Acknowledgements
Matt White, Arthur Rylah Institute for Environmental Research

Author
Arn Tolsma, Arthur Rylah Institute for Environmental Research
Jamie Molloy. Project Manager Forest Protection Survey Program

Photo credit
Cover photo: Jim Reside Wildlife Unlimited 2018

© The State of Victoria Department of Environment, Land, Water and Planning 2018

This work is licensed under a Creative Commons Attribution 4.0 International licence. You are free to re-use the work under that licence, on the condition that you credit the State of Victoria as author. The licence does not apply to any images, photographs or branding, including the Victorian Coat of Arms, the Victorian Government logo and the Department of Environment, Land, Water and Planning (DELWP) logo. To view a copy of this licence, visit http://creativecommons.org/licenses/by/4.0/

Disclaimer
This publication may be of assistance to you but the State of Victoria and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.

Accessibility
If you would like to receive this publication in an alternative format, please telephone the DELWP Customer Service Centre on 136186, email customer.service@delwp.vic.gov.au, or via the National Relay Service on 133 677 www.relayservice.com.au. This document is also available on the internet at www.delwp.vic.gov.au.
Survey Guideline – Flora Survey

1. Context .......................................................................................................................... 2
2. Objectives ....................................................................................................................... 2
3. Survey effort .................................................................................................................... 2
4. Staff requirements ......................................................................................................... 3
5. Equipment for the technique .......................................................................................... 3
6. Survey preparation ......................................................................................................... 3
7. Upon arrival at site ......................................................................................................... 4
8. Conducting the survey .................................................................................................... 4
9. Vegetation Observations ................................................................................................. 6
10. Data reporting requirements .......................................................................................... 8
Survey Guideline – Flora Survey

1. Context

Flora surveys are conducted to find identifiable flora species that require protection on timber harvesting coupes. Many of the 325 flora species listed in the Code of Practice for Timber Production 2014 (the Code) are very cryptic or are quite unlikely to be detectable on coupes e.g. many orchids. The list in the Code of 325 species are the principle target species for survey. The list has been analysed and a short list of around 75 species that have the highest likelihood of detection is also provided to further help focus survey effort on the most detectable species.

In addition to recording target species listed in the Code, contractors are required to record any flora species of interest, and to map vegetation communities of interest. These may include:

- species that are known to be rare or threatened but may not be on the list of target species
- species that are at the very edge of their known range or that may constitute a new discretely disjunct population
- species that are previously unrecorded in Victoria
- other species and vegetation communities that the botanist considers to be of particular interest that may require protection from disturbance

Contractors are required to be cognizant of the broad habitat requirements of all flora species listed in the Code or of interest, that potentially occur on or adjacent to coupes, prior to commencing field surveys.

A prioritisation process assists with the selection of which coupes to survey for which flora species. Inputs to this process include the detection probability of target species and habitat distribution models. Habitat distribution models have been generated that predict the likelihood of each prescribed species being found in a coupe. Note that only the 325 flora species that have a prescription in the Code are considered in the prioritisation process.

In addition to conducting flora surveys for target species and vegetation communities, Contractors are required to conduct at least one 20x20m quadrat in each coupe surveyed.

Contractors are also required to record target vegetation communities and selected habitat features outlined in this guideline.

2. Objectives

To detect and record target flora species within, and adjacent to, identified coupes, that are able to be positively identified.

To record target vegetation observations within and adjacent to coupes e.g. quadrats.

To record habitat features of coupes including presence or absence of hollow bearing trees, trees >2.5m DBH.

To collect specimens for later confirmation of identification or to submit as a specimen to a herbarium.

3. Survey effort

Survey effort shall include:

- conducting a desktop assessment prior to field survey as described below, to identify likely or unlikely presence of target species and vegetation communities on a coupe.
- Using the desktop assessment to determine likely habitat areas for the target species expected to be on the coupe. This will provide information as to where to focus survey effort on the coupe.
- Conducting active searching on a coupe for target species. It is expected that field survey will take between one to two days per every 30 hectares on average and depending on number of target species, access and size of coupe.
- For each target species likely to be found in the coupe, checking their preferred habitat (i.e., rocky outcrop, wet drainage line etc.) on the coupe.
- Conducting at least one quadrat on each coupe as described below.
• Collecting specimens for later confirmation of identification or for lodging of type specimens of unusual finds at the Herbarium.

• Vigilantly searching each coupe for target vegetation communities and recording sufficient information to determine whether a prescription trigger is met e.g. basal area, population extent etc, as determined by the prescription in the Code.

• Recording of habitat vegetative features that may trigger a management action e.g. presence of hollow bearing trees, Trees >2.5 DBH etc

4. Staff requirements

Botanical qualifications

Extensive field flora survey experience.

Ability to collect flora voucher specimens to herbarium standards

Ability to identify the target flora species

5. Equipment for the technique

☐ Camera for recording species of interest
☐ Field data sheets or electronic recording device
☐ Site maps and aerial photos, and a search plan for the coupe
☐ Information about nearby, alternative coupes
☐ 10x hands lens
☐ Tape measure
☐ Diameter Tape
☐ Secateurs
☐ Plant tags
☐ Small paper bags/envelopes/ Voucher specimen containers
☐ Plant presses
☐ Newspaper and sheets of corrugated cardboard
☐ Pens, pencils, permanent thick black marker pen

6. Survey preparation

Observers/contractors are expected to conduct a reasonable desktop assessment of each coupe prior to commencing field survey. Desktop assessment shall consist of the following as a minimum:

• Review the prioritisation results provided to determine list of target species in each coupe

• Review the topographical location of the coupe e.g. ridge, side slope, gully etc

• Review topographical aspects (north, south etc) and consider impact on vegetation community and target species presence/absence

• Using topographic maps, EVC maps and aerial photos, Google Earth, or any other source, determine what parts of the coupe are most likely to contain the habitat for any target species. These parts of the coupe will be the priority areas to search, and may include gullies, particular aspects, sharp breaks in slope, tops of embankments etc.

• Note that areas recently burnt may also be of interest, as there may have been prolific post-fire germination, especially of uncommon obligate re-seeders.

• Review information sources to understand as much as possible of each species’ habitat requirements to predict where it may occur on a coupe if it is likely to be present at all.

• Another source of species information is DELWP NatureKit. Load a shapefile of the coupes into NatureKit, or manually draw a polygon around each area of interest, check the species records that are found within that bounded area, and determine whether any of the species are on the prescribed list.
• Some information is provided in the pre-harvest species datafile. Other sources of information include Flora of Victoria (https://vicflora.rbg.vic.gov.au), Viridans database (www.viridans.com), the Victorian Biodiversity Atlas (www.vba.vic.gov.au) etc.

7. Upon arrival at site
As per SOP, create a GPS waypoint for your parked vehicle before walking into the coupe.

8. Conducting the survey
Record and report a GPS track log for all survey work on or off coupe. GPS data are to be provided with survey results as raw GPX files.

Ensure all surveyors are familiar with the management action/prescription triggers within the Forestry Code of Practice e.g. is it a population or an individual that triggers a prescription? If the trigger or prescription is a population, then the population must be surveyed and mapped to enable decision making for application of the prescription.

Navigate to the first pre-determined priority area of interest. Keep a continual eye out for any species that stand out as looking different or are less common. If you are unsure what species a plant is, take a waypoint and a specimen, and identify it later. The rule of thumb here is, if you don’t know what it is, it is probably uncommon and should be identified and its status determined.

At the area of interest, search around to find the species likely to be there, using your pre-determined knowledge of the habitat. The plants may be on steep banks, in wet depressions, on shaded tree trunks etc. As before, always keep an eye out for less common species or ones you don’t recognise, as they might be on the prescribed list or be worth recording for other reasons of protection or interest.

If a target species or species of interest is detected, undertake a full quadrat search to capture the typical vegetation in which the species is found (see below: Additional plant data). If no target species are found, undertake a quadrant as described below.

After all pre-determined areas of interest have been searched, do a general walk-through of the coupe to see whether any prescribed (or uncommon or unknown) species are detected.

Recording species found
If a target species is confirmed (or suspected) to be a target species or species of interest, record location details at the location of the specimen as per the datasheet.

Take photos of the target species and the general habitat area in which it is found.

The extent of the population of identified target species or species of interest is to be surveyed and mapped in the field at the time of observation. To map the extent of a species population, observers are required to record a series of GPS point locations that broadly capture the perimeter of the distribution of the population within and immediately adjacent of the edge of the gross coupe boundary. Determine and record the extent of the population within the coupe and up to 50m outside the coupe boundary, recording waypoints at around minimum 25 m intervals around the perimeter of the population (where practicable). Estimate population extent where it is not practicable to map on ground. Population extent data are to be reported as a GIS polygon or polyline shapefile and shall be linked to the species observation in the datasheet.

Make a note on the estimated number of individuals of the population, size of individuals, degree of reproductive maturity, and the habitat in which found etc.

If further work is required to identify an individual to species level, then take and label a plant specimen for later confirmation of identification.

Plant specimens
Plant specimens may be taken for the purpose of later identification or for lodging a specimen at an herbarium. Specimens may also be offered to the Herbarium at the Arthur Rylah Institute Ph: 03 9450 8600

The procedure and requirements for collection of information relating to the taking of plant specimens for lodging in a herbarium are to be consistent with the information provided on the Royal Botanic Gardens website https://www.rbg.vic.gov.au/science/herbarium-and-resources/national-herbarium-of-victoria, under ‘Science’, then ‘Herbarium & Resources’. This includes information on collection and storage, how to press, what material are needed, what to put on the label etc. The guidelines also include information about their (for fee) plant identification service.

Essential label information
• Collector(s) name.
• A unique collecting number. The simplest system is for each collector to commence their numbering sequence with the number 1, and number their collections consecutively.
• Date of collection: e.g. 10 March 2019.
• Locality: place/area name, location name (could be coupe ID/name), description of location in reference to roads, road junctions and distance from nearest place/town name (e.g. Victoria, Errinundra Plateau. The Gap Scenic Reserve, Gap Rd, 3.9 km E of junction with Bonang Highway).
• Geocode: a latitude and longitude, MGA (Map Grid of Australia) coordinates or street directory reference (include the edition). It is helpful to indicate the source of the geocode, such as GPS or map, and the precision of the geocode (is it to the nearest 100 m, 1 km etc.). Also record the datum used.

Other useful label information

Note any information on characters and field observations that cannot be observed from the pressed specimen:
• Habitat: include a brief description of where the plant is growing (e.g. rocky outcrop, gully head; wet forest, etc.) and a list of other plants growing in association, if known.
• Habit: record the growth form (e.g. tree; shrub; vine; herb) and height (e.g. dense shrub to 2 metres high; sprawling herb). For trees, record the bark type and extent (e.g. rough bark up to 2 metres on main trunk, smooth above). Bark type is especially important in Eucalyptus. Also record the colour of fresh stems, leaves, flowers (for plants) or pileus, stipe and lamellae (for fungi).
• Abundance: number of plants at site. Frequency in the area (rare, occasional, frequent/common or abundant).

Collect plants in flower and/or fruit if possible. These are usually critical for identification.
• Make specimens large enough to present a fair sample of the plant, its manner of growth, branching and so on.
• With smaller plants, such as grasses, rushes, sedges, irises and lilies, collect whole plants (or a number of entire plants) including underground parts (i.e. bulbs, corms, rhizomes) still attached to aerial parts of plant.
• Specimens should be pressed when fresh (i.e. in the field). This results in better herbarium specimens, making them easier to identify.
• When pressing a specimen, carefully spread out structures (i.e. leaves, flowers) so that diagnostic features are clearly evident. Make sure that both the upper and the lower leaf surface are visible by turning over some leaves.

Quadrats

When target species or species of interest are detected, a full quadrat of its typical habitat shall be undertaken as follows:
• Note waypoint of quadrat centre
• Estimate an area 20 m x 20 m around that point
• Record all vascular plant species rooted in or overhanging the quadrat
• Estimate the percent overlapping cover of each species (1%, 2%, then to nearest 5%)

Target species will not be found in all coupes or may not be identifiable in the field. In that instance observers are required to survey one full species quadrat in an area of the coupe
• Representative of the predominant vegetation community on the coupe, a “typical” part of the coupe
• to capture a suite of unusual species,
• in locations where the presence of rare/threatened (non-prescribed) species has been detected
• if the coupe is relatively homogenous, a ‘typical’ part of the coupe.

Waypoints shall be taken for incidental rare or threatened flora species found, to help improve their habitat distribution modelling.
9. Vegetation Observations

Observations of trees where DBHOB > 2.5 m

Measurements of tree stem diameter will be conducted as diameter at breast height over bark (DBHOB; 1.4 m above ground), and according to the Australian Standards (below). Trees with a DBHOB > 2.5 m are to be recorded in the data sheet.

Contractors are required to take a photo of the diameter tape measure on the tree trunk indicating the measurement of the DBHOB, and to record a GPS waypoint for the observation.

**DBH Protocol**

1. Tree on level ground
2. Tree on sloping ground
3. Tree leaning on level ground
4. Tree fork above 1.4 m
5. Tree fork at 1.4 m
6. Tree fork below 1.4 m
7. Branch wound at 1.4 m
8. Tree deformed at 1.4 m
9. Buttressed tree

**Observations of areas hollow bearing trees**

Observations of areas of hollow bearing trees (HBTs) may be used to assist with decision making by the FPSP team as to whether additional spotlight survey may be required on a coupe if not already prioritised. In making this decision the observation of HBTs needs to be sufficient to justify a 10 hectare spotlight survey effort e.g. a 1 kilometre transect with 50 m either side equals 10 hectares.

During pre-survey desktop assessment, and if possible while still in the field, look at satellite or other imagery, or google earth to determine areas of large crowns, and or to extrapolate the area of HBT habitat within the coupe.

If HBT’s are estimated to be present on >10 hectares of the coupe (equivalent to an area of 1000 m x 100 m) and hollows are assessed to be in sufficient quantity to be highly likely to support populations of HBT-dependent fauna, make a note of this on the CHASS data sheet.

Then estimate the percentage visibility to the canopy, through sub-canopy and shrub layers, for the purpose of spotlighting visibility (see datasheet for definitions).

Determine the category of HBT for the whole coupe using the table below. This will assist with planning future spotlighting at the site, as well as transect placement. Recommended locations for future spotlighting transects may...
be recorded as the proposed start and/or end point grid references. Location of areas of HBT can be recorded as the centre of the coupe if the whole coupe is covered in hollow-bearing trees. Record other sign that may indicate the presence of target species in the area of HBTs e.g. whitewash, scats, V notches, stags etc.

<table>
<thead>
<tr>
<th>Category</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBT 0</td>
<td>&lt;10 hectares of hollow bearing trees present</td>
</tr>
<tr>
<td>HBT 1</td>
<td>&gt;10 hectares of hollow bearing trees present, and visibility is restricted to &lt; 25% of the canopy when looking up through the sub canopy and shrub layer</td>
</tr>
<tr>
<td>HBT 2</td>
<td>&gt;10 hectares of hollow bearing trees present, and visibility is 26-50% of the canopy when looking up through the sub canopy and shrub layer</td>
</tr>
<tr>
<td>HBT 3</td>
<td>&gt;10 hectares of hollow bearing trees present, and visibility is 51-75% of the canopy when looking up through the sub canopy and shrub layer</td>
</tr>
<tr>
<td>HBT 4</td>
<td>&gt;10 hectares of hollow bearing trees present, and visibility is &gt; 76% of the canopy when looking up through the sub canopy and shrub layer</td>
</tr>
</tbody>
</table>

**Vegetation Community Observations**

Contractors are required to record any instances within or adjacent to coupes where the presence of the following vegetation communities are observed in the field. Observations are to include waypoints at 25 m intervals of the perimeter of the vegetation community where it is on-coupe or up to 50 m off-coupe, and detailed photos of key identifying features of the vegetation community.

**Box Ironbark**

Selective harvesting is excluded from Box Ironbark forest in the East Gippsland and Gippsland FMAs. These forests are characterised by a canopy of box, ironbark and gum-barked eucalypts, growing to 25 m in height, over a sparse understorey of wattles, small-leaved and prostrate shrubs, herbs and grasses (EVC 61). The main tree species are Forest Red Gum (*Eucalyptus tereticornis*), Yellow Box (*E. melliodora*), Coast Grey Box (*E. bosistoana*), Red Ironbark (*E. tricarpa*), Red Box (*E. polyanthemos*), Blue Box (*E. baueriana*) and Yellow Stringybark (*E. muelleriana*). This vegetation community occurs on gently undulating rises, low hills and peneplains on infertile, often stony soils derived from a range of geologies.

**Heathland**

Selective harvesting is excluded from Heathlands in East Gippsland and Gippsland FMAs and road construction is to be avoided. Heathlands are characterised by a dense layer of small-leaved shrubs, usually 1-2 m tall, over a ground layer of sedges, coarse lilies, rope-rushes, prostrate shrubs and herbs. In most places there are occasional small, short-trunked, spreading trees, to 15 m tall, which may form a sparse canopy on deeper soils. Three Ecological Vegetation Classes (EVC) are listed in the Management Standards and Procedures: Wet Heathland (EVC 8), Clay Heathland (EVC 7) and Riparian Scrub Mosaic (EVC 191).

**Montane Riparian Thicket**

Montane Riparian Thicket is protected in all FMAs. These stands contain at least 40 % canopy cover of Mountain Tea-tree (*Leptospermum grandifolium*). Key understorey species include Mountain Pepper (*Tasmannia lanceolata*) and a range of sedges, rushes and ferns. It typically occurs in montane and subalpine areas, often within Montane Damp Forest along drainage lines, streams with gentle gradients and in soaks at the heads of gullies on south-facing aspects (EVC 41). While most areas of Montane Riparian Thicket will already be protected within SPZs or Code exclusions, mapping of the extent of any patches of this vegetation type that are contained within the gross area of coupes will be required to check this assumption and identify any additional areas requiring protection.

**Rainforest**

Warm Temperate Rainforest (EVC 32) and Cool Temperate Rainforest (EVC 31) are protected from timber harvesting in eastern Victoria. There are extensive, existing processes for identifying and delineating rainforest patches, and these will continue to be used, rather than forming part of the forest protection survey program. Assessment will also
be addressed under a separate DELWP project focused on RFA reform. Contractors may record and report observations of Rainforest but are not required to map the extent unless this may be completed within the available time and it does not distract from surveying for target species and vegetation communities. Rainforest may however be specifically surveyed for target or threatened plant species.

**Leadbeater's Possum Habitat**

If conducting flora surveys in the Central Highlands FMA, contractors are required to record any instances within or adjacent to coupes where the presence of potential Leadbeater’s Possum habitat is observed in the field. Observations are to include waypoints of the perimeter of the identified habitat where it is on-couve or up to 25 m off-couve, and some photos of key identifying features of the habitat. Observers are not required to map the habitat as mapping extent will be conducted by remote sensing analysis and further targeted field surveys.

**Leadbeaters Possum Zone 1A Habitat**

Where there are more than 10 live mature or senescent hollow-bearing trees per 3 ha in patches greater than 3 ha, and each tree is within 100 m of one of the other trees.

In Zone 1A habitat hollow-bearing trees are defined as live mature or senescent trees of Mountain Ash (E. regnans), Alpine Ash (E. delegatensis) or Shining Gum (E. nitens) containing hollows. During salvage harvesting after fire, Zone 1A habitat is assessed as if all the trees were live.

**Leadbeaters Possum Zone 1B Habitat**

Where there are more than 12 hollow-bearing trees per 3 ha in patches greater than 10 ha and wattle density exceeds a basal area of 5 m²/ ha.

In Zone 1B habitat hollow-bearing trees are dead, mature or senescent living trees of Mountain Ash, Alpine Ash or Shining Gum containing hollows. This prescription applies until either of the Zone 1B attributes (the presence of dead, mature or senescent living trees containing hollows, or wattle understory) no longer exist.


**Glossy Black Cockatoo Habitat**

Cones of the Black She-oak (Allocasuarina littoralis) are the main food source of the Glossy Black Cockatoo in Victoria. Forest stands containing Black She-oak are therefore potential foraging habitat for this species, with the cockatoos preferring mature, sparsely distributed trees 2–10 m tall. Remnants of chewed cones and debris on the forest floor beneath these trees are an indication that cockatoos have been present. Glossy Black Cockatoos are generally considered to breed between March and August. They nest in large, old hollow-bearing trees and are known to use vertical or near-vertical spouts in senescent or dead trees. Nest sites are commonly clustered or grouped in the landscape.

If conducting flora surveys in the East Gippsland FMA, contractors are required to record any instances within or adjacent to coupes where the presence of a Black She-Oak stand (Glossy Black Cockatoo habitat) is observed in the field.

The definition of a Black She-oak stand is a group or groups of trees with a basal area equal to or greater than 10 m² in an area of 0.25 hectares.

If initial observations indicate presence of a potential stand the Contractor is required to determine whether the stand meets the definition by mapping the perimeter of the stand and measuring the basal area within the stand. The Contractor is required to map the extent of the stand using a GPS. Mapping is to consist of waypoints at minimum 25 m intervals around the perimeter of the identified habitat where it is on-couve or up to 50 m off-couve. Contractors are required to take photos of key identifying features of the habitat.

10. Data reporting requirements

Data requirements are outlined in the FLORA data sheet. FPSP data is to be reported in accordance with the procedures outlined in the SOP.

Check identification of all plant samples, especially those that are prescribed species, and curate the field data sheets accordingly.

Confirmed prescribed species must be reported to the FPSP team ASAP (immediately).
Submit all track logs, mapped perimeters and observation data. Photos are to be provided with returned datasheets.