

Conservation Area Inventory Guidelines

Melbourne Strategic Assessment



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Introduction

Background and purpose

The Victorian Government is reserving land around Melbourne to protect native grasslands and grassy woodlands, including the 15,000 ha 'Western Grassland Reserves' (WGR), the 1,200 ha 'Grassy Eucalypt Woodland Reserve', and a network of Conservation Areas, some as small as 1.6 ha.

The establishment of the reserves is linked to the expansion of Melbourne's Urban Growth Boundary. This will impact several species and ecological communities listed under the federal *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*. A 'Strategic Impact Assessment' conducted by the Victorian Government assessed these impacts and recommended ways of mitigating environmental impacts. The mitigation measures agreed to by the Victorian and Australian governments are outlined in the 'Program Report' and the 'Biodiversity Conservation Strategy' (DEPI 2013a). These measures include the establishment and management of the reserves, along with monitoring and reporting on outcomes according to the Monitoring and Reporting Framework (MRF, DELWP 2015).

For each reserve (or portion of larger reserves) that is classified as Nature Conservation and transferred to the Crown, reports will be produced which describe the biological values and land use history of the land. They will be used to determine which species outcomes are relevant, how monitoring will apply, serve as a reference for managers, and provide the logical basis of many management actions. The information will be presented in two separate reports:

- Vegetation inventory (which includes vegetation patterns, plant species and property management history)
- Fauna inventory

This document provides guidelines describing how animal, vegetation and plant surveys should be conducted and how land use history information should be collected, in order to meet DELWP's expectations for the inventory. By following these guidelines, competent survey teams can produce the reports required.

These guidelines are narrowly focussed on the methods of survey. They do not discuss in detail the choice of methods, and are not a literature review of survey techniques.

Scope

Vegetation and plant species

The vegetation inventory surveys should, for the entire area covered, seek to:

- Map the distribution of all native and non-native vegetation,
- Map the historic (pre-1750) distribution of Ecological Vegetation Classes (EVCs),
- Map the existing distribution of EVCs,
- Identify and map the distribution of all EPBC-listed ecological communities (which may include Natural Temperate Grassland of the Victorian Volcanic Plain (NTG), Grassy Eucalypt Woodland of the Victorian Volcanic Plain (GEW) or Seasonal Herbaceous Wetlands (Freshwater) of the Lowland Plains (SHW),+
- Assign all present or former areas of NTG or GEW to a 'state'. States are defined according to the existing state-transition models, where different states represent alternative assemblages of species that occur due to alternate land-use and disturbance histories of a site,

- Identify and map the distribution of any significant native vascular plant species (species listed under the EPBC Act, species listed under the *Flora and Fauna Guarantee Act 1988* (FFG Act), or species included in the Advisory List of Rare or Threatened Plants in Victoria (DEPI, 2014b)).
- Identify and map the distribution of all weed species of concern (those listed under the CaLP Act, and any other species which presents a threat and requires important management attention),
- Identify and map any subjectively-defined 'hot spots' where biological values are concentrated, and which should receive particular management focus,
- List all the vascular plant species present in the survey area, and note their approximate abundance.

Land management history

The land management history information.

Animals

The inventory data for animals should provide the necessary information for management and communication. For animals, only some taxonomic groups will be targeted for survey. These are those groups which:

- indicate something of known relevance to ecological condition / change / management effectiveness, and / or
- are listed as threatened (state and federal), and / or
- are part of a population which can be effectively managed via management intervention at the site.

Targeting of surveys to some groups over others is particularly important for animals, given the multitude of techniques required to detect the range of animal groups, and their cost. The following animal groups or species are considered relevant overall (but not necessarily on a particular property, see below):

- Spiders, scorpions and centipedes,
- Golden Sun Moth,
- Amphibians,
- Reptiles,
- Diurnal birds,
- Nocturnal birds (owls, Plains-wanderer),
- Bats,
- Ground-dwelling mammals,
- Arboreal mammals.

It is worth noting that some species or groups are excluded from inventory surveys (although they will be noted if detected). These are:

- Eastern Grey Kangaroos,
- Rabbits and Hares,
- Foxes,
- Cats.

These species are assumed to be ubiquitous and freely mobile in most Conservation Areas (often until surrounded by urban or industrial land uses in the case of kangaroos). These species may, however, present important management issues, and in these cases their populations may be monitored (see MRF, DELWP 2015).

Survey Guidelines: Vegetation and plant species

Plant species surveys

The aim of plant species surveys is to compile a list of species for the Conservation Area (or property) that is as comprehensive as practical.

Each area should be surveyed by a qualified and experienced botanist(s) so that no sizable area remains unexamined, and all vascular plant species noted (or collected for later identification). Every discrete patch of un-cultivated (never cropped) grassland or woodland on a property should be visited. For large parcels, this will be done by dividing the site arbitrarily into ~50-100 ha units before survey commences, and treating each unit as an individual patch.

- For patches where total grass cover is >30%, an effort of 1.5 hours per hectare will be spent searching for plants; until no new plant taxon for the Conservation Area (or property) has been detected for over 30 mins within the patch (preliminary surveys suggest most patches are 'completed' after a 30 minute break in species detection, long before 1.5 hours per hectare is expended).
- For patches where total grass cover is <30%, 1 hour per hectare will be spent searching for plants; until no new plant taxon for the Conservation Area (or property) has been detected for over 30 mins within the patch.
- Every discrete patch of un-cultivated native vegetation on a Conservation Area (or property) will be visited.
- Every wetland, stony rise, escarpment or drainage line visible on the aerial imagery will be visited and surveyed with intensity similar to that for other native vegetation.
- Cultivated sites have a much lower diversity of species and are thus a lower priority for flora inventory. For non-native vegetation 5 min per hectare should be spent searching.

The occurrence of different species in different habitats (EVCs, EPBC-communities, states; see below) should be noted.

The locations of any significant native species should be recorded using a GPS. 'Significant' includes any EPBC- or FFG-listed species, species listed on either the Advisory List of Rare or Threatened Plants (DEPI 2014b) or by Walsh and Stajsic (2007).

Occurrences of any exotic species of management concern should also be mapped, (unless they are so widespread as to make mapping unhelpful), including all species listed under the *Catchment and Land Protection Act 1994*, all species listed as emerging weeds in (DSE 2011a), high threat weeds considered by the botanist to pose a significant threat and therefore of relevance for management.

Plant species searches should be done mostly between September and January; however, additional visits outside this period are encouraged and may provide additional records.

Vascular plant species should be assigned to an EPBC-community (see above), so that these can be listed separately (see DEPI 2014).

Mapping native vegetation

The extent of native vegetation should be mapped. 'Native vegetation' is defined according to DEPI (2013) ("...either...an area of vegetation where at least 25 per cent of the total perennial understory plant cover is native, or any area with three or more canopy trees where the canopy foliage cover is at least 20 per cent of the area", and "foliage cover is the proportion of the ground that is shaded by vegetation foliage when lit from directly above").

Each Conservation Area should be walked so that no sizable area remains unsurveyed. The structured survey method above, already required for species searches, should ensure native vegetation is adequately inspected.

Mapping native vegetation should be completed between the start of October and the end of February, when most native grasses retain elevated culms (or their remnants) which are visible from a distance. Mapping outside this time may be difficult if native tussocks are obscured by lush annual species. Vegetation mapping can, however, be done at any time of year if sufficient care is taken to examine the ground layer.

Mapping EVCs

The pattern of pre-1750 (i.e. previous, before agricultural impacts) EVC coverage should be determined subjectively using aerial photographs and by inspecting the property. This requires an experienced observer with knowledge of plant ecology and geomorphology. Some basic guidance is provided below.

Two EVCs are presumed to have covered the majority of the relevant areas, and usually one of these EVCs covered most of any given reserve:

- Plains Grassland (EVC 132) presumed to have covered the vast majority of land in the west (WGR and western growth corridor) and many areas in the north-west and northern growth corridor (see also Ephemeral Drainage-line Grassy Wetland, below).
- Plains Grassy Woodland (EVC 55) presumed to have covered large areas in the north-west and northern growth corridor and the GEW reserve area.

A few other EVCs were presumed to be common, but generally confined to restricted geomorphological contexts, as follows:

- Stony Knoll Shrubland (EVC 649) covered most areas that have rock cover exceeding ~20% and are markedly or subtly elevated (regardless of current shrub cover or grass species composition).
- Escarpment shrubland (EVC 895) covered all areas which are steep (above ~1 in 2 gradient) and have rock cover exceeding ~20% (regardless of current shrub cover or grass species composition).
- Plains Grassy Wetland (EVC 125) covered most areas that allow water to collect occasionally, with heavy clay soils that are grey or black. Even the most degraded areas usually retain *Eleocharis acuta*, *Marselia drummondii* and / or *Rytidosperma duttonianum*.
- Plains Swampy Woodland (EVC 651) covered low-lying flat areas in the northern growth corridor and GEW reserve area, and many sites retain *Eucalyptus ovata* and/or *Poa labillardierei*, which characterise this EVC.
- Creekline Tussock Grassland (EVC 654) lined low-gradient drainage lines. It usually retains *Poa labillardierei* as a prominent component.
- Ephemeral Drainage-line Grassy Wetland (EVC 678) occurred on very poorly-defined drainage lines. This EVC was described to support the Index of Wetland Condition (DSE 2012), but it is not generally used for EVC mapping by DELWP, and all areas should be assigned to Plains Grassland or Plains Grassy Wetland.

This guidance should be interpreted flexibly. Other EVCs may also be relevant.

Once the pre-1750 coverage is mapped, the extent of native vegetation (above) defines the current extent of EVCs.

Mapping EPBC-listed communities

The occurrence and extent of EPBC listed communities should be determined using the relevant published descriptions.

- NTG and GEW: DSEWPAC (2011).
- SHW: (TSSC 2012)

For the majority of vegetation types likely encountered in MSA Conservatoin Areas there is a good correlation between EVCs and EPBC-listed communities, such that EVC mapping (described above) should provide most of the data required to map the EPBC-listed communities. No area should be assigned to more than one community (i.e. ecotones must be split as sensibly as possible). The correspondence between EPBC-listed communities and EVCs are noted below (in each case assuming that the basic species cover and patch size thresholds for each EPBC-community are met):

- NTG should include all Plains Grassland, Creekline Tussock Grassland, Plains Woodland dominated by buloke (*Allocasuarina luehmannii*), and Stony Knoll Shrubland (The definition of NTG also encompasses some areas of Plains Grassy Wetland, but this EVC is better assigned to SHW).
- GEW should include all Plains Grassy Woodland and Plains Swampy Woodland, and any Stony Knoll Shrubland that supports or is adjacent to Eucalypt trees.
- SHW should include all Plains Grassy Wetland, and may include areas of many other wetland EVCs (The definition of SHW also encompasses some areas of Creekline Tussock Grassland, but this EVC is better assigned to NTG).

It is notable that relatively few areas of native vegetation in any of the relevant reserves are not assignable to one or other EPBC-listed community.

Vascular plant species (see above) should be assigned to an EPBC-community, so that these can be listed separately (see Appendix 1).

State mapping for 'Natural Temperate Grassland' and 'Grassy Eucalypt Woodland'

All discrete present or former areas of NTG and GEW (whether native vegetation or not) should be visited in the field and assigned a state, using the state descriptions.

First, up-to-date and historic aerial photographs should be used first to distinguish previously-cropped and never-cropped land. This is usually a relatively easy distinction to make, and usually provides clear map boundaries to confine the other possible states.

All areas defined by this cropping boundary should then be assigned a state based on species composition and available soil nutrient data, as described in the state descriptions, and in the case of NTG, the key shown in Figure 1. The minimum polygon size for polygons not defined by crop-boundaries is 0.25 ha (equivalent to 50 x 50 m). Large expanses may be difficult to divide into discrete areas of different states, particularly when the variables that define the states change gradually across the site, or are close to a threshold.

State mapping should be done between June and December, when the abundance of annual species (some of which are used to distinguish states) are apparent.

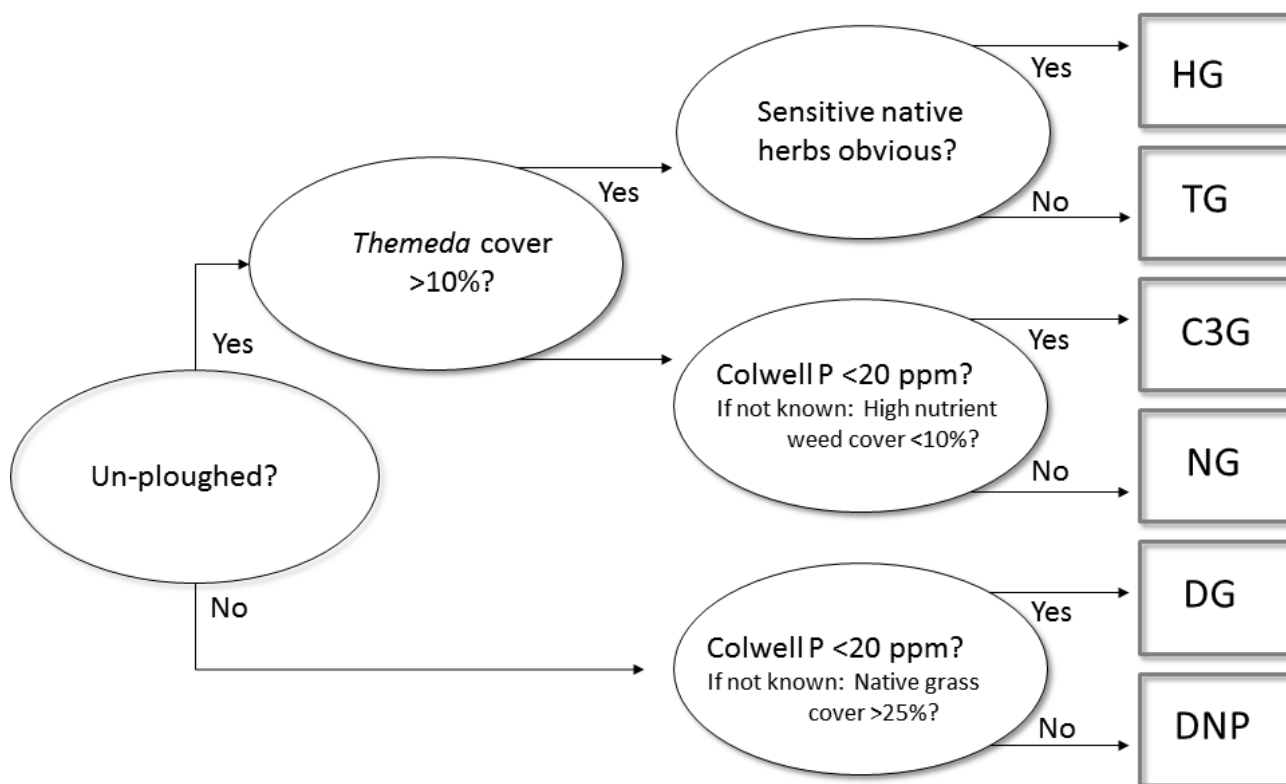


Figure 1: Key to rapidly distinguish NTG states in the field. Cowell P refers to Soil phosphorous detected in the upper soil profile (0-5cm) by the Colwell extraction (Colwell, 1963). Cover refer to proportional foliage cover . The ‘high nutrient weeds’ and ‘sensitive native herbs’ are defined in Appendix 2 and 3. Obvious; at least one plant can be located in most 10X10m sections of a homogenously managed area; generally without much searching (<1 minute). High nutrient weeds are only used to indicate nutrient levels when Colwell P is not known. State abbreviations: HG = Herb-rich Grassland, TG = Themeda Grassland, C3G = C3 Grassland, NG = Nutrient-enriched Grassland, DG = Derocked Grassland, DNP = Derocked Nutrient-enriched Pasture (including crops).

‘Hot spots’

‘Hot spots’ are subjective assessments of conspicuous concentrations of biological values. These are the places of particular interest within the Conservation Area; places that display its values to full advantage. The ‘hot spots’ are thus places where intensive or specific management may best be undertaken to protect the values of the site.

The assessment of ‘hot spots’ is necessarily subjective, because it takes into account some intangible factors, including interesting or unusual juxtapositions of biological values for educational purposes or visual amenity, etc. DELWP will be responsible for identifying all hot spot areas.

Identifying areas warranting repeat surveys

Areas that may require repeat surveys to guide future management (including to potentially alter grazing, burning, or herbicide regimes) should be identified (see MRF, DELWP 2015a). Repeat surveys may be appropriate in the following circumstances, but should be recommended sparingly, given the intensity of ecosystem monitoring already occurring through the MRF:

- Mapped 'hot spots', which contain concentrations of biological values which are considered important in aggregate, where repeat inventory surveys should occur every 5 years.
- Areas where populations of serious emerging weeds are present.
- Areas where populations of significant native species are present.

Survey Guidelines: Fauna

Groups to be surveyed

Not every fauna group will be surveyed in every area (i.e. not on every parcel or property). Before implementing fauna surveys, it is necessary to decide which groups are worth pursuing on a given property (i.e. which survey techniques are to be implemented). This will vary depending on the attributes of the property. Groups may be excluded from survey at a given location for the following reasons:

- Their known habitat is absent (e.g. trees for arboreal mammals),
- The site (or relevant patches) is deemed too small to support a population of the relevant group which can be effectively managed through interventions at the site (e.g. It is assumed that the 1.6 ha Truganina Cemetery cannot be reasonably managed to benefit owls).
- The level of disturbance that would be required for sampling is unacceptable (e.g. laying tile grids or digging pitfall traps at a small and important site such as Truganina cemetery)
- The equipment required to be left on site may be vulnerable to disturbance/ theft (e.g. cameras at urban interface)
- Previous recent surveys (<5 years) have already provided adequate data.

Table 1 provides guidance to help determine what to survey at a given site. It does not cover intensity of survey, which is dealt with in the next section. In many cases one survey technique is used for multiple taxa (e.g. roof tiles for reptiles, amphibians and small mammals). However, some taxa (e.g. Plains-wanderer, Golden Sun Moth) have specific survey requirements and thus have unique guidelines.

Table 1. Minimum area for fauna inventory surveys in the Western Grassland Reserves (WGR), Grassy Eucalypt Woodland reserve (GEW) and smaller conservation areas (CA) within the Urban Growth Boundary.

Survey type	Target taxa	Minimum size of reserve area (contiguous ha)	Minimum size of 'relevant habitat' (ha)	Definition of 'relevant habitat'
Roof tiles	Reptiles, Amphibians, Small mammals	2	0	Never-cropped areas
Rock rolling	Reptiles, Amphibians, Small mammals	0	0	All
Observation	Reptiles, Amphibians, Small mammals	0	0	All
Remote cameras	All vertebrates	10	0	Anywhere secure for equipment
Spotlighting - Amphibians	Amphibians	0	3 (including smaller patches in cluster).	SHW, Riparian, large dams.
Counts – Diurnal birds	Diurnal birds	0	0	All
Spotlighting – Plains-wanderer	Plains-wanderer	NA	5 (WGR or GEW reserve) 10 (conservation areas)	Western region only. Habitat structure open at time of survey (bare ground > 50%)
Call-playback/ Spotlighting – nocturnal birds	Owls	NA	0	Woody vegetation (e.g. GEW, Riparian, Buloke, Red Gum Swamps).
Bat detectors	Bats	0	0	Anywhere secure for equipment
Vacuum sampling	Spiders	0	0	All (but only sampled on WGR properties assigned a grassland monitoring plot; DELWP 2015)

Survey type	Target taxa	Minimum size of reserve area (contiguous ha)	Minimum size of 'relevant habitat' (ha)	Definition of 'relevant habitat'
Pitfall traps	Spiders, Scorpions, Centipedes	0	0	All (but only sampled on WGR properties assigned a grassland monitoring plot; DELWP 2015)
Spotlighting - Arboreal mammals	Possums Gliders	NA	1	Woody vegetation (e.g. GEW, Riparian, Buloke, Red Gum Swamps).
Area search (Golden Sun Moth)	Golden Sun Moth	NA	10	Never-cropped areas

*Areas excluded on the basis of being too small may be eventually surveyed when they are aggregated into a larger part of the WGR / GEW reserve.

Survey intensity

Once a decision has been made about which animal groups will be surveyed at a given site, it is necessary to determine the timing and arrangement of the various activities. This decision will depend on the area and spatial arrangement of different habitat types. The basis for making these decisions is provided in Table 2. It is important to note that the purpose of surveying is to maximize the number of species detected, not to sample the site for any quantitative or comparative purposes; so a targeted approach is advocated. For instance the location of remote cameras is dependant on habitat at a site and the location and intensity of remote camera surveys may differ greatly between Conservation Areas or properties.

Table 2. Summary of the survey protocols, intensity and timing for each taxon.

Technique	Summary of technique	Intensity	Timing
<i>Reptiles and amphibians</i>			
Roof tile grids (general)	Tile grids in a 10 x 5 configuration with 5 m spacing between tiles. Arrangements may be altered to suit habitat.	<1 ha, 0-1 grids; 1-5 ha, 1-3 grids; 6-25 ha, 3-6 grids; >25 ha, 6-10 grids. (may be some overlap with SLL roof tiles)	October – March Six visits per grid
Roof tile grids (Striped Legless Lizard)	Tile grids in a 10 x 5 configuration with 5 m spacing between tiles. Arrangements may be altered to suit habitat.	Ratio of 1 grid per 50ha of land, randomly located across grassland at least 50m apart	September to January Six visits per grid
Active search - Ground level habitat: Rock/habitat rolling	Examination of ground-level habitat (such as beneath surface rocks and logs) and beneath hard litter.	Random half hour searches in each habitat type/area. Opportunistic searches when on site.	September – April
Remote cameras	Opportunistically target unusual habitats difficult to survey with other methodologies	Dependent on habitat	February - April Deploy cameras for a minimum of 21 days.
Diurnal survey	Visual observation in habitats difficult to survey adequately with tiles and ground level surveys.	Dependent on habitat	September – April
Call recognition and spotlighting	Nocturnal survey using call recognition and active search by spotlight for frogs around aquatic habitats	5 minute listening period at each surveyed aquatic habitat, followed by a spotlight search around the perimeter of each habitat	October - December
<i>Small mammals</i>			
Roof tile grids	See reptiles and amphibians		
Active search - Ground level habitat: Rock/habitat rolling	See reptiles and amphibians		
Remote cameras	See reptiles and amphibians		

<i>Diurnal birds</i>			
Diurnal survey	Counts of all birds seen and heard in the parcel	Whole parcel	September – October
<i>Plains-wanderer</i>			
Spotlighting	Spotlighting transects using vehicle or on foot	Dependent on habitat	Any time of year. Avoid windy weather or rain as detection rates decline.
<i>Nocturnal birds</i>			
Call playback	Broadcast of territorial calls followed by spotlighting	Dependent on habitat	November – December
<i>Bats</i>			
Bat detectors	Identify potential flyways and habitat including large trees, tree hollows, rocky outcrops with openings and depth, steep sidings and gullies. Install bat recorders (AnaBat),	Dependent on habitat	December - March Minimum 5 night deployment.
<i>Arboreal mammals</i>			
Spotlighting	Spotlighting in suitable habitat type	Dependent on habitat	Any time of year
Remote cameras	See reptiles and amphibians		
<i>Spiders, scorpions and centipedes</i>			
Vacuum sampling	Vacuum collection along transects in grassland and woodland plots.	Dependent on habitat	October - November
Pitfall traps	Pitfall traps adjacent to grassland and woodland plots	Dependent on habitat	October - November, traps open for 4 consecutive nights.
<i>Golden Sun Moth</i>			
Area searches	Searches in an 8 ha area along transects.	10 – 250 ha 1 plot >250 ha 1 plot per 250 ha (min 2 plots)	November - January
<i>All fauna</i>			
Incidental observations	Incidental observations of fauna are to be recorded for all taxa during site visits	NA	Any time of year

Detailed survey methods

Roof tile grids (general)

Grids of 50 roof tiles should be installed between July and September. Each grid should consist of a rectangle of 10 x 5 tiles, spaced 5 m apart. Alternative configurations such as two rows of 25 tiles can be used to target specific habitats (e.g. linear rows of trees). The location of the four grid corners should be marked with temporary flags and the coordinates of the north-west corner recorded in a GPS device.

Grids should be installed to target the major habitat types in a parcel (e.g. grassland, rocky rise, escarpment, adjacent to wetland), the exact number and arrangement will depend on the size and features of a parcel and will need to be determined as parcels become available. This should consider the inclusion of those tile grids for Striped Legless Lizard where appropriate.

Surveys should be conducted at least two weeks after the installation of the grids. At each survey all tiles in a grid should be lifted and any vertebrate species encountered recorded (to species level where possible), tiles should be replaced carefully in their original position, they are fragile and might break if dropped onto a rock. Each grid should be surveyed six times from spring to autumn, avoiding hotter months in summer. Surveys should take place at least one week apart and the time of day a grid is surveyed should be varied across the survey period.

Roof tile grids (Striped Legless Lizard)

Monitoring of this species will be undertaken by annually surveying grids of roof tiles. Each grid is a rectangle of 10 x 5 ceramic roof tiles spaced 5 m apart, 50 tiles per grid in total.

The tile grids will be established two months prior to commencing the survey. The location of the corner tiles on each grid will be recorded using GPS. Surveys will take place in spring to early summer. Optimal conditions are between 10am and 4pm, when the tile temperature is 18-40°C and the ambient air temperature is between 15-30°C.

At each tile grid the sheltered area underneath the tiles will be inspected for evidence of lizard presence, including sloughed skins. Six repeat tile checks of each grid will be conducted at least one week apart. Tile checks will not occur at the same time of day on each occasion for any given tile grid during the survey period (i.e. randomly allocate daily site check order). At the end of the survey period each year, tiles from all grids will be collected and stored.

Active search - Ground level habitat: Rock/habitat rolling

Vertebrate surveys can be conducted by examining ground-level habitat (such as beneath surface rocks and logs) and beneath hard litter. Any habitat structures must be placed back in its original position after inspection. Formal half hour searches should take place in each appropriate habitat type or area. Opportunistic searches can take place whenever appropriately experienced personnel are on site.

Remote cameras

Remote cameras should be used to target habitats or groups of animals difficult to survey using other methods. Habitats include treed areas and escarpments. The exact location and number of cameras will depend on the arrangement of these habitats within a parcel. Cameras should be installed ~50 cm from the ground, where possible secured to a tree (or equivalent) using a cable lock. The camera lens should be directed at a bait station containing a mixture of rolled oats, peanut butter and golden syrup. The exact distance between the bait station and camera will depend on the camera model, but it is typically 2-3 m. Camera should be set to operate for a 21 day survey period and to take photos day and night. Vegetation should be trimmed between the camera and bait station and one metre behind the bait station to provide a clear frame of view. The trimmed patch should form a triangle so that the area cleared is about one metre either side of the bait station. Care should be taken to avoid permanently damaging sensitive native vegetation. The camera should record a photo of an information sheet containing a unique identifier, date, location and name of the installer. The camera location should also be recorded with a GPS unit. At camera collection the camera should be triggered to check if it is still working and this status should be recorded. Photos should be examined by experienced observers and all animals recorded to species level. If this is not possible the next highest classification should be used (e.g. *Sminthopsis* sp.).

Call recognition and spotlighting (amphibians)

Frog surveys are to be performed after dusk, at sites representative of the different aquatic or damp-land habitats present on each land parcel. The minimum size is 3 ha of wetland (including numerous smaller wetlands in a cluster). At each site surveyed an initial identification of frogs based on call will be performed during a five minute listening period, followed by a spotlight survey for frogs within and around the habitat. Each wetland or cluster selected for survey should be visited three times per season.

Diurnal survey (reptiles)

Visual observation for reptiles should be undertaken in habitats difficult to survey adequately with tiles and ground level surveys (e.g. steep rocky slopes). Binoculars can be used to aid identification. The precise methodology employed at any given site will be governed by habitat characteristics but may include observation from a sedentary position or by slowly moving and scanning the habitat.

Diurnal survey (birds)

Diurnal bird surveys should be conducted by an experienced observer in spring. In larger parcels (>100 ha) the observer should walk the entire property along transects 200-250 m apart. Properties can be separated into sub-units (e.g. paddocks) to make surveys easier, but the data will be aggregated and reported at the parcel level. Habitats such as escarpments, treed areas and wetlands should be targeted separately as these are likely to support different bird species. The species and number of all birds seen and heard should be recorded as either on-site or within 250 m of the site boundary if in habitat similar to that on the property (the latter must be clearly noted as being in the proximity and likely to use the property, rather than confirmed for the property).

Spotlighting (Plains-wanderer)

Areas to be surveyed should be assessed during the day to determine where the potentially suitable habitat for Plains-wanderers occurs. Potentially suitable habitat includes any areas with a sparse covering of native herbs and grasses, with no trees in close proximity. Unsuitable habitat that need not be surveyed includes woody vegetation, dense grass, crops and bare ground. Only the western growth corridor and the WGR should be considered for Plains-wanderer surveys. Poles with reflective tape affixed to them should be used to delineate the boundaries of the suitable habitat and transect lines 25 m apart established during the day. At night, the transects should be surveyed either by vehicle (travelling at less than 5 kmh⁻¹, only in areas appropriate for driving) or foot (rocky areas and in higher quality native grasslands) covering a 12.5 metre wide area each side of the transect line with the beam of a spotlight. Plains-wanderer and any incidental observations of other animals should be recorded.

Call playback (nocturnal birds)

Pre-recorded territorial calls should be broadcast at ~ 110% of natural volume to elicit an audible or visible response from owls. A listening period (2 mins) should be conducted immediately after playback whilst a spotlighting search (15 min) is conducted to search for owls that have responded by flying quietly to the playback site. If conducting simultaneous surveys for other owl species, the playback sequence may include calls of these species punctuated with listening periods between each species. Incidental observations of other animals (e.g. arboreal mammals) should also be recorded.

Bat detectors

Potential flyways and habitat should be identified including large trees, tree hollows, rocky outcrops with openings and depth, steep sidings and gullies. Install bat recorders (AnaBat) at these locations. The location of each detector should be recorded using a GPS unit. Bat detectors should be left in place for five nights, and set so that they turn on before dusk and turn off after dawn. Call identification should be undertaken using the appropriate software (AnaScheme)

Spotlighting (arboreal mammals)

A nocturnal/post dusk survey of each suitable habitat type should be performed using a strong spotlight/torch to visually search the habitat using eye-shine, motion and sound to detect target taxa. Incidental observations of non-target taxa (e.g. owls) should also be recorded. Time spent at a site will depend on habitat area, habitat complexity and ability to freely traverse the habitat on foot.

Area search (Golden Sun Moth)

Surveys for Golden Sun Moth should be conducted during the male flight season (November – January) Surveys should be conducted between 11am and 3pm, with temperatures 20-35°C, cloud cover < 25% and light winds. The local weather conditions at the time of survey should be recorded (temperature, wind

speed and direction, cloud cover). Surveys will be undertaken in 400 x 400m (8 ha) plots (excluding states 'De-rocked Grassland and 'De-rocked nutrient-enriched pasture'). In each plot, transects will be established 20 m apart and searched for moths. Searching should continue until one individual has been detected or the whole plot searched.

Vacuum sampling

Vacuum sampling is to be conducted at the same locations as the 20 x 20 m grassland and woodland sampling plots (described in the MRF, DELWP 2015). Some properties in the WGR will not have a plot assigned to them (e.g. if they are small), and these properties will not be sampled for spiders. In each plot, three 1m wide belt transects (with western edges 5, 10 and 15 m from the western edge of the plot) should be walked and the invertebrates sampled using a vacuum sampling device moved in a sweeping motion. At the end of each transect, all spiders collected should be transferred to a labelled sample jar containing 100% ethanol (i.e. 3 separate jars per plot), labelled with reference to the plot number. The transects do not need to be permanently marked.

Pit-fall traps

Pit fall traps will be co-located with the 20 x 20 m grassland and woodland sampling plots (described in the MRF, DELWP 2015). Ten traps will be located at each plot, set up in two lines of 5 traps 1m from the outside western and eastern edges of the plot (to ensure the plots are not disturbed). Each trap should consist of two disposable plastic drinking cups (one inside the other) buried in the ground, with the ground smoothed to make a flat surface to the edge of the cup. The cups should contain a small amount of propylene glycol preservative (used because it does not evaporate). Traps should be left in place for four nights and the samples collected after this time. All spiders, centipedes and scorpions collected should be put into a labelled sample jar containing 100% ethanol; each trap should have a separate jar, labelled with reference to the plot number. The trap lines do not need to be permanently marked.

Incidental observations

Any species recorded incidentally over the course of the survey period for each land parcel should be added to the inventory if the taxon was not recorded as part of the formal survey.

Guidelines: Property management history

The history of a property is very important to future land managers. It may help managers understand the temporal dynamics of the ecosystem they are managing, by providing good time-series data, and understand the opportunities and constraints for recovery or restoration.

Interviews

The owners of freehold land often know a great deal about their property, and retain a great deal of information which may be lost when land changes hands. To help retain and transfer this information, the most recent former land manager should be contacted immediately after acquisition, and an interview requested. No payment should be offered. If the manager agrees, the interview should be recorded and transcribed later.

If the previous owners cannot be contacted, or refuse to be interviewed, no interview should be conducted and this should be explained in the report. If an interview is granted, it should be conducted using the structured approach described below.

With the help of the former manager, a large-format property map or aerial photograph should be annotated with all paddock or management unit boundaries and any key features that need to be spatially referenced (dams, fences, buildings, etc.). Every land management unit (as conceived by the manager) should be named (using the former landowner's paddock names, if they exist) or numbered.

For each management unit (paddock), the following information should be recorded if it is known. It is acknowledged that in many cases this information will be only partly known:

- Has the area been ploughed / cropped, within landowner's memory / knowledge? (Yes / no)
 - *If yes-*
- When was the first ploughing or de-rocking? (record year).
- When was the most recent ploughing? (record precise date, or year if date unknown).
- For every year within the manager's memory, the following information should be recorded in as much detail as possible:
 - Crop or rest?
 - Type of crop? (barley, wheat, canola, etc.).
 - Fertiliser application? (yes / no)
 - Which fertilizer was applied and at what rate? (record Brand name and rate)

- Has the area been grazed, within landowner's memory / knowledge? (Yes / no)
 - *If yes-*
- When was the most recent grazing? (record precise date, or year if date unknown).
- What type of stock mostly grazed the area over the last 5 years of grazing (cattle, sheep, etc.).
- What stocking rate was "normal" over the last 5 years of grazing? (rate in any units familiar to the manager).
- What type of stock mostly grazed the area before the last 5 years of grazing (cattle, sheep, etc.).
- What stocking rate was "normal" before the last 5 years of grazing? (rate in any units familiar to the manager).
- For every year within the manager's memory, the following information should be recorded in as much detail as possible:

- Was pasture sown? (yes or no).
 - What was sown? (grasses, legumes, etc.).
 - Fertilizer application? (yes or no).
 - Which fertilizer was applied and at what rate? (record Brand name and rate).
- Has the area been subject to chemical weed control? (Yes / no):
 - *If yes-*
 - List the dates that aerial spraying has been undertaken (if any).
 - List the dates that boom spraying has been undertaken (if any).
 - List the dates that spot spraying has been undertaken (if any).
 - For each spraying action, document whether the control was undertaken or funded by the landholder, or a government agency.
 - For each spraying action, document the target weed species.
 - For each spraying action, document the herbicide used, and the rate applied.
 - Has the area ever been subject to a notice under the *CaLP Act 1994*?
- Have rabbits ever been controlled in the area? (Yes / no):
 - *If yes-*
 - Record the locations of any warrens, and the means which were used to destroy them.

For the whole property, information on fire history should be recorded.

- Draw in all known fire boundaries with as much accuracy as possible.
- Record the date of all fires (year if date not known).
- Record the type of each fire (wildfire, controlled burn by landholder, controlled burn by CFA, etc.)

The following questions may also be posed to the previous landholder, if considered appropriate and relevant. All information should be spatially referenced on the property map, if appropriate.

- How long have you or your family managed the property?
- Can you recall the dates of construction of the buildings / fences / dams / wind-breaks on the property?
- Do you remember any native trees that once grew on the property, but are now gone?
- Have you ever seen any unusual animals on the property?
- Have you ever seen any unusual plants on the property?
- Are you aware of any aboriginal sites on the property?
- Have you ever found any unexploded bombs or other military debris? (This question is particularly relevant to those large areas of the southern portion of the Western Grassland Reserve known to have been used for Royal Australian Air Force bombing training in the 1940s).
- Do you have any stories related to the property that may be of general interest?

Inventory proposal

Before inventory surveys commence, an 'inventory proposal' must be produced, and approved by DELWP's Melbourne Strategic Assessment ecological group. That brief document should detail how the guidelines presented here will be implemented on a specific Conservation Area (or property). It should detail which species groups will be targeted, based on the guidance provided in Table 1. It should detail the intensity of each survey technique, including the time spent (e.g. for plant surveys) and the numbers of survey sites (e.g. tile grids). It should also show the proposed locations of all activities. It is acknowledged that some inventory data (e.g. locations of states) is required before final decisions regarding plot location can be made. The inventory proposal template is provided as Appendix 4.

Reporting

Vegetation inventory report

The vegetation inventory report should use the standard template and contain the following elements:

- Introduction, including:
 - The purpose and constraints of the inventory.
 - A description of the study area (location, name and extent), including details of any internal paddocks with their names.
 - Descriptions and full citations of all known previous surveys.

- Methods, including:
 - A list of all dates the property was visited and an estimate of the total survey effort.
 - Definitions of terms and categories used, including definitions of significance, native vegetation, etc.
 - The dates of land use history interviews and the association of the person (or people) interviewed with the property (manager? owner? length of knowledge?).
 - A copy of the questions discussed in the interview.

- Results, itemizing:
 - EPBC-listed communities identified, noting their extent (in hectares) and a brief description of their composition and condition.
 - EPBC-listed species identified, noting their extent, their population size and the nature of their habitat.
 - FFG-listed communities identified, noting their extent (in hectares) and a brief description of their composition and condition.
 - FFG-listed species identified, noting their extent, their population size and the nature of their habitat.
 - Victoria's Advisory List of Rare or Threatened plants (VROT's)(DEPI, 2014b)
 - Vegetation patterns- EVCs, described according to the EVCs identified (pre-1750 and current). A brief description and indication of extent (in hectares) of each EVC as it is expressed on the site should be included.
 - Vegetation patterns – NTG or GEW states, noting their extent (in hectares) and a brief description of their composition and condition.

- Plant species identified, including an indication of the total number, and the proportion of which are native. Significant native and exotic species (defined above) should be tabulated, with comments on their extent and abundance.
- Any 'hot spots' identified by DELWP.
- A summary of the interview, itemizing
 - Grazing history of each paddock.
 - *Cropping history of each paddock.*
 - Fire history of each paddock.
 - Weed control history of each paddock.
 - Reporting any anecdotes or stories relevant to the property.

- A list of all vascular plant species, acknowledging which species are known only from other surveys, with some indication (estimate) of how abundant each species is within relevant habitats (EVCs, EPBC-communities, and/or states, as appropriate). See Appendix 1.

Maps must be included which show the following ecological information:

- The boundary of the reserve (or study area)
- Vegetation map showing the extent of native / non-native vegetation.
- Vegetation map showing the coverage of EVCs, pre-1750 and currently.
- Vegetation map showing the 'state' of all NTG or GEW vegetation.
- Point locations of all significant native plant species.
- Point locations of all high threat weeds (except those that are too widespread to show).
- Map showing the locations of any 'hot spots'.

Maps must be included which show the following information from the interviews, where it is known. In cases where boundaries are uncertain, this should be annotated on the maps:

- The extent of all known distinct cropping regimes.
- The extent of all known distinct burning regimes (i.e. the boundaries of all wild fires and management burns)
- The locations of all past weed control activities.
- The locations of all buildings / infrastructure of interest, with any information about their history (e.g. date of construction).
- The locations of any other points of interest.
- The extent of all known distinct grazing regimes.

These maps may be separate, or combined in any way that is convenient and shows the information clearly.

Fauna inventory report

The vegetation inventory report should contain the following elements:

- Introduction, including:
 - The purpose and constraints of the inventory.
 - A description of the study area (location, name and extent), including details of any internal paddocks with their names.
 - Descriptions and full citations of all known previous surveys.

- Methods, including:
 - A description of how the guidance about the techniques and intensity described in this document were interpreted for the property.
 - A list of all dates the property was visited and an estimate of the total survey effort.
 - Definitions of terms and categories used, including definitions of significance, etc.
 - Descriptions of the weather at the time of Golden Sun Moth surveys.
- Results, itemizing:
 - EPBC-listed species identified, with any relevant qualitative notes about their abundance and habitat usage.
 - FFG-listed species identified, with any relevant qualitative notes about their abundance and habitat usage.
 - Victoria’s Rare or Threatened Vertebrate fauna (DSE, 2013)
 - Victoria’s Rare or Threatened Invertebrate fauna (DSE, 2009)
- A list of all relevant species, acknowledging which species are known only from other surveys, with some qualitative comment (only where appropriate or able to be estimated) of how abundant each species is within relevant habitats (EVCs, or states).

Maps must be included which show the following information:

- The locations of all tile grids
- Point locations of all significant reptile observations (including tile grids and records from rock rolling, etc.)
- Point locations of all significant mammal observations (including tile grids and records from rock rolling, etc.)
- Point locations of all significant bird observations that are not observations of merely transient behavior.
- Point locations of all spider sampling plots.
- Locations of all Plains-wanderer transects.
- Point location of remote cameras.
- Point location of bat detectors.
- Areas surveyed with active searches (as points or polygons) (e.g. rock rolling)

These maps may be separate, or combined in any way that is convenient and shows the information clearly.

Data management and storage

A combination of existing and built for purpose processes and systems will be used to manage and store inventory data and property management history. These include:

Victorian Biodiversity Atlas (VBA) – VBA is a web-based information system used to manage flora and fauna species information across Victoria. All species survey data relevant Conservation Area inventories will be stored and managed in the VBA.

Native Vegetation Information System (NVIM) – NVIM is web-based system used for the management of native vegetation information and projects. An initial version of the system is in use, and is in development to expand to support additional processes and data management for the MSA. Important native vegetation mapping and assessment data and information products will be stored on NVIM.

MSA program files – Records for the MSA will be managed in line with the Department’s Records Management Policy which complies with legislative obligations relating to public records under the *Public Records Act (Vic) 1973*.

All vegetation mapping and assessment data or records of significant flora and fauna data will be submitted to the MSA Ecological Program Team, or directly to the VBA, using the following templates (Table 3).

Table 3: DELWP data collection templates for inventory surveys

Template	Template Name	Template type	Description
Conservation Area Vegetation Inventory Survey Template	Conservation Area Vegetation Inventory Template.shp	Polygon shapefile	Maps the distribution of native vegetation, non native vegetation, historic and current EVCs, EPBC-listed ecological communities (incl. NTG, SHW and GEW) as well as their relative ‘states’ and any ‘hot spots’ where biological values are concentrated and which should receive particular management focus
VBA batch upload template- Flora	VBA template – Flora – data entry v3.0.8non-macro	Excel database	Excel template to enter batches of flora data in to VBA
VBA batch upload template- Fauna	VBA template – TF – upload v3.0.8non-macro	Excel database	Excel template to enter batches of flora data in to VBA
^Guidelines – Property management history	^Guidelines – Property management history	Word file	Guideline for conducting landowner interviews using a standard set of questions to collect the required management history information

^This template is provided on page 15-16 of this document: Conservation Area Inventory Guidelines (DELWP 2015)

Data requirements for Native Vegetation Information System (NVIM) and MSA Program Files

Geographic Information System (GIS) spatial data will be supplied as an ESRI polygon shapefile using GDA94 datum and VicGrid94 projection. Native vegetation spatial data will be stored within a GIS database managed by DELWP, whereas native vegetation information products (e.g. Vegetation/ Fauna Inventory Reports) will be stored on NVIM.

Information on the property management history will be stored as digital reports on MSA program files.

Data requirements for Victorian Biodiversity Atlas (VBA)

Flora and fauna species data will comply with VBA standards, which can be accessed from the DELWP website at <http://www.depi.vic.gov.au/environment-and-wildlife/biodiversity/victorian-biodiversity-atlas/vba-further-information> or by contacting VBA.help@delwp.vic.gov.au.

All species records will be associated with a Project ID. Projects are structured data, typically survey based with one or more surveys grouped together, and can include instances where additional detail about the individual species is recorded. Each individual property (within the Western Grassland Reserve) or Conservation Area will be designated as a Project for the purpose of storing and managing inventory data.

Significant flora and fauna species records (refer to page 4 and 9) will be submitted to the VBA, as follows:

- Species lists appended to a Project polygon, including:
 - Complete vascular plant list with BB2 abundance estimates
 - Complete bird list with count estimates from all survey sources
 - Complete reptile and amphibian list compiled from all survey sources
 - Complete bat list taken from all bat-detector results
 - Complete mammal list compiled from all survey sources
 - Complete spider and insect list from vacuum sampling, pit-fall traps and GSM area searches

- Point locations of all significant flora (native species and weeds) for a Project – this comprises incidental records of accurate plants locations added as sites within a Project. All records for EPBC- or FFG- listed species will be recorded. All other significant flora records will be summarised to prevent too many records of common species (e.g. one record of common weeds per paddock, clusters of species relevant for management represented by a single point)

- Point locations with survey times and dates, linked to a Project, for:
 - Bat recorders
 - Remote camera
 - Roof tile grids (not individual tiles)
 - Area search plots – GSM
 - Vacuum sampling/ pit-fall trap plots (not individual traps)

- List of all fauna species recorded on individual:
 - Bat recorders
 - Remote camera – with photographs individually uploaded only for animals that are rare, unexpected or of controversial identity

- List of all fauna species, aggregated to provide a single record per grid/ plot, recorded at each:
 - Roof tile grid
 - Area search plot – GSM
 - Vacuum sampling/ pit-fall trap plot (Aachnids identified to genus or family as appropriate)

References

- Colwell, J.D. (1963). The estimation of the phosphorous requirements of wheat in southern New South Wales by soil analysis. *Australian Journal of Experimental Agriculture and Animal Husbandry*. 6: 105-120.
- Department of Environment, Land, Water and Planning (2015). Monitoring and Reporting Framework: Program Outcomes, for the Melbourne Strategic Assessment. Victorian Government Department of Environment and Primary Industries, East Melbourne, Unpublished 2014.
- Department of Environment and Primary Industries (2013a). Biodiversity Conservation Strategy for Melbourne's Growth Corridors. Victorian Government Department of Environment and Primary Industries, East Melbourne, May 2013.
- Department of Environment and Primary Industries (2013b). Permitted Clearing of native vegetation: Biodiversity assessment guidelines. Victorian Government Department of Environment and Primary Industries, East Melbourne, September 2013.
- Department of Environment and Primary Industries (2014b). Advisory list of rare or threatened plants in Victoria. Victorian Government Department of Environment and Primary Industries, East Melbourne, 2014.
- Department of Sustainability and Environment (2009). Advisory List of Threatened Invertebrate Fauna in Victoria. Victorian Government Department of Sustainability and Environment, East Melbourne, 2009.
- Department of Sustainability and Environment (2013). Advisory List of Threatened Vertebrate Fauna in Victoria. Victorian Government Department of Sustainability and Environment, East Melbourne, 2013.
- Department of Sustainability, Environment, Water, Population and Communities (2011). Nationally Threatened Ecological Communities of the Victorian Volcanic Plain: Natural Temperate Grassland & Grassy Eucalypt Woodland. A guide to the identification, assessment and management of nationally threatened ecological communities Environment Protection and Biodiversity Conservation Act 1999. Department of Sustainability, Environment, Water, Population and Communities, Canberra, ACT.
- Threatened Species Scientific Committee (2012). Advice to the Minister for Sustainability, Environment, Water, Population and Communities from the Threatened Species Scientific Committee (the Committee) on an Amendment to the List of Threatened Ecological Communities under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act): Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains. Threatened Species Scientific Committee.

Appendix 1: List of vascular plants identified

The following outlines the format for reporting all vascular plants recorded. All vascular plants should be recorded by habitat. This includes the community, EVC and where a State and Transition model for the community exists, the state of the habitat. For example:

- NTG (C3G) (Natural Temperate Grassland / Plains Grassland in state 'C3 grassland')
- NTG (TG) (Natural Temperate Grassland / Plains Grassland in state 'Themeda grassland')
- SHW (Seasonal Herbaceous Wetlands / Plains Grassy Wetland)
- SKS (Stony Knoll Shrubland)
- Etc.

A distinction should also be made between habitats that are considered native versus non-native vegetation.

The significance of each species should be rated using the following categories:

- EPBC: EPBC listed (see main text for discussion of species in this category)
- e VROT: Endangered in Victoria.
- v: VROT: Vulnerable in Victoria.
- r: VROT: Rare in Victoria.
- k: VROT: Poorly known in Victoria.
- SP: CaLP listed: State Prohibited weed.
- RP: CaLP listed: Regionally Prohibited weed.
- RC: CaLP listed: Regionally Controlled weed.
- Res: CaLP listed: Restricted weed.

Cover categories should use Mueller-Dombois & Ellenberg (1974) to describe the observed abundance / distribution of each species in each vegetation type *in the survey area*. They make no reference to the status of the species outside the study area (see Assignment of conservation status and significance, above):

- r Solitary (or at least exceedingly rare)
- + Few individuals, <5% cover
- 1 Numerous or scattered, <5% cover
- 2 5-25% cover
- 3 25-50% cover
- 4 50-75% cover
- 5 >75% cover

Species where the record is doubtful should be marked with an ?. The location of the ? denotes the level of uncertainty. Species with a ? before their generic names are of doubtful occurrence; often because they have been reported by other observers without supporting specimens or photographs. Species marked with a ? before their specific or subspecific names are of doubtful identity, usually because mature material could not be obtained that displayed all of the characters required for positive identification.

		Species name														
		Status / Significance														
		Habitat (Community, EVC, State)														
		Habitat (Community, EVC, State)														
		Habitat (Community, EVC, State)														
		Habitat (Community, EVC, State)														
		Habitat (Community, EVC, State)														
		Habitat (Community, EVC, State)														
		Habitat (Community, EVC, State)														
		Habitat (Community, EVC, State)														
		Habitat (Community, EVC, State)														
		Habitat (Community, EVC, State)														
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		Habitat (Community, EVC, State)														
		Habitat (Community, EVC, State)														
		Habitat (Community, EVC, State)														
		Habitat (Community, EVC, State)														
		Habitat (Community, EVC, State)														
		Habitat (Community, EVC, State)														
NATIVE																
MONCOTS																
FAMILY	<i>SPECIES</i>	e		1				r	+							
FAMILY	<i>SPECIES</i>								?		1				r	+
	<i>SPECIES</i>	r						r	+		?					+
INTRODUCED																
DICOT																
FAMILY	<i>SPECIES</i>			+	1											

Appendix 2: High Nutrient Weeds

They were compiled from several sources:

- Dorrough *et al.* (2006)
- Dorrough and Scroggie (2008)
- The data in McIntyre and Dorrough (unpublished)
- The expert advice of the TAG
- Anecdotal field observations of species which occur in sites that have probably been fertilised.

The list may be changed when real site data allow us to link species patterns to soil nutrient measures on the Werribee Plains.

'High-nutrient weeds'

Species marked # are supported in some way by the literature, the remainder are based only on anecdotal observation.

Introduced dicotyledons	Introduced monocotyledons
Brassicaceae spp.#	<i>Bromus</i> spp.#
<i>Arctotheca calendula</i> #	<i>Hordeum</i> spp.#
<i>Carduus tenuiflorus</i> #	<i>Lolium</i> spp.#
<i>Carthamus lanatus</i> #	<i>Poa annua</i> #
<i>Cirsium vulgare</i> #	<i>Vulpia</i> spp.#
<i>Cynaria cardunculus</i>	
<i>Echium</i> spp.	
<i>Erodium</i> spp.#	
<i>Leontodon taraxacoides</i> #	
<i>Polygonum</i> spp.#	
<i>Malva</i> spp.#	
<i>Marrubium vulgare</i>	
<i>Medicago</i> spp.#	
<i>Plantago lanceolata</i>	
<i>Rumex</i> spp.#	
<i>Salvia</i> spp.	
<i>Trifolium</i> spp.# (other than <i>T. campestre</i>)	

Appendix 3: Sensitive Native Herbs

Sensitive native herbs tend to be lost from sites that are regularly grazed over long periods (decades). They include species that are highly palatable and are removed by selective grazing, and/or species that compete poorly in nutrient-enriched pastures.

Compiled from published sources (Stuwe and Parsons 1977, Lunt and Morgan 1999, Vesk and Westoby 2001, Lunt 2003, Rawlings et al. 2010; species marked # supported by quantitative data), unpublished data (Dorrrough, unpubl.) anecdotal observations in Recovery Plans and Action Statements, and the opinions of the authors. Grasses, sedges and rushes are excluded, as are annuals and ruderals.

Native dicotyledons		Native monocotyledons and ferns
<i>Acaena</i> spp.#	<i>Linum marginale</i> #	Any Orchidaceae #
<i>Asperula</i> spp.#	<i>Lotus australis</i>	Any Liliaceae#
<i>Brachyscome</i> spp.	<i>Microseris</i> spp.#	Any Ferns or Fern-allies
<i>Calocephalus citreus</i> #	<i>Minuria leptophylla</i>	<i>Anthosachne</i> spp. #
<i>Calotis</i> spp.	<i>Pelargonium</i> spp.#	<i>Dichelachne</i> spp.#
<i>Chrysocephalum</i> spp.	<i>Pimelea</i> spp.	<i>Lomandra</i> spp.#
<i>Comesperma polygaloides</i>	<i>Plantago</i> spp.	<i>Poa</i> spp.#
<i>Craspedia</i> spp.	<i>Podolepis</i> spp.	<i>Schoenus apogon</i> #
<i>Cymbonotus</i> spp.	<i>Ptilotus</i> spp.#	
<i>Cynoglossum suaveolens</i> #	<i>Pycnosorus chrysanthes</i>	
<i>Drosera</i> spp.#	<i>Rutidosis leptorhynchoides</i> #	
<i>Eryngium ovinum</i> #	<i>Senecio macrocarpus</i> #	
<i>Geranium</i> spp.#	<i>Senecio squarrosus</i>	
<i>Goodenia</i> spp.	<i>Siloxerus multiflorus</i>	
<i>Haloragis</i> spp.#	<i>Spergularia</i> spp.	
<i>Hyalosperma demissum</i>	<i>Stackhousia subterranea</i> #	
<i>Isoetopsis graminifolia</i>	<i>Velleia paradoxa</i>	
<i>Leucochrysum albicans</i>	<i>Veronica gracilis</i> #	
<i>Leptorhychos squamatus</i> #		

Appendix 4: Inventory Proposal Template

Property information

The approach taken to survey each area depends on its size and the arrangement and complexity of vegetation and habitats that it supports. A summary of the property/s to be surveyed should be provided with reference to the attributes that influence the survey approach. This information will be compiled from aerial photograph interpretation and potential rapid site checks.

Table 1. The assets currently anticipated to be present on each unsurveyed property. All numerical values are approximate.

Attribute	Property Name	Property Name	Property Name	Property Name	Property Name	Property Name
NTG	1.5 ha	20 ha	1.5 ha	-	100 ha	3 ha
SHW	-	None, but gilgai plains present	-	-	1 ha	-
GEW	-	-	-	-	-	-
Expected complexity / richness of vegetation	Low	High	High	Moderate	Moderate	Moderate
Dams or riparian areas	-	-	-	-	-	-
Natural Woody vegetation	-	Scattered wattles	-	Scattered wattles.	Few wattles	-
Introduced woody vegetation	Woody weeds (minor)	Planted Trees, Woody weeds	Planted Trees	Woody weeds	Planted trees	Planted trees
Stony rises	-	~30%	-	-	~1%	~10%
Areas concealed from public view	Yes	Yes	No	Yes	Yes	Yes

Vegetation inventory surveys

For each parcel, the inventory surveys will:

- Map the distribution of all native and non-native vegetation,
- Map the historic (pre-1750) distribution of Ecological Vegetation Classes (EVCs),
- Map the existing distribution of EVCs,
- Identify and map the distribution of all EPBC-listed ecological communities,
- Assign all present or former areas of NTG or GEW to a 'state',
- Identify and map the distribution of any significant native vascular plant species (EPBC-listed, FFG-listed, VROT, locally significant),
- Identify and map the distribution of all weed species of concern (those listed under the CaLP Act, and any other species which presents a threat and requires important management attention),
- Identify and map any subjectively-defined 'hot spots' where biological values are concentrated, and which should receive particular management focus,
- List all the vascular plant species present in the survey area, and note their approximate abundance.

With reference to the attributes that influence the survey approach (table above) and the survey intensity described in these guidelines an expected survey intensity and time-frame required to adequately cover each area should be provided as below.

Table 2. Proposed survey effort for vegetation inventory surveys.

Area	Number of full survey days	Likely months of survey
Property Name	2	August, December
Property Name	3	August, September, November, December
Property Name	3	September, November, December
Property Name	2	September, November
Property Name	4	August, September, November, December
Property Name	3	August, November, December
Total	17	

Fauna inventory surveys

As described in these guidelines only some animal groups will be targeted for survey. It is necessary to decide which groups are worth pursuing in a given area (i.e. which survey techniques are to be implemented). This will vary depending on the attributes of the property. Groups may be excluded from survey at a given location for the following reasons:

- Their known habitat is absent (e.g. trees for arboreal mammals),
- The site (or relevant patches) is deemed too small to support a population of the relevant group which can be effectively managed through interventions at the site (e.g. It is assumed that the 1.6 ha Truganina Cemetery cannot be reasonably managed to benefit owls).
- The level of disturbance that would be required for sampling is unacceptable (e.g. laying tile grids or digging pitfall traps at a small and important site such as Truganina cemetery)
- The equipment required would be insecure in the context (e.g. cameras at urban interface)
- Previous recent surveys (<5 years) have already provided adequate data.

Information should be provided on which survey techniques are considered appropriate in each area, and the intensity at which they will be applied for the survey area.

Table 3. Proposed survey types to be applied in each area, given their attributes.

Survey type	Sewells Road	Kalkallo Common	Truganina cemetery	Clyde-Tooradin	Little Raven	Magpie	Likely months of survey
Roof tiles (general)	1 grid (elongated)	4 grids: 2 <i>Rocky rise</i> 1 <i>Gilgai plain</i>	No (insecure)	1 grid (elongated)	4 grids: 2 <i>North paddock</i> ¹ 2 <i>South paddock</i>	5 grids: 3 <i>Rocky rises</i> 2 <i>Former cropland</i>	Sept - Apr
Rooftiles (SLL)	No	1 grid	No	No	2 grids	1 grids	Sept-Dec
Rock rolling	1 visit	2 visits	No	No	2 visits	2 visits	Sept - Apr
General Observation	1 visit	2 visits	1 visit	1 visit	2 visits	2 visits	Sept - Apr
Remote cameras	1 camera	2 cameras	No	1 camera	2 cameras	2 cameras	Feb - Mar
Spotlighting - Amphibians	No	No	No	1 visit	1 visit (if SHW wet)	No	Oct - Dec
Counts – Diurnal birds	yes	yes	yes	yes	yes	yes	Sept – Dec
Spotlighting – Plains-wanderer	No	No	No	No	No	No	NA
Call-playback	No	No	No	No	1 visit	1 visit	Nov - Dec
Bat detectors	1 detector	1 detector	No	1 detector	2 detectors	2 detectors	Feb - Mar
Vacuum sampling	No	No	No	No	Yes	Yes	Nov -Dec
Invertebrate Pitfall traps	1 plot	1 plot	No	No	3 plots	2 plots	Nov -Dec
Spotlighting - Arboreal mammals	No	No	No	No	No	No	NA
Golden Sun Moth Area search	No	1 plot	No	No	1 plot	1 plot	Nov -Jan

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