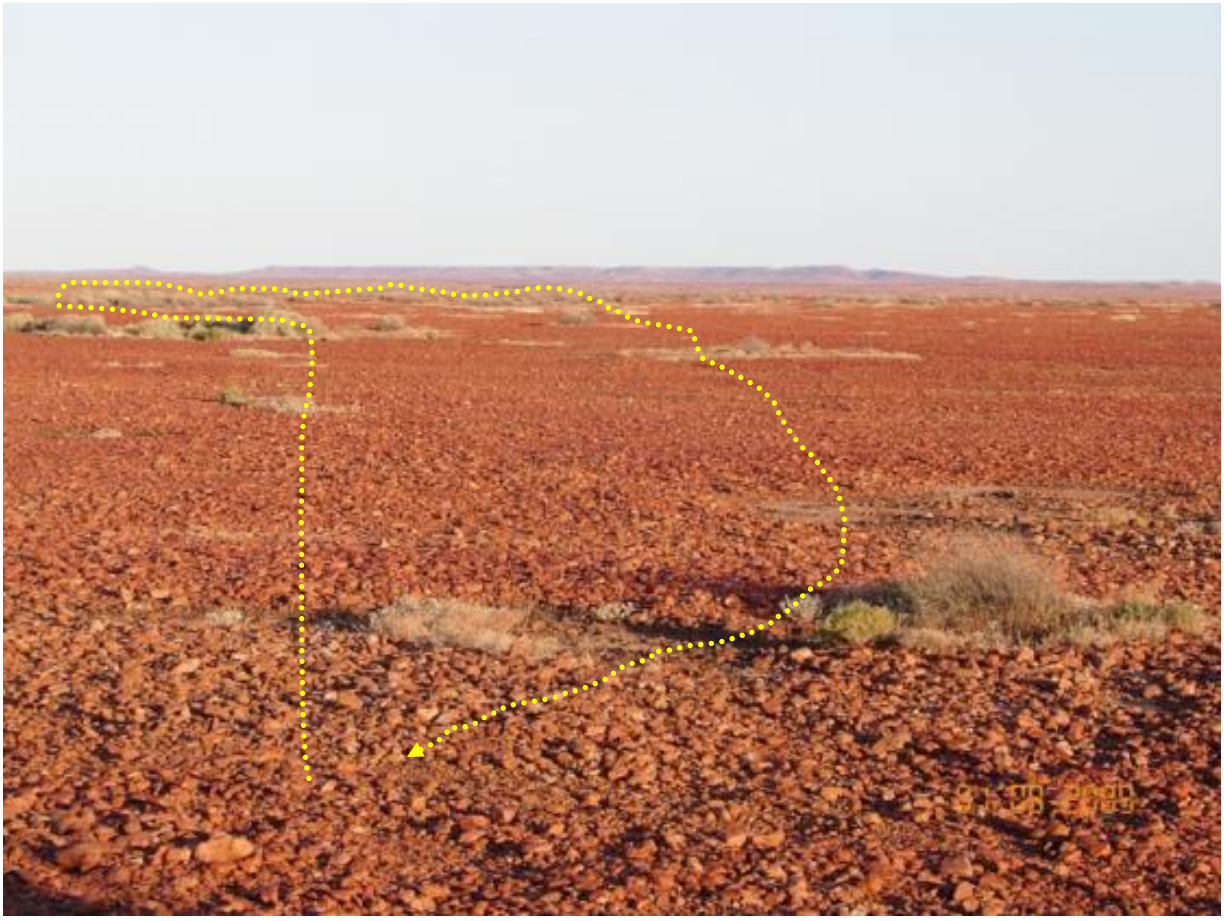


Figure 6: An example of 'the traverse' at a Sample Point. This area is 50 m in *from a track in a pre-determined stratified Site. The traverse needs to focus on the area with the highest concentration of perennial vegetation as shown by the dotted line on the photo. In a well-vegetated plot, a 100-200 m loop would suffice, but in more open patchy situations a longer loop or transect may be required to cover areas devoid of perennials. If none are near the predetermined Sample Point, move to the next area with woody perennials. The shape of the loop is determined by the terrain and woody perennials.*

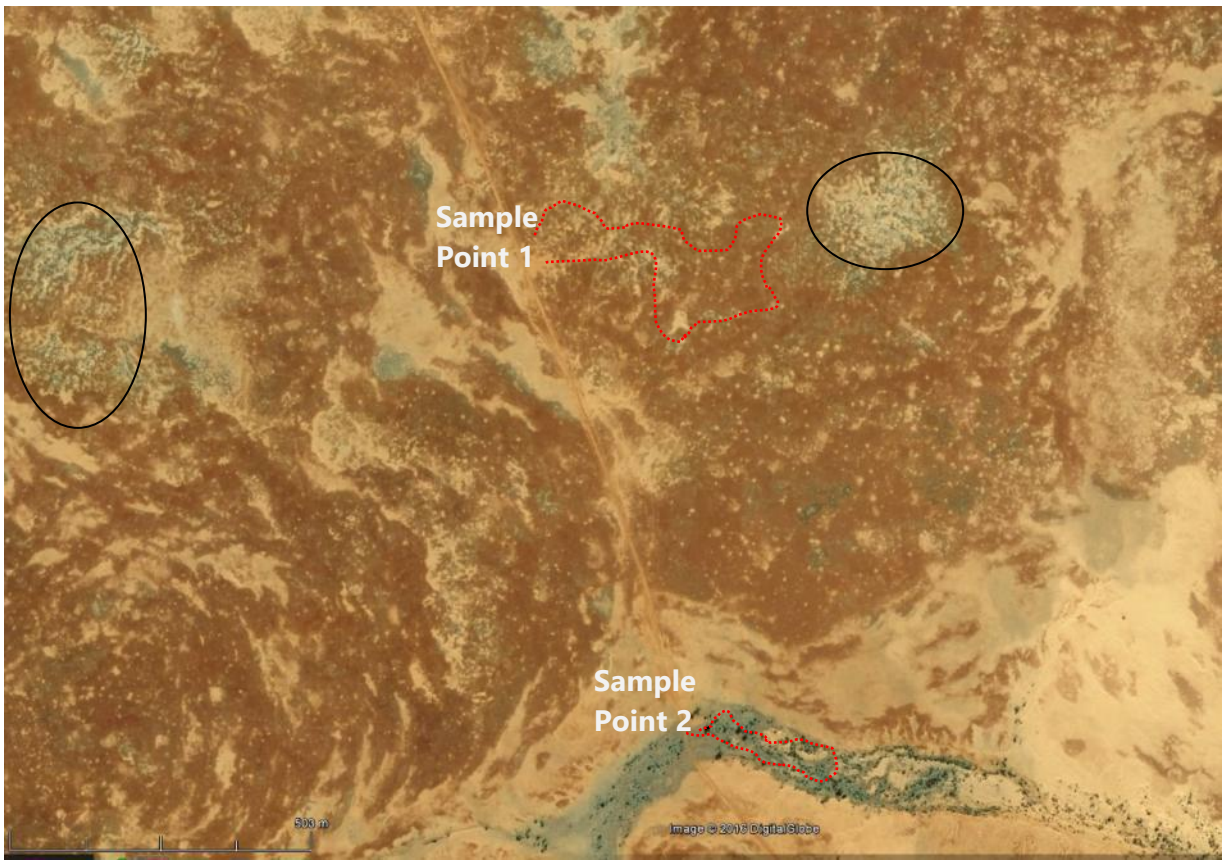


Figure 7: Imagery showing an area with extremely patchy and sparse vegetation that is common in the north east of South Australia. Sample Point 1 is an area of pavement gibber with sand mounds and spreads. Sample Point 2 is the open woodlands/shrubland of a drainage line. Very few perennials are likely at Sample Point 1 and so a traverse would require covering more than twice the distance of Sample Point 2, which has a denser distribution of trees and shrubs. Where features are off-track (e.g. black circled swamps) it may be necessary to drive or walk off track to undertake the assessment. The area covered by a traverse should not be less than 100m from the start point.

4.3.3 Sample Point assessment details explained

4.3.3.1 Sample Point location

In this section, record details that identify the Sample Point, including location (property/GPS), names of observers, date, photo and Sample Point label (e.g. A1-PU).

4.3.3.2 Landscape description

The landscape description is important for the analysis of impacts on landscape type across the rangelands and over time. Recording the 'surface type' enables the identification of areas with higher productive potential and important biodiversity habitat characteristics to be identified from similar landscape types without those features. This data will be useful for analysing land and vegetation condition for particular landscape types.

1) Landform type

Select the most relevant category of landform type from the options in Table 2. Selection of drainage lines is pre-requisite for filling out the physical disturbance category associated with creek and channel bank stability.

Table 2: Descriptions of landform types

Landform type	**Description**
Ranges and hill slopes	Obvious protrusions in the landscape with areas of steep slopes
Breakaways	Occur where plains drop into drainage basins and deeper river valleys
Outcrops (rocks)	Occur where basement and sedimentary rocks protrude through plains or dune fields
Drainage lines/floodouts	Occur in the lowest point of the broader landscape as watercourses and adjacent floodplain areas
Swamps	Large productive internal drainage depressions that periodically or permanently support vegetation
Clay pans and salt lakes	Large unproductive internal drainage depressions devoid of vegetation
Plains – level	Level and gently inclined plains
Plains – undulating	Uneven plains that are dissected by drainage networks but not obviously a cluster of hills or ranges
Dune fields	Plains with regular or irregular cover of sand dunes
Springs/Mound springs	Natural outlets for the waters of the Great Artesian Basin, often occurring as a raised mound, with freestanding water or small water seepage

2) Surface character

Select >50%, 1-50% or don't select. A Site can support multiple surface types. This data will enable the analysis of land condition for surface characteristics that influence the pastoral productivity of particular landscape types.

Table 3: Description of soil surface types.

Surface type	**Description**
Pavement (impermeable)	Dense mantle of rounded stones (gibber) or sheet rock (e.g. limestone) with no exposed soil that is able to grow vegetation
Stony	Regular cover of stone but with spaces between rock that are able to grow vegetation
Cracking	Associated with clays that shrink when dry, common on floodplains, swamp beds and undulating clay plains such as the Moon Plain. Only consider areas with obvious cracking > 10 mm wide
Gilgai	Irregularly distributed depressions and mounds associated with cracking clay soils in some gibber and flood plains
Hummock	Sand mounds and spreads protruding above the regular soil surface

Photo 1: Pavement gibber with small sand mounds or hummocks

Photo 2: Cracking clay country when dry – often in flooded areas but also relict floodplains where gypsum is abundant, e.g. the Moon Plain near Coober Pedy.

Photo 3: Stony plain with productive patches plus gilgai depressions

3) Soil surface

All three broad categories of soil surface (i.e. sand, loam or clay) can be selected if the Site is complex, which is common where wind or water cause sand or clays to accumulate. Locations with a broad range of soil types often support more diverse perennial plant assemblages, and collection of this data will assist in the analysis of trends.

4.3.3.3 Vegetation association description

Each Sample Point must be described in terms of dominant species and structure using terminology consistent with the recognised South Australian Vegetation Structural Formations (Appendix C).

Firstly, divide it according to its **overstorey** [5]structural formation and [6]species. For example, you may have two associations – *Atriplex vesicaria/Maireana astrotricha* Low Very Open Shrubland and *Eucalyptus socialis* Open Mallee.

If needed, make further divisions according to its **understorey** structure (which often infers condition) and species. For example, two distinct vegetation associations are both *Acacia papyrocarpa* Low Woodland, but one is described as 'over *Acacia* spp + *Maireana* spp. + *Enchylaena tomentosa* var. ', and the other 'over *Acacia* spp and introduced *Aspholdelus fistulosus* + *Carrichtera annua'*, reflecting different levels of degradation. The two are considered separate vegetation associations.

4.3.3.4 Vegetation strata

Up to four functional vegetation strata can be selected as present or absent on the traverse at a Sample Point:

- Trees and shrubs greater than 3 m in height
- Shrubs from 1 to 3 m high
- Low shrubs less than 1 m high and/or hummock grasses (includes Spinifex *Triodia* spp., Sandhill Canegrass *Zygochloa paradoxa*, Swamp Cane-grass *Eragrostis australasica* and perennial Mitchell Grass (*Astrebla* spp) because they provide similar functional roles with respect to structure;
- Perennial tussock grasses with basal areas >30 mm (e.g. a 50 cent piece with 30 mm diameter).

[5] Plant life form of tallest layer plus height and projective foliage cover, e.g. Low Open Shrubland

[6] E.g. *Atriplex vesicaria* Low Open Shrubland (only need to list dominant species)

Strata selection will influence which physical and biotic disturbance assessment fields are available for selection. For example, if there are no trees or shrubs over 3 m, the attribute categories for palatable shrubs and intact litter mats under canopies are not relevant and will not feature in the assessment of those Sites.

1) Tree/shrub strata

Selected strata need to be consistent with the age class(es) in the perennial plant species list. Sub-adults or recruits of larger shrub or tree species should be treated as shrubs and included in the relevant height category.

For example, if a larger species such as Mulga (*Acacia aneura*) is recorded in only the adult age class, 'Trees/shrubs >3 m' should be selected. If mixed age Mulga are present, then one or both of the shrub categories should be selected in addition to 'Trees/shrubs >3 m', depending on the size of the recruits.

2) Perennial tussock grasses

Perennial tussock grasses are a feature of all open canopy vegetation communities and because the abundance varies in response to natural drivers (i.e. rainfall) the presence of a single grass butt >30 mm indicates that persistent grazing has not eliminated them from the community. The absence of grasses contributes negatively to the assessment.

Perennial tussock grasses are characterised by solid bases with extensive root systems. Putting a minimum size on the basal area means that shorter-lived grasses or less established perennial grasses are not counted, as these will appear following favourable seasonal conditions. When allowed to prosper they will develop substantial bases from which they reshoot following sustainable grazing and dry periods. Perennial grasses are expected to be present even during dry times, when they might all be grazed down to the butt.

Stratum together with age class tells a story about grazing pressure over time. Underlying assumptions are that in a functioning system:

- perennial grass tussocks will always be present
- mixed age classes will be present
- Whatever the tallest height class present is, all other height classes below that should also be present => recruits.

Example – A Sample Point is in a mulga grassy woodland. Mulga is the only woody perennial in the Site. Ideally all height classes should be represented due to different aged mulga recruits. An absence of plants in the lower height categories would also indicate an absence of mulga recruits, and therefore that grazing pressure might be suppressing regeneration.

Note – it is possible to see different aged cohorts depending on recruitment events e.g. high rainfall years (1975, 1992, 2010, etc.). Factors suppressing regeneration includes drought and fire, or fire with follow-up grazing.

4.3.3.5 Woody and long-lived perennial plants

Record all obvious woody perennial trees, shrubs and long-lived perennial grasses and assess for dominance in the landscape, utilisation and broad age categories.

1) Species and dominance

Record only the perennial species that appear on the list in Appendix G. Perennial species that don't meet the woody tree or shrub requirement are not included in this list, e.g. annual and biennial woody forbs, creepers, vines, lilies. Long-lived perennial and grazing resistant grasses are included because of their structural importance and general persistence in most of the landscapes in which they occur. These include the hummock grasses, Porcupine Grasses (*Triodia* spp.) and Sandhill Canegrass (*Zygochloa paradoxa)* plus Swamp Canegrass (*Eragrostis australasica)*, a tussock grass. Other longer-lived perennial grasses and sedges should be recorded where the butt of a plant exceeds 30 mm on entering the ground. Note that if long-lived perennial grass species are heavily grazed or in an extended dry period, it may not be possible to identify to genus or species, so they can be recorded at a higher taxonomic level.

2) Utilisation

Undertake the utilisation assessment of woody perennial shrubs, trees and long-lived perennial grasses at the Sample Point. The level of cumulative utilisation and palatability of each species forms the basis of the biotic disturbance measures.

Plants will grow to a genetically determined form if there are no major disturbances (in contrast to size or population density which are significantly affected by environmental factors such as nutrient and moisture status). This concept of the intact form (see below and Figure 8) is the basis for rapid assessment, with the proportion of plants in one of three broad utilisation categories driving the analysis of condition state.

The three utilisation states are:

- **Intact** – the plant has grown to expected functional form (woody structure of stems, branches, twigs and grass stems are not noticeably interrupted by the action of herbivores). Identifiable species that are dead or stressed should be recorded as intact if branches and twigs are intact. They could be dead or stressed as a result of disease, grazing by invertebrates or moisture stress, all of which can occur naturally and independent of land management.

- **Modified** – plant shape has been noticeably modified from the intact functional form - leaves, twigs, branches and/or grass stems have obviously been removed or pruned back over the whole or part of the plant. Look at the part of the plant within 2 m above the ground. The canopies of taller plants above 2 m should not form part of the assessment unless camel impact is being documented.

- **Over-utilised** – more than 50% of the intact functional form of the plant is absent (leaves and twigs are restricted to parts of the plant that are difficult for a herbivore to access, and branches >6 removed given the diameter of the basal trunk, stems and branches ≥ 6mm browsed back or broken off). Most long-lived species in this state are compromised with respect to next season's productive capacity, and reproductive potential. Where the majority of long-lived plants are in this state the opportunity for maintenance of ground cover and recruitment of perennial plants is unlikely.

For each species, the number of individuals observed in each utilisation state is scored to determine the proportion of plants in each utilisation state. If the vegetation is sparse, or there are a number of species to remember, it may be useful to tally plants in each state. However, for each species you will need to arrive at a proportion in each column (Intact/Modified/Over-utilised) of >50% or <50% or none.

The Perennial Species Scoresheet converts the utilisation tally to a proportion code (i.e. **2** for >50%, **1** for <50%, or **0** for 0) which is then used with the palatability rating to calculate a score for each utilisation state.

If the proportions are easily distinguishable in the field (or overwhelmingly in one category) you can simply give the species a proportion (>50% or <50% or none) instead of using the tally, and then enter the proportion code for each state into the scoresheet. If the code (**2** for >50%, **1** for <50% and **0** for none) is typed into the tally column of the scoresheet, the calculations will still work.

See Figure 8 for a depiction of the three utilisation states.

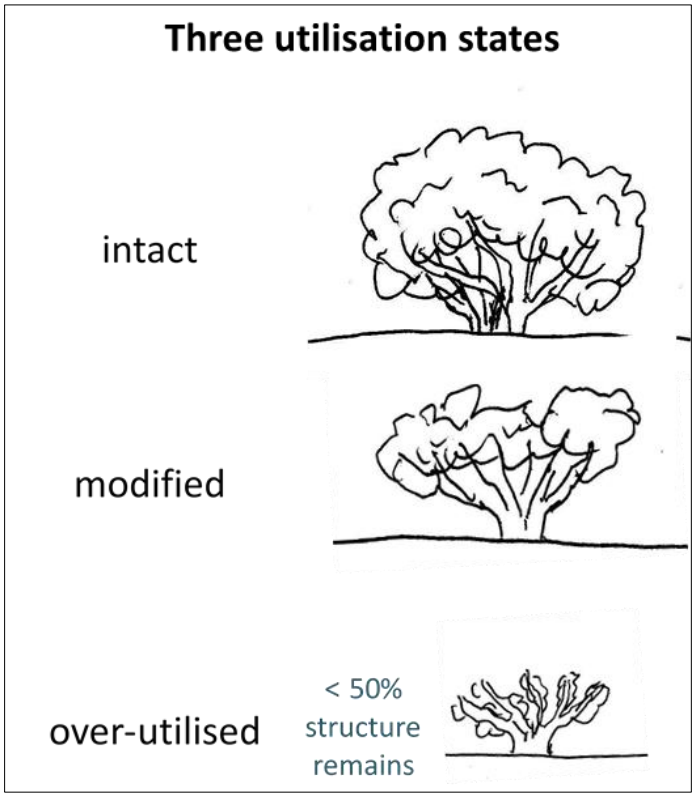


Figure 8: A depiction of the three utilisation states used as an estimate of grazing pressure.

3) Age class

Age classes for species is another important indicator of the state of the system with respect to maintaining the functional form of the vegetation community. Make a note of the presence or absence of mature and younger sub-adult plants. Record the data as one of the following codes:

- **Y = young, sub-adult plants**. Record this when there are only young plants present as may be the case in a landscape recovering from fire, a redirection of floodwaters, or the cessation of overgrazing. Seedlings (plants with less than one season's growth) are not included as part of the assessment and must be ignored as they are a poor indicator of ongoing land condition. Young plants are characterised by immature growth forms which generally includes thin stems and branches growing upwards more than outwards, and generally less than one quarter of the bulk of a typical mature plant.

- **A = adult plants**. Record this when no younger cohorts are visible, which is common close to permanent water sources and an indicator of chronic high utilisation. Adult plants include plants that are not considered sub-adult and should include plants that have been stunted at immature heights by ongoing grazing pressure. This can be assessed by looking at the size of trunks, stems and lower branch diameters.

- **M = mixed cohorts**. Record this when young and adult plants are visible. This should be the norm in sustainably grazed landscapes.

The age class indicators provide information on longer term utilisation, while the plant form focusses more on the current and previous season's utilisation levels.

4.3.3.6 Biotic and physical disturbance indicators

Biotic indicators include the level of disturbance to litter mats and the presence of palatable perennial plants below the canopy area of tall shrubs and trees (>3 m high).

Coherent litter mats are important areas for soil formation, nutrient recycling and habitat and can only form in areas where disturbance is low. Coherent litter mats don't form in areas where significant surface water flows are likely to occur such as on major floodplains.

Palatable perennials are distributed around the landscape by seed-eating birds perching in trees and shrubs and are therefore present in all habitats frequented by birds. Common species include *Rhagodia* spp., *Enchylaena tomentosa, Santalum* spp*., Pittosporum angustifolium* and *Pimelia microcephala*. Presence, utilisation level and age class for these species need to be included in the species list.

Physical indicators include the level of disturbance to the natural soil surface via tracks, prevalence of bare soil scalds and destabilisation of creek banks (if present). Table 4 provides more explanation of these indicators.

Assumptions:

- Undisturbed and lightly grazed systems will have one or more species of berry producing plants living under the canopy area of most trees/shrubs. In areas not subject to regular natural disturbances (such as flooding), litter accumulation under the canopy will form stable mats that promote soil formation and protect the underlying soil from rain and wind. This further promotes perennial plant growth which may obscure the litter mats with their cover. These are considered intact.
- Moderate utilisation will not remove all palatable plant species under the canopy. In areas not subject to regular natural disturbances (such as flooding), litter accumulation under the canopy will be present under at least half of the canopy area of the tree/shrub.
- Over-utilisation is characterised by the absence of palatable perennial plants and, in non-flood-prone areas, the disturbance or loss of coherent litter mats under tall trees and shrubs.

Table 4: Description of biotic and physical disturbances

Biotic	
Canopies with palatable shrubs	Area below the canopy of trees and tall shrubs >3 m which contain palatable shrubs (e.g. *Enchylaena tomentosa*, *Rhagodia spinescens*)
Canopies with intact litter mats (not in flood-prone areas)	Area below the canopy of trees and tall shrubs >3 m supports intertwined litter accumulation (ie. a litter mat) and/or shrub cover, over more than half of the canopy area
Physical	
Prevalence of unproductive bare soil patches	Cumulative estimation of unproductive scalds and crusted bare patches (larger than 5 m x 5 m) that contain no evidence of supporting plants (i.e. ephemeral plant litter, stems, etc.)
Tracks or previous disturbance of natural land surface	Evidence of animal tracks, vehicle tracks or other physical disturbance to the natural land surface
Destabilised and deflated creek channel banks	This is only an option in drainage lines and mostly apparent near waterholes. Destabilised banks have no ground vegetation holding them together and show signs of collapse or deflation from trampling. Inspect banks on both sides of channel.

5 Filling in the Rangelands Assessment Scoresheet

A Rangelands Assessment Scoresheet (Appendix B) should be prepared for each application area (Block). The Landscape Context score is determined from the Block and is therefore completed in the first spreadsheet. Each subsequent sheet relates to the Vegetation Condition and Conservation Significance of the Site(s) in the Block and the associated species lists. The Landscape Context score for all the Sites will be auto-filled from the Landscape Context score for the Block.

This section provides instructions on how to fill in the Rangelands Assessment Scoresheet.

The cells in light purple must be filled in with the data collected in the field (as per field datasheets) or from geographic mapping tools. After filling in these cells, Excel will automatically calculate the scores.

The Assessment Scoresheet allows you to select the purpose of the assessment. This will provide results that are specific to that purpose. For example, for an assessment for a clearance application, the scoresheet will calculate the SEB points that need to be provided to offset the clearance. If the assessment is for a proposed SEB area, then the scoresheet will calculate the SEB points that the Site will provide.

The plant species (both native and introduced) and fauna species (threatened fauna and introduced species) are recorded for each vegetation association (Site).

5.1 Landscape Context Scores

Landscape Context considers the influence of the area of vegetation on the broader landscape. In particular, how the removal of the vegetation or its protection and enhancement will affect the plants and animals that occur in the landscape. Given that the arid zone is almost completely covered in native vegetation, relative connectivity is less of an issue compared to the highly fragmented vegetation in the agricultural zone. Accordingly, Landscape Context for the arid zone is based on the number of land form features present, size of the area being affected, presence of wetland features, and level of protection of native vegetation in that local geographic area.

The following information can be entered directly into the Rangelands Assessment Scoresheet, after which the Landscape Context score will be automatically calculated.

5.1.1 Number of landform features in Block

This is a measure of the variation of landform features in the area of impact.

Scoring for number of landform features is:

- 1 = 0.01pts
- 2 = 0.03pts
- >2 = 0.06pts.

5.1.2 Size of the Block

This is a measure of the size (hectares) of the Block. The larger the Block the greater the impact on the local environment.

Scoring for Block size is:

- <100ha =0.01pt
- 100 – 500 ha = 0.02pts
- 500 – 1,000ha = 0.03pts
- 1,000 – 2000 ha = 0.04pts
- 2,000 – 5,000 ha = 0.05pts
- >5,000ha 0.06pts.

5.1.3 Percentage (%) area protected in IBRA sub-region score

Identify the percent of vegetation cover that is protected in the IBRA sub-region in which the Block is located. Use the layer on NatureMaps to identify the IBRA sub-region. The percent vegetation protected can be located in Appendix D.

Scoring for protection at the IBRA sub-region is:

- 0-2% = 0.05pts
- >2-5% = 0.04pts
- >5-10% = 0.03pts
- >10-25% = 0.02pts
- >25-100% = 0.01pt.

5.1.4 Presence of a wetland, watercourse or lake score

Given the dry nature of the arid zone, wetland features are rare and extremely important habitat and refugia for flora and fauna. Record if a Block contains a naturally occurring wetland, watercourse, floodplain or lake.

Scoring is:

- Permanent or semi-permanent (e.g. contains water for at least 6 months of the year) = 0.08pts
- Occasionally contains water (e.g. at least once every 5 years) = 0.05 pts
- Very occasionally contains water (e.g. at least once every 20 years) = 0.02pts.

5.2 Vegetation Condition Scores

Enter the field data obtained at the Sample Points into the Vegetation Condition section of the Rangelands Assessment Scoresheet (Appendix B). Vegetation Condition also includes measures of land condition (physical and biotic disturbance indicators) which are important factors in a rangelands environment. They indicate whether a landscape is intact or not, and where the presence and condition of vegetation can be heavily influenced by annual climatic conditions, irrespective of land management history.

The scoring for the components of Vegetation Condition is explained below.

5.2.1 Utilisation scores

Enter the details of the woody perennial species and long-lived species that were recorded during the field assessment into the Perennial Species Scoresheet. For each species, enter the tally of individuals in each utilisation state (Intact, Modified or Over-utilised). Once you have entered all three tallies, the proportions for each utilisation state will be calculated for that species and expressed as a code (i.e. **2** for >50%, **1** for <50%, or **0** for 0). If you have simply recorded a proportion category (>50%, <50%, or 0) for a species, you must enter the appropriate code (i.e. **2** for >50%, **1** for <50%, or **0** for 0) into the tally column and the calculations will still work

The calculation for each utilisation state takes into account the listed palatability of that species and assigns an appropriate score using the information in Table 5. For example, if a *Highly Palatable* species at a Sample Point recorded >50% of individuals as *Intact*, that species would score the maximum of 20 points. However, if an *Unpalatable* species recorded >50% of individuals as *Intact*, it would not score as highly (10 points) since we would expect that unpalatable species would not be utilised even in a reasonably well grazed area. But conversely, if an *Unpalatable* species at a Sample Point recorded >50% of individuals as *Modified* or *Over-utilised*, this would register the lowest scores of five and zero (respectively). The utilisation of unpalatable species is an indicator of the area being heavily impacted, and should ring alarm bells especially when they are over-utilised. Any utilisation state that has not registered for the species does not influence the calculations.

Each species entered will have a **Plant Utilisation Score**, which takes the mean of the utilisation states and multiplies it with the age class score. When all the perennial species at the Sample Point have been entered, the mean **Site Utilisation Score** will be automatically calculated.

Age class scores:

- Mixed=1.3
- Young=1
- Adult =0.7

Table 5: Scoring for the utilisation states of each perennial species taking into account its listed palatability.

Palatability	Modification level (utilisation)	score >50%	score <50%
Highly Palatable (HP)	Intact	20	15
Palatable (P)	Intact	15	12.5
Unpalatable (U)	Intact	10	10
Highly Palatable (HP)	Modified	12.5	15
Palatable (P)	Modified	10	12.5
Unpalatable (U)	Modified	5	7.5
Highly Palatable (HP)	Over Utilised	11	12
Palatable (P)	Over Utilised	5	7.5
Unpalatable (U)	Over Utilised	0	5

5.2.2 Biotic and physical disturbance scores

Enter the biotic and physical disturbance data for each Sample Point into the Site Scoresheet. The biotic disturbance focuses on the presence of *positive* indicators including litter mats and palatable shrubs under canopies. The physical disturbance focusses on the presence of *negative* indicators including bare scalds, tracks and other soil disturbance. Hence note that the scores for *dominant*, *minor* and *none* are opposite for the positive (biotic disturbance) and negative (physical disturbance) indicators. Scores for biotic and physical disturbance are calculated separately.

Biotic disturbance scoring is:

- dominant = 2
- minor =1
- none = 0.

Physical disturbance scoring is:

- dominant = 0
- minor =1
- none = 2.

5.2.3 Vegetation stratum score

Enter details of the vegetation strata that are present and notably absent (i.e. have been removed). If the strata were never likely to have been present (e.g. tree canopy in a low shrubland) do not tick either box – ticking 'absent' will falsely penalise the shrubland for not having tree strata. A Vegetation Stratum score will be automatically calculated.

Scoring:

- 1 point for each stratum present
- -1.5 for each stratum that is absent.

5.2.4 Introduced plant species cover score

Mark into the Site Scoresheet whether any *declared* weed species are present in the Site. Choose the appropriate cover category of introduced plant species. An overall score is calculated, where a score of 10 is registered for a Site with little to no weeds. A Site that is dominated by weeds will get a low score of 5, but if declared weeds are present the Site would score 0.

Scoring is:

- Declared species present (yes = 0, no = 2)
- introduced species dominate, sparse or isolated natives persist (>50% of vegetation cover) = 0
- Moderate invasion of introduced species (5 to 50% of the vegetation cover) = 1
- Very sparse to nil introduced species present (<5% of vegetation cover) = 2

5.3 Conservation Significance Scores

To assist field data collection, a search of historical flora and fauna species records should be carried out for the property and its surrounds. To do this use NatureMaps, The Atlas of Living Australia (ALA), the Biological Databases of South Australia (BDBSA), the Protected Matters Search Tool (EPBC Search Tool), and the regional species

assessment lists. This will alert you to the potential presence of species of conservation significance before you undertake the field visit. Appendix F gives instructions on how to delineate and search an area for flora and fauna records using some of these databases.

Species highlighted as potentially present in these searches may be excluded if it is determined that there is **no** suitable habitat within the Sites.

Note: Conservation Significance scores apply to each Site and are used to weight the Vegetation Condition and Landscape Context Site scores.

5.3.1 Conservation significance of ecological community score

Refer to the DEWNR provisional list (Appendix E)[7] and the *Environment Protection & Biodiversity Conservation* (EPBC) *Act 1999* to determine if the Site contains a state or national 'threatened ecosystem' or 'threatened ecological community' (TEC) (see a map of South Australia for information on areas that may contain an EPBC Act Threatened Ecological Community here: www.environment.gov.au/biodiversity/threatened/communities/sa).

You may need to refer to EPBC criteria to determine if a vegetation community qualifies as a TEC. Note that the state listings do not specify a minimum size for a remnant to be classified.

5.3.2 Plant species of conservation significance

Direct observations – Count the number of nationally-listed (EPBC Act) or state-listed (*National Parks and Wildlife Act 1972*) flora species recorded at the Sample Point. Enter the number directly into the Rangelands Assessment Scoresheet. Additional threatened flora directly observed in the broader Site but not necessarily at the Sample Point must be recorded on the scoresheet for that Site.

Historical records – Identify any observations of flora species of conservation significance that have been recorded within 50 km of the Block. Use NatureMaps, ALA records or BDBSA search and the EPBC Search Tool (Appendix F) to identify threatened species that have been recorded within a 50 km radius of the Sample Point. Only use records from and after the year 1995, within 50 km of the Site and with locational reliability <1km. For the EPBC Act Search Tool, only record species that state – *Species or Species habitat known to occur within area* (Refer to Appendix F for further details).

When counting species present do not double up – if a plant species has regional, state and national ratings, only count its national rating.

5.3.3 Fauna species of conservation significance

The fauna species score is based on direct observations plus the presence or absence of 'suitable habitat'.

Direct observations – Use the fauna species observed during the field assessment to identify species of conservation significance that use the Site. This can include evidence of a threatened species that has been observed anywhere within the relevant Site.

Historical records – Identify any observations of fauna species of conservation significance that have been recorded within 50 km of the Block. Use NatureMaps, ALA records or BDBSA search and the EPBC Search Tool (Appendix F) to identify threatened species that have been recorded within a 50 km radius of the Site. Only use records from and after the year 1995, within 50 km of the Site and with locational reliability <1km. For the EPBC Act Search Tool, only

[7] DEWNR (in progress). Provisional List of Threatened Ecosystems of South Australia (unpublished & provisional list).

record species that state – *Species or Species habitat known to occur within area* (Refer to Appendix F for further details).

When counting the number of species observed or recorded, do not double up – if a fauna species has regional, state and national ratings, only count its national rating. This information can be further supplemented where appropriate with **expert opinion and local knowledge.**

5.4 Site Scores

5.4.1 Unit Biodiversity Score

The scores that a Site receives for Vegetation Condition (including land condition), Conservation Significance and Landscape Context are combined to provide a Unit Biodiversity Score (UBS) for the Site. This is a per hectare score.

The formula is applied as follows:

Unit Biodiversity Score = Vegetation Condition x Landscape Context x Conservation Significance

This formula ensures Sites that are of conservation significance receive a proportionately greater score. It recognises the importance of these areas for conservation and the increased risk of decline and extinction as a result of the clearance impact. It also recognises the difficulty of replacing such areas, species and vegetation communities, given that they are often scarce or in decline.

5.4.2 Total Biodiversity Score

Given that the Unit Biodiversity Score is a per hectare score, it must be multiplied by the area (in hectares) of the Site to determine the Total Biodiversity Score.

6 Submission of Datasheets and Scoresheets

6.1 Rangelands Assessment Site information and scores

You will provide rangeland assessment data as part of an assessment report. This data will be stored in DEWNR information systems. While members of the public cannot access or query this system, the NVB will provide a regular data update at this location on the DEWNR website: www.environment.sa.gov.au/managing-natural-resources/Native_vegetation

You can view and sort the data for score comparisons.

6.2 Clearance application or regulation reports

If you are required to complete a Clearance Application (under Section 28 of the Native Vegetation Act 1991) or Regulation Report (for a clearance under the Native Vegetation Regulations 2017) use NVB's assessment template. The template outlines the information that needs to be provided and in what format.

7 Interpretation & review of the Rangeland Assessment method

7.1 Revisits to Rangelands Assessment Sites

It is anticipated that there will be revisits to Rangelands Assessment Sites for monitoring and other purposes.

When rescoring a Rangelands Assessment Site, keep in mind the following:

- Each Sample Point is considered to represent the entire Site so, theoretically, return visits do not have to involve a traverse of the exact area of the original survey. It is recommended, however, that the original waypoint is used as a reference when planning a return visit, and repeat searches are undertaken in the vicinity of this waypoint where possible.
- A new photo must be taken in the same photo point location and in the same direction as in the original survey. This will illustrate broad changes over time.
- Assessors should refer to the datasheets from previous visits to assist with interpretation of observed changes, particularly where the associated scores will be guiding management.
- An application area (Block) should not be re-mapped into a different combination of Sites to the original mapping, even when the vegetation has changed significantly e.g. where a previously grazed Site now resembles its neighbouring ungrazed area after stock has been excluded for ten years. Re-mapping takes away the opportunity to measure change from the originally-surveyed condition.
- Visiting the original Sample Points at the same time of year is less relevant in rangelands environments as the climatic conditions in the previous months and years can cause variations in the landscape more significantly than the traditional 'seasons' experience in agricultural environments. The Rangelands Assessment Method attempts to lessen the influence of the seasonal conditions on results of the assessment and it should be applicable to compare assessments from any time of the year. Due to the nature of the rangelands environment, revisits will more likely be dictated by when assessors may be in the area (as many Sites may be quite remote), suitable access to the area and other factors such as funding.

7.2 Review of the Rangeland Assessment Method

The NVC will contact a review of the method after 12 months following the endorsement of the manual. The NVB will incorporate any necessary modifications to the method (if required, according to feedback from users) after the review has been conducted.

8 References

Croft, S.J., Milne, T.I. & Pedler, J.A. (2005-2009). Bushland Condition Monitoring Manual - Southern Mt Lofty Ranges, Murray Darling Basin, Eyre Peninsula, Northern Agricultural & Yorke Peninsula regions.

DEH and SAAL NRMB. South Australian Arid Lands Biodiversity Strategy – six volumes including regional priority actions and conservation priorities for the six bioregions, www.naturalresources.sa.gov.au/aridlands/plants-and-animals/native-plants-and-animals

DEWNR (in progress). Provisional List of Threatened Ecosystems of South Australia (unpublished & provisional list).

DEWNR (2011). Alinytjara Wilurara (AW) Regional Natural Resources Management (NRM) Plan – includes State of the region, Strategic Plan and Business Plan www.naturalresources.sa.gov.au/alinytjara-wilurara/about-us/our-regions-plan

Flora of South Australia, 5th Edition. Compiled by J.M. Black 1922-1957 and updated by the Editorial Board. www.environment.sa.gov.au/Science/Science_research/State_Herbarium/Resources/Publications/Flora_of_SA

Heard, L. & Channon, B. 1997. Guide to a native vegetation survey (agricultural region) using the biological survey of South Australia methodology. South Australian Department of Housing & Urban Development, Adelaide. As cited by Hobbs et al. (2015).

Hobbs T.J., Haby N. and Schutz A., 2015, Mingkiri – Developing a Rapid Assessment Technique for Native Vegetation Council Clearance and Offset Applications in the Arid Zone, DEWNR Technical Note 2015, Government of South Australia, through the Department of Environment, Water and Natural Resources, Adelaide.

Milne, T.I. & Croft, T. (2012). Bushland Condition Monitoring Manual – Benchmark Communities of the South East.

Milne, T.I. & McCallum, B. (2012). Bushland Condition Monitoring Manual – Benchmark Communities of Kangaroo Island.

Native Vegetation Council (2015). Bushland Assessment Manual. Native Vegetation Management Unit, July 2015.

9 Appendices

Appendix A. Field Datasheets – Sample Point Datasheet

(on next 2 pages and an example datasheet)

Rangeland Assessment (Native Vegetation) - Sample Point datasheet

Sample point Location	
Property	
Date	
Observers	
Sample Point No.	
Waypoint No.	
Getac/Camera	
Photo No.	
Photo direction	
Vegetation association structural description	

Sample point Description		
Landscape Type (tick any present)		**Soil Surface**
Breakaways		Sand
Claypans and saltlakes		
Drainage lines / floodouts		
Dunefield		Loam
Outcrop (rocks)		
Plain – level		
Plain – undulating		Clay
Ranges and hill slopes		
Swamp		
Springs/Mound Springs		

Surface Character (D = dominant, M = minor)				
Stony	Gilgai	Hummock	Pavement	Cracking clay

Woody Perennial Plant Details (including long-lived perennial grasses and sedges)

Species name	Dominant (O/U)	Age Class (M/Y/A)	UTILISATION record individuals on the traverse to collect a tally - this will help to arrive at a **proportion** of >50%, <50% or zero for each category											
			INTACT				**MODIFIED**				**OVER-UTILISED**			
			number (tally)	proportion (%)			number (tally)	proportion (%)			number (tally)	proportion (%)		
e.g. Maireana sedifolia	*U*	*M*	*24*	>50	<50	0	*5*	>50	<50	0	*0*	>50	<50	0
e.g. Atriplex vesicaria ssp	*U*	*M*	*11*	>50	<50	0	*19*	>50	<50	0	*2*	>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0

INTACT = Plant has grown to expected functional form (woody structure of stems, branches and twigs)

MODIFIED = Plant shape has been significantly modified from intact functional form

OVER-UTILISED = More than 50% of the intact functional form of the plant is absent given the size of basal stems and branches visible

Biotic disturbance indicators (tick box - for sites with trees and large shrubs only)	**Dominant >50%**	**Minor <50%**	**None 0**	**Vegetation Stratum** (tick box or NA if not relevant i.e. trees/tall shrubs in a naturally low shrubland)	Present	Absent
Presence of palatable shrubs or perennial grasses under the canopy of tree/shrub >3m				Trees/shrubs >3m		
				Shrubs 1- 3m		
Presence of mostly intact litter mats under canopy of tree/shrub >3m tall (>50% of tree canopy area has intertwined litter or shrub cover				Low shrubs <1m & hummock grasses		
				Perennial tussock grasses with basal areas >30mm		
Physical disturbance indicators (tick box)	**Dominant >50%**	**Minor <50%**	**None 0**	**Is the site naturally treeless?**		
Prevalence of large patches of bare soil (> 5m x 5m) that shows no signs of productive capacity (ie ephemeral plant litter, stems etc.)				**Is the vegetation naturally very sparse/bare?**		
				Exotic Species		**tick**
Evidence of animal tracks, vehicle tracks or other physical disturbance to the natural land surface				Declared exotic species present?		
Destabilised creek channel banks (if present), characterised by no vegetation or stabilizing roots, deflation and bank erosion. Inspect banks on both sides of channels.				Introduced species dominate, sparse or isolated natives persist		
				Moderate invasion of introduced species		
				Very sparse to nil introduced species present		

Additional Flora and Fauna Species Recorded (Native and Introduced)

Species	**Common name**	**Threatened status**		**Exotic species**
		EPBC	**SA**	

NOTES

Rangeland Assessment (Native Vegetation) - Sample Point datasheet

Sample point Location	
Property	Rangeland Block
Date	1/5/17
Observers	AE + RB
Sample Point No.	A1 - D
Waypoint No.	5
Getac/Camera	NV - 5
Photo No.	103 - 0725
Photo direction	South East
Vegetation association structural description	Acacia papyrocarpa Low woodland over Atriplex vesicaria + Lycium australe + Maireana spp.

Sample point Description			
Landscape Type (tick any present)		Soil Surface	
Breakaways		Sand	(circled)
Claypans and saltlakes			
Drainage lines / floodouts			
Dunefield	✓	Loam	(circled)
Outcrop (rocks)			
Plain – level			
Plain – undulating	✓	Clay	
Ranges and hill slopes			
Swamp			
Springs/Mound Springs			

Surface Character (D = dominant, M = minor)				
Stony	Gilgai	Hummock	Pavement	Cracking clay

Woody Perennial Plant Details (including long-lived perennial grasses and sedges)

Species name	Dominant (O/U)	Age Class (M/Y/A)	UTILISATION record individuals on the traverse to collect a tally - this will help to arrive at a **proportion** of >50%, <50% or zero for each category									
			INTACT				MODIFIED				OVER-UTILISED			
			number (tally)	proportion (%)			number (tally)	proportion (%)			number (tally)	proportion (%)		
e.g. Maireana sedifolia	U	M	24	(>50)	<50	0	5	>50	(<50)	0	0	>50	<50	(0)
e.g. Atriplex vesicaria ssp	U	M	11	>50	(<50)	0	19	(>50)	<50	0	2	>50	(<50)	0
Lycium australe	U	m	25	>50	<50	0	11	>50	<50	0	1	>50	<50	0
Atriplex vesicaria	U	m	25	>50	<50	0	2	>50	<50	0	—	>50	<50	0
Maireana sedifolia		m	26	>50	<50	0	—	>50	<50	0	—	>50	<50	0
Acacia papyrocarpa	O	A	6	>50	<50	0	—	>50	<50	0	—	>50	<50	0
Minuria cunninghamii		A	—	>50	<50	0	3	>50	<50	0	5	>50	<50	0
Scaevola spinescens		A	3	>50	<50	0	1	>50	<50	0	—	>50	<50	0
Rhagodia parabolica		m	17	>50	<50	0	—	>50	<50	0	—	>50	<50	0
Enchylaena tomentosa		m	30	>50	<50	0	—	>50	<50	0	—	>50	<50	0
Maireana pyramidata		m	15	>50	<50	0	1	>50	<50	0	—	>50	<50	0
Myoporum platycarpum		m		(>50)	<50	0		>50	<50	(0)		>50	<50	(0)
Rhagodia spinescens		m	2	>50	<50	0	3	>50	<50	0	—	>50	<50	0
Acacia ligulata		A		(>50)	<50	0		>50	<50	(0)		>50	<50	(0)
Pimelia microcephala		m		(>50)	<50	0		>50	(<50)	0		>50	<50	(0)
Stipa elegantissima		m		(>50)	<50	0		>50	(<50)	0		>50	<50	(0)
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0
				>50	<50	0		>50	<50	0		>50	<50	0

INTACT = Plant has grown to expected functional form (woody structure of stems, branches and twigs)

MODIFIED = Plant shape has been significantly modified from intact functional form

OVER-UTILISED = More than 50% of the intact functional form of the plant is absent given the size of basal stems and branches visible

Biotic disturbance indicators (tick box - for sites with trees and large shrubs only)	Dominant >50%	Minor <50%	None 0
Presence of palatable shrubs or perennial grasses under the canopy of tree/shrub >3m	✓		
Presence of mostly intact litter mats under canopy of tree/shrub >3m tall (>50% of tree canopy area has intertwined litter or shrub cover	✓		
Physical disturbance indicators (tick box)	**Dominant >50%**	**Minor <50%**	**None 0**
Prevalence of large patches of bare soil (> 5m x 5m) that shows no signs of productive capacity (ie ephemeral plant litter, stems etc.)		✓	
Evidence of animal tracks, vehicle tracks or other physical disturbance to the natural land surface		✓	
Destabilised creek channel banks (if present), characterised by no vegetation or stabilizing roots, deflation and bank erosion. Inspect banks on both sides of channels.			✓

Vegetation Stratum (tick box or NA if not relevant i.e. trees/tall shrubs in a naturally low shrubland)	Present	Absent
Trees/shrubs >3m	✓	
Shrubs 1- 3m	✓	
Low shrubs <1m & hummock grasses	✓	
Perennial tussock grasses with basal areas >30mm	✓	
Is the site naturally treeless?		—
Is the vegetation naturally very sparse/bare?		—
Exotic Species		**tick**
Declared exotic species present?		X
Introduced species dominate, sparse or isolated natives persist		
Moderate invasion of introduced species		✓
Very sparse to nil introduced species present		

Additional Flora and Fauna Species Recorded (Native and Introduced)

Species	Common name	Threatened status		Exotic species
		EPBC	SA	
Carrichtera annua	Wards Weed			✓
Schinus molle	Pepper Tree			✓

NOTES

- Reasonably good condition vegetation
- Moderate cover of Wards Weed.

Appendix B. Rangelands Assessment Scoresheets

Block (name)	
NRM Region	
IBRA Sub Region	
Property	

ASSESSOR(S)	
DATE OF ASSESSMENT	

Map of the Block (Including the Sites)

Insert Map

Landscape Context Scores

Number of Landform Features within Block	
1 = 0.01pts, 2 = 0.03pts, >2 = 0.06pts	0

Size of the Block	
<10ha = 0; 10 - <100ha = 0.01pts; 100 - <500ha = 0.02pts; 500 - <1000ha = 0.03pts; 1000 - <2000ha = 0.04pts; 2000 - 5000 = 0.05pts; >5000pts = 0.06pts	0

% native veg. protected in IBRA Sub region	
0-2% = 0.05 pts; >2-5% = 0.04 pts; >5-10% = 0.03 pts; >10-25% = 0.02 pt; >25% = 0.01 pt	0

Wetland or Riparian Habitat present	
Does the block contain a wetland feature (Yes/No)	
Permanent or semi permanent = 0.08 pt *Contains water for at least 6 months of the year*	
Occasionally contains water = 0.05 pts *Contains water approximately once every 5 years*	
Very occasionally contains water = 0.02 pts *Contains water approximately once every 20 years*	
Score	0

Note; Blocks will score a minimum Landscape Context Score of 1

LANDSCAPE CONTEXT SCORE (max 1.25)	**1**

Plant Species	Common name	Palatability	Utilisation enter the tally from datasheet for each category. If a proportion (>50%, <50% or zero) was recorded in the field, enter the code for each proportion (>50% is **2**, <50% is **1,** and 0 is **0)**			Age Class (M/Y/A)	plant utilisation mean	Site Utilisation Score mean
			Intact	Modified	Over utilised			
			number (tally)	number (tally)	number (tally)			

Threatened Fauna - Recorded or Observed		Threatened Species			
Species	Common Name	EPBC	SA	Past Record	Observed

Threatened Flora Species Recorded or Observed		Threatened Species			
Species	Common Name	EPBC	SA	Past Record	Observed

Vegetation Condition Scores

SITE (name):		**SIZE OF SITE (Ha)**	
VEGETATION ASSOCIATION DESCRIPTION			
LANDSCAPE TYPE			
SURFACE CHARACTER **Dominant**		**Minor**	

Biotic Disturbance Indicators Sites with trees and large shrubs only (select one tickbox for each row)	**Dominant >50%**	**Minor <50%**	**None - 0**	**Score**
Presence of palatable shrubs or perennial grasses under the canopy of tree/shrub >3m	☐	☐	☐	1
Presence of mostly intact litter mats under canopy of tree/shrub >3m tall (>50% of tree canopy area has intertwined litter or shrub cover)	☐	☐	☐	1
	Total Score (Max 10 - weighted by 2.5)			**5**

Physical Disturbance Indicators	**Dominant >50%**	**Minor <50%**	**None - 0**	**Score**
Prevalence of large patches of bare soil (> 5m x 5m) that shows no signs of productive capacity (ie ephemeral plant litter, stems etc.)	☐	☐	☐	1
Evidence of animal tracks, vehicle tracks or other physical disturbance to the natural land surface	☐	☐	☐	1
Destabilised creek channel banks (if present), characterised by no vegetation or stabilizing roots, deflation and bank erosion. Inspect banks on both sides of channels.	☐	☐	☐	1
	Total Score (Max 18 - weighted by 3)			**9**

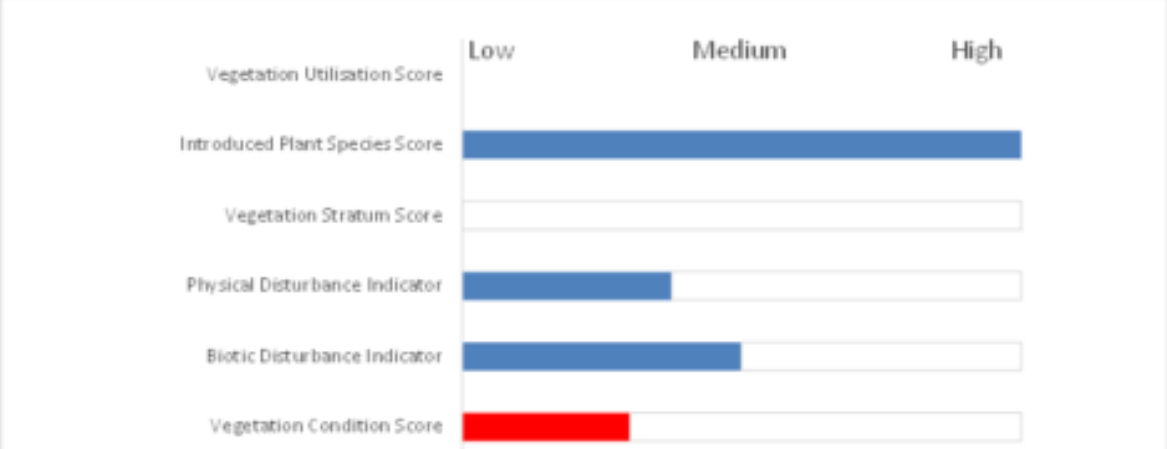
Vegetation Stratum (tick the Present box for all stratum that are present or tick for Absent box of any stratum that should be present but have been removed)	**Present**	**Absent**	*Note; don't tick either box if stratum was likely never present - e.g. Trees stratum in a low shrubland*
Trees/shrubs >3m	☐	☐	
Shrubs 1- 3m	☐	☐	
Low shrubs <1m & hummock grasses	☐	☐	
Perennial tussock grasses with basal areas >30mm	☐	☐	
Total Score (Max 16 - weighted by 4)			**0**

Introduced Plant Species	**Select**	**Score**
Declared species present?		2
Introduced species dominate (>50% of vegetation cover)	☐	2
Moderate invasion of introduced species (5 to 50% of the vegetation cover)	☐	
Very sparse to nil introduced species present (<5% of vegetation cover)	☐	
Total Score (Max 10 - weighted by 2.5)		**10**

Vegetation Utilisation Score	
Total Score (Max 26)	

Vegetation Condition Score Calculation

VEGETATION CONDITION SCORE	**24.00**



Conservation Significance Score

Is the vegetation association considered a Threatened Ecological community or Ecosystem?	Yes/No
State (Provisional List of Threatened Ecosystems of SA) **Rare** community (0.1 pt)	☐
State (Provisional List of Threatened Ecosystems of SA) **Vulnerable** community (0.2 pts)	☐
State (Provisional List of Threatened Ecosystems of SA) **Endangered** community (0.3 pts)	☐
Nationally (EPBC Act) **Vulnerable** community (0.35 pts)	☐
Contains a Nationally (EPBC Act) **Endangered** or **Critically Endangered** community (0.4 pts)	☐
Note all sites will score a minimum Conservation Significance Score of 1 **Score**	1

Number of Threatened Plant Species recorded for within the Site	Number
*If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.	
State **Rare** species recorded (1 pt each)	0
State **Vulnerable** species recorded (2.5 pt each)	0
State **Endangered** recorded (5 pts each)	0
Nationally **Vulnerable** species recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species recorded (20 pts each)	0
0 = 0 pts; <2 = 0.04 pts; 2 - <5 = 0.08 pts; 5 - <10 = 0.12 pts; 10 - <20 = 0.16 pts; 20 or > = 0.2 pts	0
Score	0

Potential habitat for Threatened Animal Species (number observed or recorded) for the Site	Number
*If a species has both a State (NP&W Act) and National (EPBC Act) rating, it's only recorded for its National rating.	
State **Rare** species observed or locally recorded (1 pt each)	0
State **Vulnerable** species observed or locally recorded (2.5 pt each)	0
State **Endangered** species observed or locally recorded (5 pt each)	0
Nationally **Vulnerable** species observed or locally recorded (10 pts each)	0
Nationally **Endangered** or **Critically endangered** species observed or locally recorded (20 pts each)	0
0 = 0 pts; <2 = 0.02 pts; 2 - <5 = 0.04 pts; 5 - <10 = 0.06 pts; 10 - <20 = 0.08pts; 20 or > = 0.1 pts	0
Score	0

CONSERVATION SIGNIFICANCE SCORE	1

Total Scores for the Site

LANDSCAPE CONTEXT SCORE	1.00
VEGETATION CONDITION SCORE	24.00
CONSERVATION SIGNIFICANCE SCORE	1.00

Vegetation Condition x Landscape Context x Conservation Significance =	
UNIT BIODIVERSITY SCORE	24.00
Total Biodiversity Score (Biodiversity Score x hectares)	0.00

Photo Point and Vegetation Survey Location	Direction of the Photo
Insert Photopoint Photo	
	GPS Reference
	Datum
	Zone (52, 53 or 54)
	Easting (6 digits)
	Northing (7 digits)
	Description

Clearance | SEB Area | Other

SEB Area Assessment

Future UBS Negative Score	22.70
Future UBS Positive Score	27.81
UBS Gain Score	5.10
SEB Points provided	**0.00**

Vegetation condition		
Likely % loss	Standard	0.05
Potential increase	Standard	11.20
Likelihood of outcome	Standard	0.34

Appendix C. South Australian Vegetation Structural Formations

Table below taken from Heard, L. & Channon, B. (1997). Gu*ide to a Native Vegetation Survey (Agricultural Region) using the Biological Survey of South Australia Methodology*. Department of Housing and Urban Development.

LIFE FORM/ HEIGHT CLASS	PROJECTIVE FOLIAGE COVER OF TALLEST STRATUM			
	Dense (70-100%)	Mid-dense (30-70%)	Sparse (10-30%)	Very sparse (<10%)
Trees > 30m	Tall closed forest	Tall open forest	Tall woodland	Tall open woodland
Trees 10-30m	Closed forest	Open forest	Woodland	Open woodland
Trees 5-10m	Low closed forest	Low open forest	Low woodland	Low open woodland
Trees <5m	Very low closed forest	Very low open forest	Very low woodland	Very low open woodland
Mallee (>3m)	Closed mallee	Mallee	Open mallee	Very open mallee
Low Mallee (<3m)	Closed low mallee	Low mallee	Open low mallee	Very open low mallee
Shrubs > 2m	Tall closed shrubland	Tall shrubland	Tall open shrubland	Tall very open shrubland
Shrubs 1-2m	Closed shrubland	Shrubland	Open shrubland	Very open shrubland
Shrubs < 1m	Low closed shrubland	Low shrubland	Low open shrubland	Low very open shrubland
Mat plants	Closed mat plants	Mat plants	Open mat plants	Very open mat plants
Hummock grasses	Closed Hummock grassland	Hummock grassland	Open hummock grassland	Very open hummock grassland
Tussock grasses	Closed (tussock) grassland	(Tussock) grassland	Open (tussock) grassland	Very open (tussock) grassland
Sedges	Closed sedgeland	Sedgeland	Open sedgeland	Very open sedgeland
Herbs	Closed herbland	Herbland	Open herbland	Very open herbland
Ferns	Closed fernland	Fernland	Open fernland	Very open fernland

[Note: Table originally derived from Specht (1972) and Muir (1977)]

Appendix D. Percent Area Protected in Sub IBRA Regions

Terrestrial Protected Areas in each Sub-Region (IBRA Version 7) of South Australia (2014)

IBRA Subregion Name	IBRA Subregion Code	Area in SA (ha)	*Area Protected (ha)	Percent Protected (%)
Barrier Range	BHC01	380,669	46,132	12.12
Barrier Range Outwash	BHC04	502,059	2,206	0.44
Bimbowrie	BHC05	279,258	87,768	31.43
Curnamona	BHC06	706,696	614	0.09
Everard Block	CER03	525,998	176,244	33.51
Mann-Musgrave Block	CER01	1,893,605	617,515	32.61
Watarru	CER02	423,360	312,513	73.82
Coongie	CHC06	1,731,149	807,924	46.67
Cooper-Diamantina Plains	CHC05	698,375	-	0.00
Diamantina-Eyre	CHC04	243,784	-	0.00
Lake Pure	CHC07	219,808	186,134	84.66
Sturt Stony Desert	CHC02	2,266,564	194,930	8.60
Eyre Hills	EYB03	1,172,576	157,928	13.47
Eyre Mallee	EYB05	2,319,398	488,413	21.06
Southern Yorke	EYB01	438,470	30,179	6.88
St Vincent	EYB02	1,093,789	8,339	0.76
Talia	EYB04	1,096,175	212,404	19.38
Pedirka	FIN04	903,228	-	0.00
Tieyon	FIN03	1,012,237	3,729	0.37
Broughton	FLB02	1,032,918	4,902	0.52
Central Flinders	FLB06	961,667	111,417	11.59
Mount Lofty Ranges	FLB01	300,580	16,078	5.35
Northern Flinders	FLB05	1,846,804	405,403	21.95
Olary Spur	FLB03	1,745,479	15,290	0.88
Southern Flinders	FLB04	728,317	26,919	3.70
Arcoona Plateau	GAW04	1,089,865	1,789	0.16
Commonwealth Hill	GAW08	1,448,062	12,267	0.85
Gawler Lakes	GAW03	2,049,193	551,024	26.89
Gawler Volcanics	GAW02	1,556,182	189,592	12.18
Kingoonya	GAW05	1,922,414	156,991	8.17
Myall Plains	GAW01	1,088,767	112,465	10.33
Roxby	GAW07	1,409,305	142,809	10.13
Torrens	GAW06	1,439,093	730,800	50.78
Kintore	GVD04	4,383,805	2,832,364	64.61
Maralinga	GVD03	7,577,005	2,864,515	37.81
Tallaringa	GVD05	3,663,149	1,628,032	44.44
Yellabinna	GVD06	4,828,389	2,651,501	54.91
Hampton	HAM01	45,155	44,709	99.01
Fleurieu	KAN02	370,730	18,181	4.90
Kangaroo Island	KAN01	441,685	148,886	33.71
Braemer	MDD07	966,276	3,488	0.36
Lowan Mallee	MDD04	971,933	383,358	39.44

Murray Lakes and Coorong	MDD03	249,191	42,775	17.17
Murray Mallee	MDD02	2,121,127	90,895	4.29
South Olary Plain	MDD01	1,219,032	494,695	40.58
Wimmera	MDD05	133,335	640	0.48
Bridgewater	NCP01	445,578	40,892	9.18
Glenelg Plain	NCP02	156,144	9,524	6.10
Lucindale	NCP03	731,656	30,353	4.15
Tintinara	NCP04	708,061	87,269	12.33
Carlisle	NUL01	723,427	342,562	47.35
Nullarbor Plain	NUL02	4,114,333	2,786,949	67.74
Yalata	NUL03	1,148,966	895,075	77.90
Murray Scroll Belt	RIV06	166,462	34,785	20.90
Dieri	SSD03	4,845,026	4,137,727	126.59
Simpson Desert	SSD02	1,827,765	1,710,491	93.58
Strzelecki Desert	SSD05	5,988,318	1,276,380	21.31
Warriner	SSD04	1,032,165	4,289	0.42
Baltana	STP07	2,688,870	45,019	1.67
Breakaways	STP01	2,419,787	182,492	7.54
Macumba	STP05	693,282	23,139	3.34
Murnpeowie	STP03	2,910,385	52,805	1.81
Oodnadatta	STP02	2,593,717	73,166	2.82
Peake-Dennison Inlier	STP04	158,623	-	0.00
Witjira	STP06	1,498,778	556,596	37.14
Mount Gambier	SVP02	84,194	2,534	3.01

Appendix E. DEWNR provisional list of threatened ecosystems, latest available update

Provisional List of Threatened Ecosystems of South Australia

Please cite as DEH (in progress) unpublished and provisional list (Originally cited as DEH 2001)

EPBC Status:

Rated

1 Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions
2 The community of native species dependent on natural discharge of groundwater from the Great Artesian Basin
3 Swamps of the Fleurieu Peninsula
4 Iron-grass Natural Temperate Grassland of South Australia
5 Peppermint Box (*Eucalyptus odorata*) Grassy Woodland of South Australia
6 Giant Kelp Marine Forests of South East Australia
7 Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia
8 Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains
9 Eyre Peninsula Blue Gum (Eucalyptus petiolaris) Woodland
10 Kangaroo Island Narrow-leaved Mallee (Eucalyptus cneorifolia) Woodland
11 Subtropical and Temperate Coastal Saltmarsh
12 White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

State Status: No ecosystems have any official State rating.

State Assessed: All have been assessed for the purposes of the NLWA Subregion Synopses and Conservation Strategy Case Studies project (2001).

Threats: Apply across all subregions unless otherwise stated.

Last update: 10 October 2005

Threatened Ecosystems of the Non Agricultural Regions

VULNERABLE *Acacia aneura* Low Woodland on sand plains
Threatened by extensive fires in good seasons, followed by inhibited regeneration due to rabbit grazing. May not have yet reached equilibrium from past Aboriginal burning. Poorly conserved if at all. Where it occurs in the Finke Bioregion it is in better condition and less threatened.
IBRA Regions: CR, GVD, FIN, STP, CHC, SSD, GAW
Trend: declining
NVIS Subgroup: mulga
Subregion: CR3, GVD3, GVD4, GVD5, STP1, STP2, STP3, STP4, STP5, CHC2, SSD5, GAW5 (also in FIN3 & FIN4 but not threatened, therefore don't list for these subregions)

VULNERABLE *Acacia aneura* Low Woodland over tussock grasses on ranges
In the Central Ranges this is threatened by extensive fires in good seasons, followed by inhibited regeneration due to rabbit grazing. May not have yet reached equilibrium from past Aboriginal burning. Poorly conserved if at all. In the Flinders Ranges the main threat is from goat grazing.
IBRA Regions: CR, FLB
Trend: declining
NVIS Subgroup: mulga
Subregion: CR1, CR2, FLB4, FLB5

VULNERABLE ? *Acacia calcicola* Low Woodland on calcareous soils of breakaway tablelands
Threatened by camel and rabbit grazing. Occurrences few, small, thinly spread and widely scattered.
Note 1: Plenty of recruitment at Evelyn Downs – Mike Fleming
Note 2: Rating disputed by Phil Gee – "Not threatened by camel grazing".
IBRA Regions: STP, GAW, GVD
Trend: declining
NVIS Subgroup: arid acacia low open woodlands and shrublands with chenopods
Subregion: STP1, STP2, GAW5, GVD5

VULNERABLE *Acacia carneorum* Low Woodland on low dunes and sand plains
Threatened by rabbit grazing. Seedlings extremely rare and new suckers are very palatable to rabbits. Grows on softer (sandy) country and this is also favoured by rabbits.
IBRA Regions: FLB, BHC
Trend: declining
NVIS Subgroup: arid acacia low open woodlands and shrublands with tussock grass
Subregion: FLB3, BHC1

VULNERABLE *Acacia estrophiolata* Low Open Woodland on red sands of low hills, open flats and floodplains
Not conserved in SA. Threatened by rabbits and cattle grazing.
IBRA Regions: CR, GVD
Trend: declining
NVIS Subgroup: arid acacia low open woodlands and shrublands with tussock grass
Subregion: CR1, CR3, GVD4 (Officer Creek, Fregon)

VULNERABLE *Alectryon oleifolius* ssp. *canescens* Tall Shrubland on alluvial soils of plains. Although a very widespread community most areas have very little regeneration of the overstorey dominant and a severely degraded understorey. Regeneration is suppressed by rabbit and stock grazing.
IBRA Regions: GAW, FLB, BHC, MDD, SSD, GVD, EYB?
Trend: declining
NVIS Subgroup: other low open woodlands and shrublands with tussock grass
Subregion: GAW1, GAW2, FLB3, FLB5, BHC4, MDD1, SSD5, GVD6, EYB5?

VULNERABLE *Eucalyptus camaldulensis* Woodland on levees and channel banks of regularly inundated floodplains in semi-arid areas
Although a very widespread community most areas have very little regeneration of the overstorey dominant and a severely degraded understorey. Regeneration is suppressed by rabbit and stock grazing and tourism to a lesser degree.
IBRA Regions: BHC, FLB
Trend: declining
NVIS Subgroup: eucalyptus woodlands with a shrubby understorey
Subregion: BHC1, BHC4, FLB2, FLB2, FLB4, FLB5

VULNERABLE *Hakea divaricata*, *H. suberea*, *Acacia estrophiolata* Low Open Woodland on outwash slopes of ranges
Character ecosystem of range country, yet the most disturbed of all range country ecosystems. Not conserved. Threatened by fire and rabbits. While the hakeas are a fire tolerant species much of the rest of the associated plant species are less so. Many settlements in region are associated with this community, therefore threatened by human habitation.
IBRA Regions: CR
Trend: declining
NVIS Subgroup: other low open woodlands and shrublands with tussock grass
Subregion: CR1, CR2, CR3

VULNERABLE *Hemichroa mesembryanthema* +/- *Maireana pyramidata* +/- *M. astrotricha* +/- *Atriplex vesicaria* +/- samphires Low Shrubland in saline soils of broad shallow depressions surrounding mound springs
Impact of grazing unclear. Badman (1999) suggests grazing impact to be negligible given the populations found close to mound springs had "survived in areas that domestic stock have been traversing on their way to water for more than a century". Roadworks at Strangways have destroyed part of the population there. Main threat likely to be changes to groundwater levels in GAB due to excessive extraction of artesian groundwater. Tourism is also a possible threat. Very limited distribution. Apparent lack of regeneration.
IBRA Regions: STP, SSD
Trend: declining
NVIS Subgroup: other shrublands
Subregion: STP2, STP3, SSD4

ENDANGERED Communities associated with Mound Springs
EPBC ACT ENDANGERED
Threatened by a reduction in flow due to excessive extraction of artesian groundwater from the Great Artesian Basin and grazing and trampling by stock. Tourism is also a possible threat.
IBRA Regions: STP, SSD
Trend: declining
NVIS Subgroup: herbland, sedgeland and rushland
Subregion: STP1, STP2, STP3, STP4, SSD4

ENDANGERED Freshwater wetlands eg *Triglochin procerum* Herbland
Threatened by grazing and trampling by stock
IBRA Regions: all regions
Trend: declining
NVIS Subgroup: herbland, sedgeland and rushland
Subregion: FLB2, FLB4,CHC2, CHC4, CHC6, STP1, STP2, STP3, STP4, STP5, SSD3, SSD5

The following ecosystems are considered to be **OF CONCERN AT SUBREGIONAL LEVEL** but were unable to be rated at Bioregional/State level due to lack of detailed knowledge.

OF CONCERN Communities associated with major drainage lines and associated floodplains (particularly close to permanent waterholes)
Threats are the same for all these ecosystems. While the overstoreys are usually intact the understoreys are generally heavily modified by weeds and grazing by stock and rabbits.
Threatened by chronic grazing pressure.
IBRA Regions: CHC, STP, FIN, SSD, GAW

Examples: *Acacia salicina*, *Eucalyptus coolabah*, +/- *Lysiphillum gilvum* Woodland of drainage lines and floodplains
Trend: declining
NVIS Subgroup: other forests and woodlands

Subregion: CHC6

Atriplex nummularia Open Shrubland with occasional emergent *Eucalyptus camaldulensis* or *E. coolabah* on low sandy rises of floodplains
Trend: declining
NVIS Subgroup: chenopod shrublands
Subregion: STP1, STP2, STP3, STP5, SSD3, SSD4, SSD5, CHC2, CHC6, GAW4

Chenopodium auricomum (Queensland bluebush) Shrubland on cracking clay depressions subject to periodic waterlogging (swamps)
Common in channel country, particularly Alton Downs. Resilient and long lived species.
IBRA Regions: CHC
Trend: declining
NIS Subgroup: chenopod shrublands
Subregion: CHC6, STP5, SSD3

Eucalyptus camaldulensis Woodland on levees and channel banks of regularly inundated floodplains in arid areas.
Although a very widespread community most areas have very little regeneration of the overstorey dominant and a severely degraded understorey. Regeneration is suppressed by disturbance by pigs and rabbit and stock grazing.
IBRA Regions: STP, FIN, CHC, CR, GVD, SSD
Trend: declining
NVIS Subgroup: eucalyptus woodlands with a shrubby understorey
Subregion: CR1, FIN4, GVD4

Eucalyptus coolabah Woodland on levees and channel banks of regularly inundated floodplains
Trend: declining
NVIS Subgroup: eucalyptus woodlands with a shrubby understorey
Subregion: STP1, STP2, STP3, STP4, STP5, SSD3, SSD4, SSD5, CHC2, CHC4, CHC6, CHC7, GAW4, FIN3, FIN4

3. Rare Ecosystems in South Australia (Note: List Incomplete)

RARE *Eucalyptus willisii* ssp. *falciformis* Open Forest/Woodland on sand
Moderately conserved in several Native Forest Reserves and Heritage Agreements.
IBRA Regions: NCP
NVIS Subgroup:
Subregion:

RARE *Acacia cambagei* Low Open Woodland over *Typhonium* aff. *alismifolium* and *Nicotiana truncata* lining arid watercourses on gypseous plains
Threatened by stock and feral animal trampling.
IBRA Regions: STP (Moon Plain)
NVIS Subgroup:
Subregion:

RARE *Eucalyptus conglobata* Low Woodland on fertile loams over limestone
ENDEMIC to EYB Originally described by Davies (1982) as E. dumosa ssp. conglobata Low Woodland of Lower EP, though he also had the same open scrub association listed in sth MLR, sth EP & YP. Now considered to be confined to southern EP and adjacent Taylor and Boston Islands (Nicolle 1997). Large proportion of range conserved within Lincoln NP.
IBRA Regions: EYB
NVIS Subgroup:
Subregion: EYB4

RARE *Melaleuca armillaris* ssp. *akineta* Closed Scrub in drainage lines associated with granite.
Limited in extent, and much of that is within reserves.
IBRA Regions: EYB, GAW
NVIS Subgroup:
Subregion:

RARE *Eucalyptus cyanophylla* Mallee on loamy sand dunes
Limited in extent. Mostly narrow, linear examples remain, though many of these are in Heritage Agreements. Occurs mainly south of the River Murray. Unknown extent in Cooltong CP. Possible upgrade to Vulnerable if not in this park.
IBRA Regions: MDD, RIV(?)
NVIS Subgroup:
Subregion:

RARE *Allocasuarina helmsii* Shrubland on granitic sands
Moderately conserved in Lake Gilles CP, Gawler Ranges CR and two Heritage Agreements near Buckleboo.
IBRA Regions: EYB
NVIS Subgroup:
Subregion:

RARE (?)

Triodia compacta Hummock Grassland on sandy consolidated dune fields
Of limited extent and threatened by coastal development.
IBRA Regions: EYB
NVIS Subgroup:
Subregion:

RARE

Baumea juncea, *Chorizandra enodis* Sedgeland
A number of small areas in reserves. Endangered for SE..
IBRA Regions: NCP, EYB, KAN
NVIS Subgroup:
Subregion:

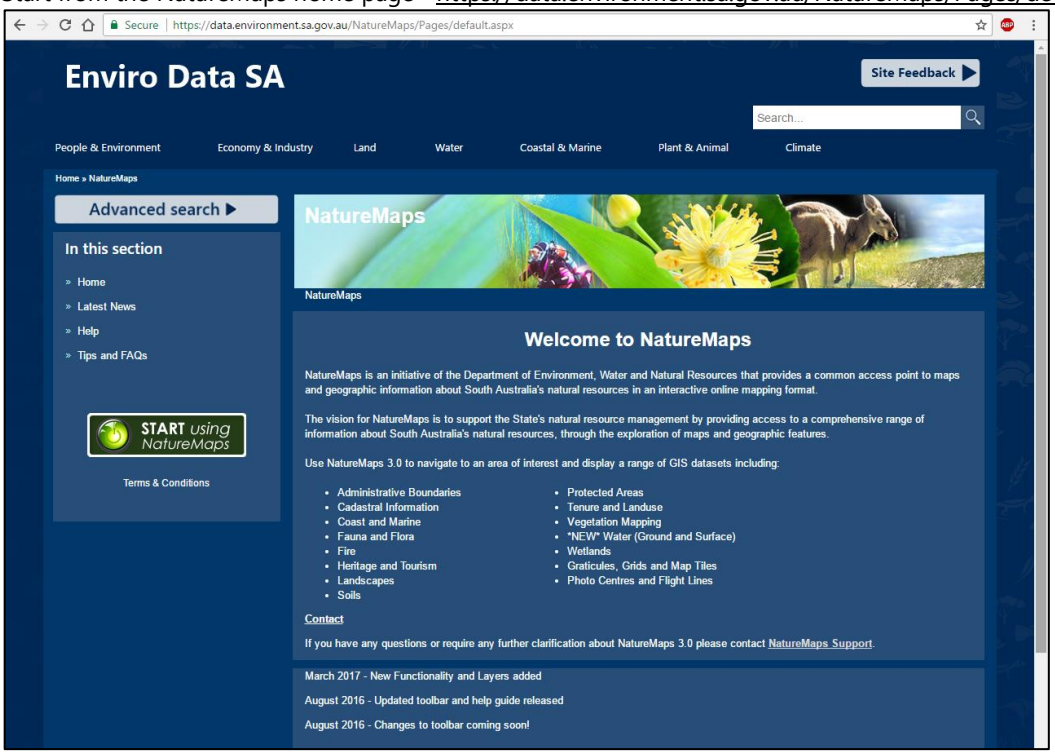
Appendix F. Searching for records using the NatureMaps and EPBC Act Search Tool

NatureMaps

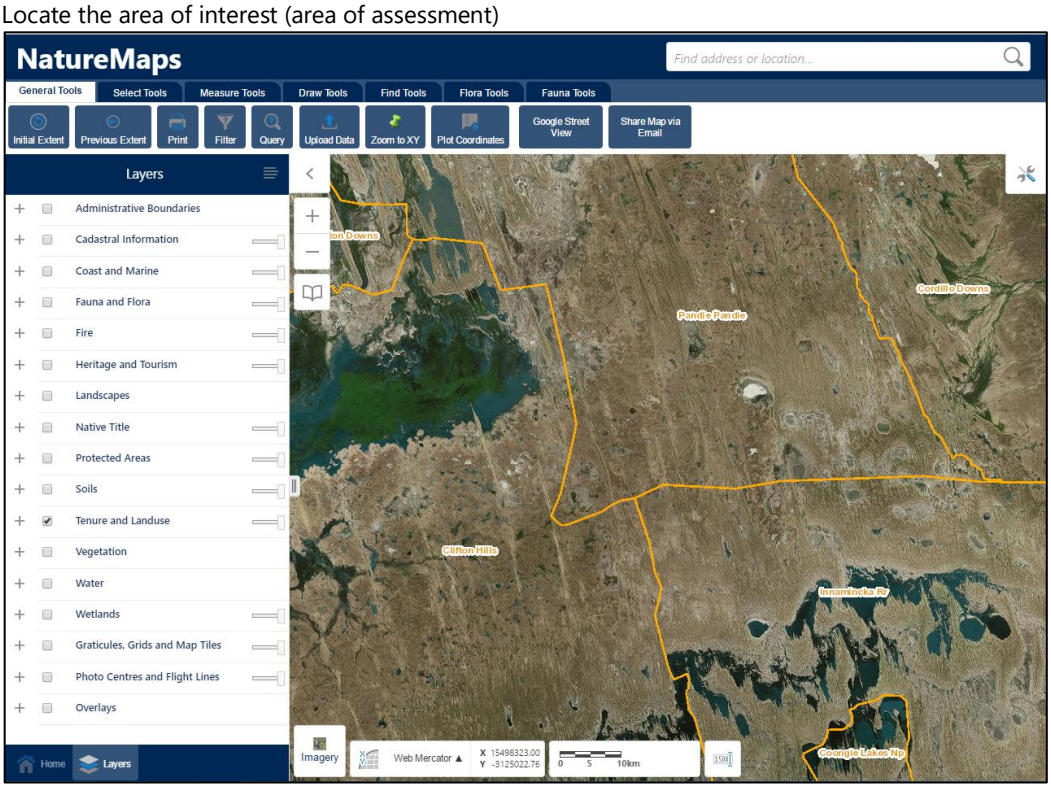
Search Tool

The procedure for downloading detailed species data for records within a specified area is:

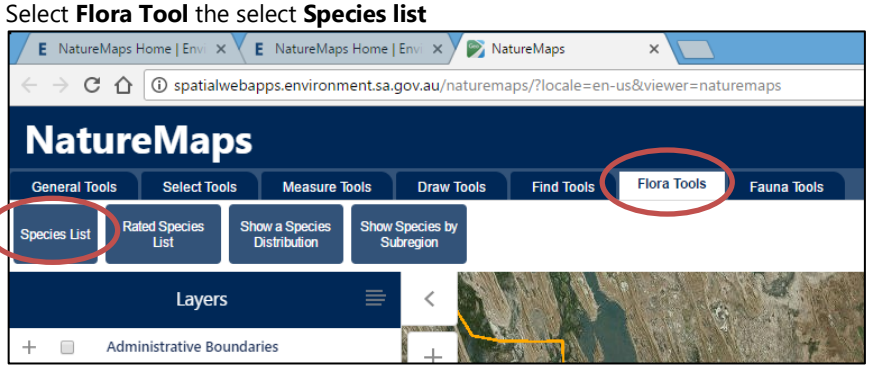
1. Start from the NatureMaps home page - https://data.environment.sa.gov.au/NatureMaps/Pages/default.aspx



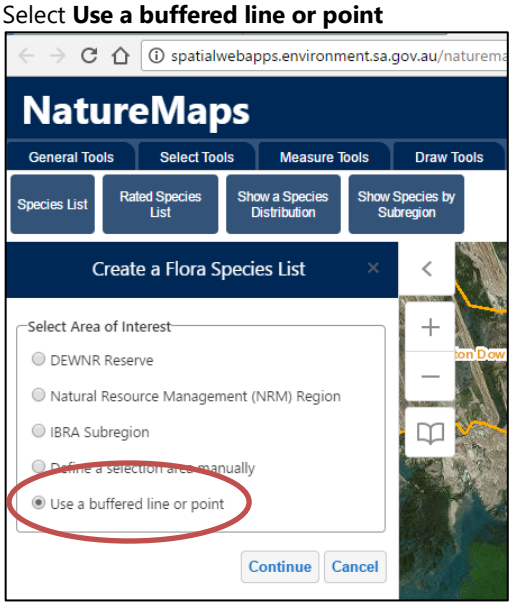
2. Locate the area of interest (area of assessment)



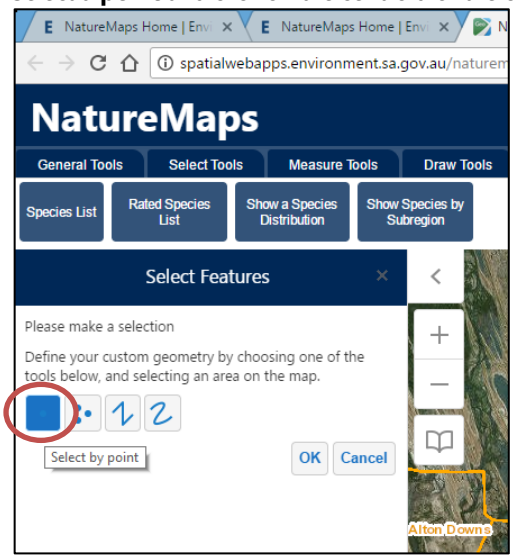
3. Select **Flora Tool** the select **Species list**

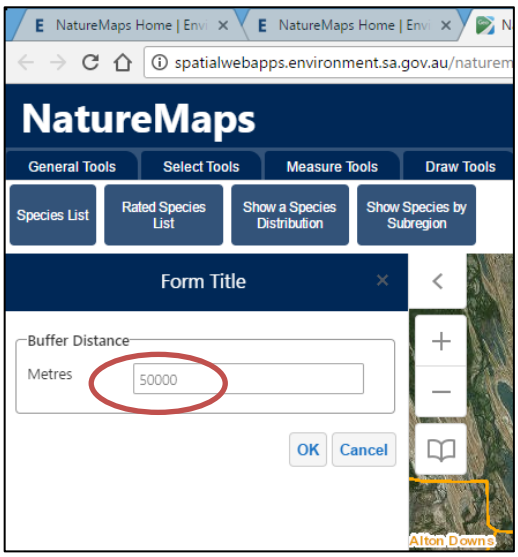


4. Select **Use a buffered line or point**

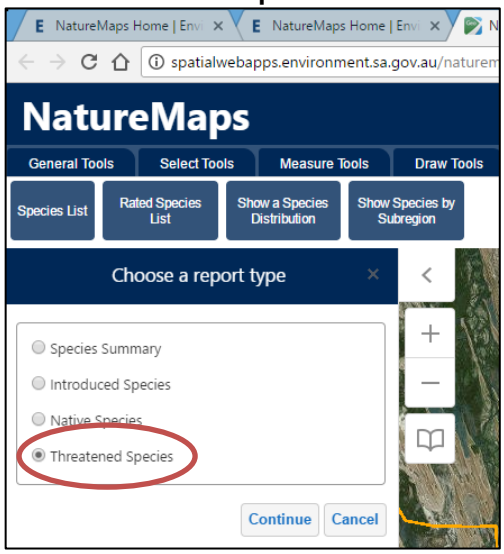


5. Select a **point** and click on the centroid of the clearance area or SEB area, then enter **50000**





6. Select the **Threatened species**



7. Select **Click here to open species summary report**

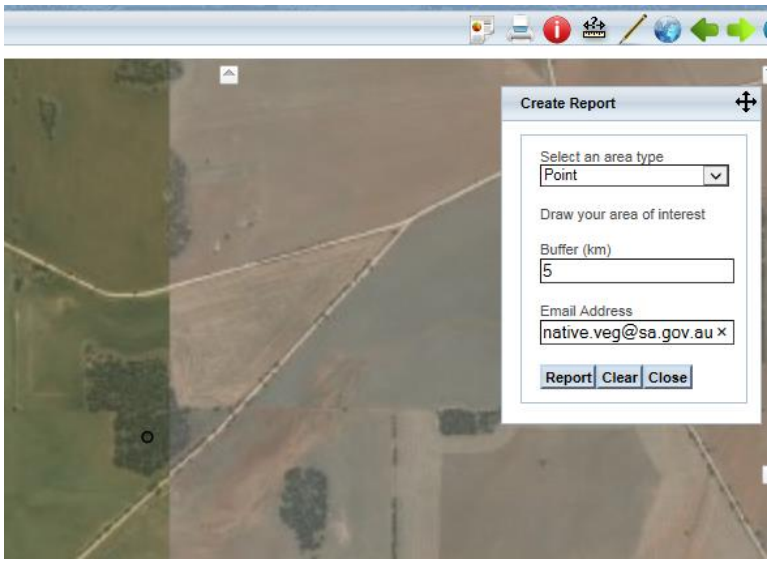
	A	B	C	D	E	F	G	H	I	J
1	NSXCODE	FAMILY NA	SPECIES	COMMON NAME	NATIVE	NATIONAI	STATE RAT	COUNT	LAST SIGHTED	
2	Q01600	LEGUMIN(	Acacia pickardii	Pickard's Wattle	Y	VU	R	1	10-Oct-1993	
3	W01055	PORTULA(	Calandrinia stagnensis		Y		R	1	10-May-1987	
4	K00073	CYPERACE	Cyperus bifax	Downs Flat-sedge	Y		R	2	05-May-1995	
5	K02725	SCROPHUI	Elacholoma prostrata	Small Monkey-flower	Y		R	3	06-May-2011	
6	A02112	STERCULIA	Gilesia biniflora	Western Tar-vine	Y		R	2	03-May-1995	
7	Y03576	CHENOPO	Osteocarpum pentapterum	Five-wing Bonefruit	Y		E	1	06-May-1995	
8										

8. Repeat for fauna species

EPBC Act - Protected Matters Search Tool

The Protected Matters Search Tool generates a report that will help determine whether matters of national environmental significance or other matters protected by the *Environment Protection and Biodiversity Conservation Act 1999* are likely to occur in your area of interest. Any information provided through this facility is indicative only, and local knowledge and information should also be sought where possible.

1. Start the Protected Matters Search Tool
2. Zoom to the area of interest.
3. Select Report, in to Select an area type enter **Point and click in the centre of the site,** in Buffer (km) enter **50**, and then enter your email address and select **Report**.



4. Review the report to identify threatened species for with it is stated that the **Species or species habitat** known **to occur in the area**.

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area

Appendix G. Plant species palatability ratings

HP = Highly Palatable
P = Palatable
U = Unpalatable

Species Name	Common Name	Palatability	Species Name	Common Name	Palatability
Acacia acinacea	Wreath Wattle	P	*Exocarpos sparteus*	Slender Cherry	P
Acacia adsurgens		P	*Frankenia crispa*	Hoary Sea-heath	P
Acacia aneura (includes brachystachya, clelandii)	Mulga	HP	*Frankenia foliosa*	Leafy Sea-heath	P
Acacia araneosa	Spidery Wattle	P	*Frankenia serpyllifolia*	Thyme Sea-heath	U
Acacia argyrophylla	Silver Mulga-bush	P	*Geijera linearifolia*	Sheep Bush	P
Acacia ayersiana	Blue Mulga	U	*Geijera parviflora*	Wilga	P
Acacia barattensis	Baratta Wattle	P	*Goodenia ovata*	Hop Goodenia	P
Acacia beckleri ssp. beckleri	Beckler's Rock Wattle	P	*Goodenia saccata*	Flinders Ranges Goodenia	P
Acacia beckleri ssp. megaspherica	Beckler's Rock Wattle	P	*Goodenia valdentata*	Davenport Range Goodenia	P
Acacia brachybotrya	Grey Mulga-bush	P	*Goodia medicaginea*	Western Golden-tip	P
Acacia burkittii	Pin-bush Wattle	U	*Gossypium sturtianum var. sturtianum*	Sturt's Desert Rose	U
Acacia calamifolia	Wallowa	P	*Grammosolen truncatus*	Shrubby Ray-flower	P
Acacia calcicola	Northern Myall	U	*Grevillea aspera*	Rough Grevillea	P
Acacia cambagei	Gidgee	P	*Grevillea huegelii*	Comb Grevillea	U
Acacia carneorum	Needle Wattle	P	*Grevillea ilicifolia ssp. ilicifolia*	Holly-leaf Grevillea	P
Acacia colletioides	Veined Wait-a-while	U	*Grevillea juncifolia ssp. juncifolia*	Honeysuckle Grevillea	U
Acacia confluens	Arkaroola Wattle	P	*Grevillea lavandulacea ssp. lavandulacea*	Spider-flower	P
Acacia continua	Thorn Wattle	P	*Grevillea nematophylla ssp. nematophylla*	Water Bush	P
Acacia cupularis	Cup Wattle	P	*Grevillea pterosperma*	Dune Grevillea	P
Acacia cyclops	Western Coastal Wattle	P	*Grevillea sarissa ssp. umbellifera*	Desert Comb Grevillea	P
Acacia cyperophylla var. cyperophylla	Red Mulga	U	*Grevillea stenobotrya*	Rattle-pod Grevillea	U
Acacia dictyophleba	Net-veined Wattle	P	*Grevillea striata*	Beefwood	P
Acacia elachantha	Cowle's Wattle	P	*Grevillea treueriana*	Mt Finke Grevillea	P
Acacia estrophiolata	Ironwood	P	*Gunniopsis quadrifida*	Sturt's Pigface	P
Acacia euthycarpa	Wallowa	P	*Gunniopsis tenuifolia*	Narrow-leaf Pigface	P
Acacia georginae	Georgina Gidgee	P	*Gunniopsis zygophylloides*	Twin-leaf Pigface	P
Acacia gilesiana	Giles' Wattle	P	*Gyrostemon ramulosus*	Bushy Wheel-fruit	P

Acacia gracilifolia	Graceful Wattle	P	*Gyrostemon tepperi*	Tepper's Wheel-fruit	P
Acacia hakeoides	Hakea Wattle	P	*Haeckeria punctulata*	Sticky Haeckeria	P
Acacia havilandiorum	Needle Wattle	P	*Hakea carinata*	Erect Hakea	P
Acacia iteaphylla	Flinders Ranges Wattle	P	*Hakea ednieana*	Flinders Ranges Corkwood	P
Acacia jennerae	Coonavittra Wattle	P	*Hakea eyreana*	Fork-leaf Corkwood	U
Acacia kempeana	Witchetty Bush	P	*Hakea francisiana*	Bottlebrush Hakea	P
Acacia latzii		P	*Hakea leucoptera ssp. leucoptera*	Silver Needlewood	U
Acacia ligulata	Umbrella Bush	U	*Hakea lorea ssp. lorea*	Long-leaf Corkwood	P
Acacia loderi	Nealie	P	*Hakea rugosa*	Dwarf Hakea	P
Acacia melleodora	Net-veined Wattle	P	*Hakea tephrosperma*	Hooked Needlewood	P
Acacia menzelii	Menzel's Wattle	P	*Halgania andromedifolia*	Scented Blue-flower	P
Acacia minyura	Desert Mulga	P	*Halgania cyanea*	Rough Blue-flower	P
Acacia murrayana	Colony Wattle	P	*Hannafordia bissillii ssp. bissillii*	Grey Felt-bush	P
Acacia notabilis	Notable Wattle	P	*Hemichroa diandra*	Mallee Hemichroa	P
Acacia nyssophylla	Spine Bush	U	*Hemichroa mesembryanthema*	Pigface Hemichroa	P
Acacia oswaldii	Umbrella Wattle	HP	*Hibbertia crinita*	Velvet-leaf Guinea-flower	P
Acacia papyrocarpa	Western Myall	HP	*Hibbertia crispula*	Ooldea Guinea-flower	P
Acacia paradoxa	Kangaroo Thorn	P	*Hibbertia exutiacies*	Prickly Guinea-flower	P
Acacia paraneura	Weeping Mulga	P	*Hibbertia virgata*	Twiggy Guinea-flower	P
Acacia pendula	Weeping Myall	P	*Hibiscus krichauffianus*	Velvet-leaf Hibiscus	P
Acacia pickardii	Pickard's Wattle	U	*Homoranthus wilhelmii*	Wilhelm's Homoranthus	P
Acacia prainii	Prain's Wattle	P	*Hovea purpurea*	Tall Hovea	P
Acacia pravifolia	Coil-pod Wattle	P	*Indigofera australis ssp. australis*	Austral Indigo	P
Acacia pycnantha	Golden Wattle	P	*Indigofera australis ssp. hesperia*	Austral Indigo	P
Acacia quornensis	Quorn Wattle	P	*Indigofera cornuligera ssp. cornuligera*	Silver Indigo	P
Acacia ramulosa	Horse Mulga	P	*Indigofera cornuligera ssp. flindersensis*	Silver Indigo	P
Acacia rhodophloia	Minni Ritchi	P	*Indigofera ewartiana*	Ewart's Indigo	P
Acacia rigens	Nealie	P	*Indigofera georgei*	George's Indigo	P
Acacia rivalis	Silver Wattle	P	*Indigofera helmsii*	Helm's Indigo	P

Acacia rupicola	Rock Wattle	P	*Indigofera leucotricha*	Silver Indigo	P
Acacia salicina	Willow Wattle	U	*Indigofera longibractea*		P
Acacia sericophylla	Wirewood	P	*Indigofera psammophila*	Sand Indigo	P
Acacia sibirica	Bastard Mulga	P	*Ixodia flindersica*	Flinders Ranges Ixodia	P
Acacia sp. Blyth Range (W.V.Fitzgerald s.n. 1898)		P	*Kippistia suaedifolia*	Fleshy Kippistia	P
Acacia spinescens	Spiny Wattle	P	*Lasiopetalum baueri*	Slender Velvet-bush	P
Acacia spooneri		P	*Lasiopetalum behrii*	Pink Velvet-bush	P
Acacia stenophylla	River Cooba	U	*Lepidium leptopetalum*	Shrubby Peppercress	P
Acacia tarculensis	Steel Bush	P	*Leptospermum coriaceum*	Dune Tea-tree	P
Acacia tenuissima	Slender Wattle	P	*Leucopogon cordifolius*	Heart-leaf Beard-heath	P
Acacia tetragonophylla	Dead Finish	P	*Leucopogon virgatus var. virgatus*	Common Beard-heath	P
Acacia trineura	Three-nerve Wattle	P	*Logania linifolia*	Flax-leaf Logania	P
Acacia verticillata ssp. ovoidea	Prickly Moses	P	*Logania nuda*	Leafless Logania	P
Acacia victoriae	Elegant Wattle	P	*Logania saxatilis*	Rock Logania	P
Acacia wattsiana	Dog Wattle	P	*Lycium australe*	Australian Boxthorn	U
Acacia wilhelmiana	Dwarf Nealie	P	*Maireana aphylla*	Cotton-bush	P
Acrotriche patula	Prickly Ground-berry	P	*Maireana appressa*	Pale-fruit Bluebush	P
Adriana quadripartita	Coast Bitter-bush	P	*Maireana astrotricha*	Low Bluebush	P
Adriana tomentosa var. hookeri	Mallee Bitter-bush	P	*Maireana brevifolia*	Short-leaf Bluebush	U
Alectryon oleifolius ssp. canescens	Bullock Bush	HP	*Maireana campanulata*	Bell-fruit Bluebush	P
Allocasuarina helmsii	Helm's Oak-bush	P	*Maireana cannonii*	Cannon's Bluebush	P
Allocasuarina muelleriana ssp. alticola	Flinders Ranges Oak-bush	P	*Maireana georgei*	Satiny Bluebush	P
Allocasuarina muelleriana ssp. muelleriana	Common Oak-bush	P	*Maireana luehmannii*	Luehman's Bluebush	P
Allocasuarina verticillata	Drooping Sheoak	HP	*Maireana oppositifolia*	Salt Bluebush	P
Aluta maisonneuvei ssp. auriculata	Desert Thryptomene	P	*Maireana planifolia*	Flat-leaf Bluebush	P
Alyogyne hakeifolia	Hakea-leaf Hibiscus	P	*Maireana pyramidata*	Black Bluebush	P

Alyogyne huegelii	Native Hibiscus	P	*Maireana rohrlachii*	Rohrlach's Bluebush	P
Alyogyne pinoniana	Sand Hibiscus	P	*Maireana schistocarpa*	Split-fruit Bluebush	P
Alyxia buxifolia	Sea Box	P	*Maireana sedifolia*	Bluebush	P
Androcalva loxophylla	Pur#ar-pur#arpa	P	*Melaleuca acuminata ssp. acuminata*	Mallee Honey-myrtle	P
Anthocercis angustifolia	Narrow-leaf Ray-flower	P	*Melaleuca armillaris ssp. akineta*	Needle-leaf Honey-myrtle	P
Anthocercis anisantha ssp. collina	Gawler Ranges Ray-flower	P	*Melaleuca bracteata*	River Tea-tree	P
Aotus subspinescens	Mallee Aotus	P	*Melaleuca dissitiflora*		P
Arabidella glaucescens		P	*Melaleuca eleuterostachya*	Hummock Honey-myrtle	P
Arabidella trisecta	Shrubby Cress	P	*Melaleuca glomerata*	Inland Paper-bark	U
Astroloma humifusum	Cranberry Heath	P	*Melaleuca interioris*	Broombush	P
Atalaya hemiglauca	Whitewood	P	*Melaleuca lanceolata*	Dryland Tea-tree	P
Atriplex incrassata	Oodnadatta Saltbush	U	*Melaleuca leiocarpa*	Pungent Honey-myrtle	P
Atriplex nummularia ssp. nummularia	Old-man Saltbush	P	*Melaleuca pauperiflora ssp. mutica*	Boree	P
Atriplex stipitata	Bitter Saltbush	U	*Melaleuca trichostachya*	Narrow-leaf Honey-myrtle	P
Atriplex vesicaria	Bladder Saltbush	HP	*Melaleuca uncinata*	Broombush	U
Baeckea crassifolia	Desert Baeckea	P	*Melaleuca xerophila*	Boree	P
Bauhinia gilva	Bauhinia	U	*Melicytus angustifolius ssp. divaricatus*	Tree Violet	P
Bertya tasmanica ssp. vestita	Mitchell's Bertya	P	*Microcybe multiflora ssp. baccharoides*	Scale-leaf Microcybe	P
Beyeria lechenaultii	Pale Turpentine Bush	P	*Microcybe multiflora ssp. multiflora*	Small-leaf Microcybe	P
Beyeria opaca	Dark Turpentine Bush	P	*Minuria cunninghamii*	Bush Minuria	P
Bossiaea walkeri	Cactus Pea	P	*Minuria rigida*		P
Bursaria spinosa ssp. lasiophylla	Downy Bursaria	P	*Myoporum brevipes*	Warty Boobialla	P
Bursaria spinosa ssp. spinosa	Sweet Bursaria	P	*Myoporum insulare*	Common Boobialla	P
Callistemon rugulosus	Scarlet Bottlebrush	P	*Myoporum montanum*	Native Myrtle	U
Callistemon teretifolius	Needle Bottlebrush	P	*Myoporum petiolatum*	Sticky Boobialla	P
Callitris canescens	Scrubby Cypress Pine	U	*Myoporum platycarpum*	False Sandalwood	P
Callitris glaucophylla	White Cypress-pine	U	*Newcastelia cephalantha*		P
Callitris gracilis	Southern Cypress Pine	U	*Newcastelia spodiotricha*		P
Callitris verrucosa	Scrub Cypress Pine	U	*Nitraria billardierei*	Nitre-bush	U

Calytrix gypsophila	Gypsum Fringe-myrtle	P	*Olearia arckaringensis*		P
Calytrix tetragona	Common Fringe-myrtle	P	*Olearia arida*	Desert Daisy-bush	P
Capparis mitchellii	Native Orange	P	*Olearia brachyphylla*	Short-leaf Daisy-bush	P
Carissa spinarum	Conker Berry	P	*Olearia calcarea*	Crinkle-leaf Daisy-bush	P
Cassinia arcuata	Drooping Cassinia	P	*Olearia decurrens*	Winged Daisy-bush	P
Cassinia complanata	Sticky Cassinia	P	*Olearia exiguifolia*	Lobed-leaf Daisy-bush	P
Cassinia laevis	Curry Bush	U	*Olearia floribunda*	Heath Daisy-bush	P
Casuarina pauper	Black Oak	P	*Olearia incana*	Showy Daisy-bush	P
Chenopodium auricomum	Golden Goosefoot	HP	*Olearia lepidophylla*	Clubmoss Daisy-bush	P
Chenopodium curvispicatum	Cottony Goosefoot	P	*Olearia magniflora*	Splendid Daisy-bush	P
Chenopodium desertorum	Goosefoot	P	*Olearia minor*	Heath Daisy-bush	P
Chenopodium gaudichaudianum	Scrambling Goosefoot	P	*Olearia muelleri*	Mueller's Daisy-bush	U
Chenopodium nitrariaceum	Nitre Goosefoot	P	*Olearia passerinoides ssp. passerinoides*	Feather Daisy-bush	P
Choretrum chrysanthum	Yellow-flower Sour-bush	P	*Olearia pimeleoides*	Pimelea Daisy-bush	U
Choretrum glomeratum	White Sour-bush	P	*Olearia ramulosa*	Twiggy Daisy-bush	P
Citrus glauca	Desert Lime	P	*Olearia stuartii*	Stuart's Daisy-bush	P
Codonocarpus cotinifolius	Desert Poplar	P	*Olearia subspicata*	Spiked Daisy-bush	P
Codonocarpus pyramidalis	Slender Bell-fruit	P	*Olearia tubuliflora*	Rayless Daisy-bush	P
Comesperma scoparium	Broom Milkwort	P	*Owenia acidula*	Sour Plum	P
Comesperma viscidulum	Varnished Milkwort	P	*Ozothamnus retusus*	Notched Bush-everlasting	P
Correa backhouseana var. coriacea	Thick-leaf Correa	P	*Ozothamnus scaber*	Rough Bush-everlasting	P
Correa glabra var. turnbullii	Smooth Correa	P	*Petalostylis labicheoides*	Butterfly Bush	P
Corymbia terminalis	Plains Bloodwood	P	*Philotheca angustifolia ssp. angustifolia*	Narrow-leaf Wax-flower	P
Cratystylis conocephala	Bluebush Daisy	P	*Philotheca difformis ssp. difformis*	Small-leaf Wax-flower	P
Crotalaria cunninghamii ssp. sturtii	Bird-flower Rattle-pod	P	*Philotheca linearis*	Narrow-leaf Wax-flower	P

Crotalaria medicaginea var. neglecta	Trefoil Rattle-pod	P	*Phyllanthus calycinus*	Snowdrop Spurge	P
Cryptandra campanulata	Long-flower Cryptandra	P	*Phyllanthus fuernrohrii*	Sand Spurge	P
Cryptandra propinqua	Silky Cryptandra	P	*Phyllanthus oblanceolatus*	Sandhill Spurge	P
Cryptandra sp. Floriferous (W.R.Barker 4131)	Pretty Cryptandra	P	*Phyllanthus striaticaulis*	Southern Spurge	P
Cynanchum floribundum	Desert Cynanchum	P	*Phyllanthus virgatus*		P
Cynanchum viminale ssp. australe	Caustic Bush	P	*Pimelea curviflora var. gracilis*		P
Dampiera dysantha	Shrubby Dampiera	P	*Pimelea flava ssp. dichotoma*	Diosma Riceflower	P
Dampiera lanceolata var. lanceolata	Grooved Dampiera	P	*Pimelea glauca*	Smooth Riceflower	P
Dampiera rosmarinifolia	Rosemary Dampiera	P	*Pimelea humilis*	Low Riceflower	P
Darwinia salina	Salt Darwinia	P	*Pimelea imbricata var. petraea*	Rock Woolly Riceflower	P
Daviesia arenaria	Sand Bitter-pea	P	*Pimelea linifolia ssp. linifolia*	Slender Riceflower	P
Daviesia benthamii ssp. humilis	Mallee Bitter-pea	P	*Pimelea micrantha*	Silky Riceflower	P
Daviesia genistifolia	Broom Bitter-pea	P	*Pimelea microcephala ssp. microcephala*	Shrubby Riceflower	P
Daviesia leptophylla	Narrow-leaf Bitter-pea	P	*Pimelea octophylla*	Woolly Riceflower	P
Daviesia stricta	Flinders Ranges Bitter-pea	P	*Pimelea penicillaris*	Sandhill Riceflower	P
Daviesia ulicifolia ssp. aridicola	Gorse Bitter-pea	P	*Pimelea petrophila*	Rock Riceflower	P
Daviesia ulicifolia ssp. incarnata	Gorse Bitter-pea	P	*Pimelea stricta*	Erect Riceflower	P
Dicrastylis beveridgei	Sand-sage	P	*Pittosporum angustifolium*	Native Apricot	HP
Dicrastylis costelloi	Sand-sage	P	*Plectranthus intraterraneus*	Inland Spur-flower	P
Dicrastylis lewellinii	Purple Sand-sage	P	*Pomaderris paniculosa ssp. paniculosa*	Mallee Pomaderris	P
Dicrastylis verticillata	Whorled Sand-sage	P	*Prostanthera althoferi ssp. longifolia*		P
Dodonaea baueri	Crinkled Hop-bush	P	*Prostanthera behriana*	Downy Mintbush	P
Dodonaea bursariifolia	Small Hop-bush	P	*Prostanthera eurybioides*	Monarto Mintbush	P
Dodonaea intricata	Gawler Ranges Hop-bush	P	*Prostanthera sericea*	Silky Mintbush	P
Dodonaea lobulata	Lobed-leaf Hop-bush	U	*Prostanthera spinosa*	Spiny Mintbush	P

Dodonaea microzyga var. microzyga	Brilliant Hop-bush	P	*Prostanthera striatiflora*	Striated Mintbush	P
Dodonaea petiolaris	Balloon Hop-bush	P	*Prostanthera wilkieana*		P
Dodonaea stenozyga	Desert Hop-bush	P	*Psydrax ammophila*		P
Dodonaea subglandulifera		P	*Psydrax latifolia*	Broad-leaf Native Currant	P
Dodonaea tepperi	Streaked Hop-bush	P	*Ptilotus barkeri*	Barker's Mulla Mulla	P
Dodonaea viscosa ssp. angustissima	Narrow-leaf Hop-bush	U	*Ptilotus disparilis*	Small-leaf Mulla Mulla	P
Dodonaea viscosa ssp. spatulata	Sticky Hop-bush	U	*Ptilotus obovatus*	Silver Mulla Mulla	P
Duboisia hopwoodii	Pituri	P	*Ptilotus parvifolius*	Small-leaf Mulla Mulla	P
Duma florulenta	Lignum	P	*Ptilotus propinquus*		P
Enchylaena tomentosa	Ruby Saltbush	P	*Ptilotus remotiflorus*		P
Epacris impressa	Common Heath	P	*Ptilotus sp. Arckaringa (D.J.Duval 1958)*		P
Eragrostis australasica	Cane-grass	P	*Ptilotus whitei*	Small-leaf Mulla Mulla	P
Eremophila alternifolia	Narrow-leaf Emubush	P	*Pultenaea graveolens*	Scented Bush-pea	P
Eremophila arachnoides ssp. tenera	Spider Emubush	P	*Pultenaea largiflorens*	Twiggy Bush-pea	P
Eremophila battii		U	*Rhagodia crassifolia*	Fleshy Saltbush	P
Eremophila bignoniiflora	Bignonia Emubush	HP	*Rhagodia eremaea*	Desert Saltbush	P
Eremophila bowmanii ssp. latifolia	Velvet Emubush	P	*Rhagodia parabolica*	Mealy Saltbush	P
Eremophila dalyana		P	*Rhagodia preissii ssp. preissii*	Mallee Saltbush	P
Eremophila decussata		P	*Rhagodia spinescens*	Spiny Saltbush	P
Eremophila delisseri	Nullarbor Emubush	P	*Rhagodia ulicina*	Intricate Saltbush	P
Eremophila deserti	Turkey-bush	U	*Santalum acuminatum*	Quandong	HP
Eremophila duttonii	Harlequin Emubush	U	*Santalum lanceolatum*	Plumbush	HP
Eremophila fallax		P	*Santalum spicatum*	Sandalwood	HP
Eremophila freelingii	Rock Emubush	U	*Scaevola amblyanthera var. centralis*		P
Eremophila gibsonii	Gibson's Emubush	P	*Scaevola collaris*		P
Eremophila gilesii ssp. gilesii	Hairy-fruit Emubush	U	*Scaevola spinescens*	Spiny Fanflower	P
Eremophila glabra ssp. glabra	Tar Bush	P	*Sclerolaena tatei*	Tate's Bindyi	P
Eremophila latrobei ssp. glabra	Crimson Emubush	P	*Senecio anethifolius ssp.*	Feathery Groundsel	P

Eremophila latrobei ssp. latrobei	Grey-leaf Crimson Emubush	P	*Senecio cunninghamii var. flindersensis*	Shrubby Groundsel	U
Eremophila longifolia	Weeping Emubush	HP	*Senecio gawlerensis*	Gawler Ranges Groundsel	P
Eremophila macdonnellii	Macdonnell's Emubush	U	*Senecio lanibracteus*	Inland Shrubby Groundsel	P
Eremophila macgillivrayi	Dog-bush	P	*Senecio magnificus*	Showy Groundsel	U
Eremophila maculata ssp. maculata	Spotted Emubush	P	*Senecio megaglossus*	Large-flower Groundsel	P
Eremophila neglecta		P	*Senna artemisioides ssp. alicia*	Desert Senna	U
Eremophila obovata ssp. obovata		P	*Senna artemisioides ssp. artemisioides*	Silver Senna	U
Eremophila oppositifolia ssp. oppositifolia	Opposite-leaved Emubush	P	*Senna artemisioides ssp. coriacea*	Broad-leaf Desert Senna	P
Eremophila paisleyi ssp. paisleyi		P	*Senna artemisioides ssp. filifolia*	Fine-leaf Desert Senna	U
Eremophila pentaptera		P	*Senna artemisioides ssp. helmsii*	Blunt-leaf Senna	P
Eremophila platythamnos ssp. villosa		P	*Senna artemisioides ssp. oligophylla*	Limestone Senna	U
Eremophila polyclada	Twiggy Emubush	P	*Senna artemisioides ssp. petiolaris*		U
Eremophila rotundifolia	Round-leaf Emubush	U	*Senna artemisioides ssp. quadrifolia*	Four-leaf Desert Senna	P
Eremophila santalina	Sandalwood Emubush	P	*Senna artemisioides ssp. sturtii*	Grey Senna	U
Eremophila scoparia	Broom Emubush	U	*Senna artemisioides ssp. zygophylla*	Twin-leaf Desert Senna	U
Eremophila serrulata	Green Emubush	U	*Senna cardiosperma ssp. gawlerensis*	Gawler Ranges Senna	P
Eremophila sturtii	Turpentine Bush	U	*Senna cardiosperma ssp. microphylla*	Curved-leaf Senna	P
Eremophila subfloccosa ssp. glandulosa	Green-flower Emubush	P	*Senna glutinosa ssp. chatelainiana*		P
Eremophila subfloccosa ssp. lanata	Woolly Emubush	P	*Senna glutinosa ssp. pruinosa*	White Senna	P
Eremophila verrucosa ssp. verrucosa	Warty Emubush	P	*Senna notabilis*	Showy Senna	P
Eremophila willsii ssp.		P	*Senna occidentalis*	Western Senna	P
Eucalyptus albens	White Box	U	*Senna phyllodinea*		P
Eucalyptus behriana	Broad-leaf Box	U	*Senna planitiicola*	Yellow Pea	P
Eucalyptus brachycalyx	Gilja	U	*Senna pleurocarpa var. pleurocarpa*	Stripe-pod Senna	P

Eucalyptus cajuputea	Green Mallee	U	*Spartothamnella teucriiflora*	Bead Bush	P
Eucalyptus calcareana	Nundroo Mallee	U	*Spyridium parvifolium*	Dusty Miller	P
Eucalyptus calycogona	Square-fruit Mallee	U	*Spyridium spathulatum*	Spoon-leaf Spyridium	P
Eucalyptus camaldulensis	River Red Gum	U	*Spyridium stenophyllum ssp. renovatum*	Forked Spyridium	P
Eucalyptus capitanea	Desert Ridge-fruited Mallee	U	*Spyridium subochreatum*	Velvet Spyridium	P
Eucalyptus cladocalyx	Sugar Gum	U	*Styphelia exarrhena*	Desert Heath	P
Eucalyptus concinna	Victoria Desert Mallee	U	*Synostemon ramosissimus*		P
Eucalyptus coolabah	Coolibah	U	*Synostemon rigens*	Stiff Spurge	P
Eucalyptus cyanophylla	Blue-leaf Mallee	U	*Tecticornia arbuscula*	Shrubby Samphire	P
Eucalyptus dumosa	White Mallee	U	*Tecticornia disarticulata*		P
Eucalyptus eremicola		U	*Tecticornia fontinalis*	Mound Spring Samphire	P
Eucalyptus flindersii	Flinders Grey Mallee	U	*Tecticornia halocnemoides ssp. longispicata*	Grey Samphire	P
Eucalyptus gillii	Curly Mallee	U	*Tecticornia halocnemoides ssp. tenuis*		P
Eucalyptus goniocalyx	Long-leaf Box	U	*Tecticornia indica ssp. bidens*	Brown-head Samphire	P
Eucalyptus gracilis	Yorrell	U	*Tecticornia indica ssp. leiostachya*	Brown-head Samphire	P
Eucalyptus gypsophila	Kopi Mallee	U	*Tecticornia medullosa*		P
Eucalyptus intertexta	Gum-barked Coolibah	U	*Tecticornia nitida*	Shining Glasswort	P
Eucalyptus largiflorens	River Box	U	*Tecticornia pergranulata ssp. divaricata*	Black-seed Samphire	P
Eucalyptus leptophylla	Narrow-leaf Red Mallee	U	*Tecticornia pergranulata ssp. elongata*	Black-seed Samphire	P
Eucalyptus leucoxylon ssp. leucoxylon	South Australian Blue Gum	U	*Tecticornia pergranulata ssp. pergranulata*	Black-seed Samphire	P
Eucalyptus leucoxylon ssp. pruinosa	Inland South Australian Blue Gum	U	*Tecticornia pluriflora*		P
Eucalyptus microcarpa	Grey Box	U	*Tecticornia pruinosa*	Bluish Samphire	P
Eucalyptus odorata	Peppermint Box	U	*Tecticornia pterygosperma ssp. pterygosperma*	Winged-seed Samphire	P

Eucalyptus oleosa	Red Mallee	U	*Tecticornia tenuis*	Slender Samphire	P
Eucalyptus percostata	Ribbed White Mallee	U	*Tecticornia undulata*		P
Eucalyptus pileata	Capped Mallee	U	*Templetonia aculeata*	Spiny Mallee-pea	P
Eucalyptus polybractea	Flinders Ranges Box	U	*Templetonia egena*	Broombush Templetonia	P
Eucalyptus porosa	Mallee Box	U	*Templetonia incrassata*	Thick-stemmed Broombush Templetonia	P
Eucalyptus socialis	Beaked Red Mallee	U	*Templetonia retusa*	Cockies Tongue	P
Eucalyptus sp. Great Victoria Desert (D.Nicolle 3877)	Narrow-leaf Red Mallee	U	*Teucrium grandiusculum ssp. pilosum*		P
Eucalyptus trivalva	Three-valve Mallee	U	*Teucrium racemosum*	Grey Germander	U
Eucalyptus viminalis ssp. viminalis	Manna Gum	U	*Teucrium reidii*	Rock Germander	P
Eucalyptus youngiana	Ooldea Mallee	U	*Thryptomene elliottii*		P
Eucalyptus yumbarrana	Yumbarra Mallee	U	*Westringia rigida*	Stiff Westringia	P
Eutaxia diffusa	Large-leaf Eutaxia	P	*Xanthorrhoea quadrangulata*	Rock Grass-tree	P
Eutaxia microphylla	Common Eutaxia	P	*Xerothamnella parvifolia*		P
Exocarpos aphyllus	Leafless Cherry	P	*Zygophyllum aurantiacum ssp.*	Shrubby Twinleaf	U
Exocarpos cupressiformis	Native Cherry	P	*Zygophyllum crassissimum*	Thick Twinleaf	P

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