

Forest Protection Survey Program

Survey Guideline - Reptile Survey (V4.1)



Acknowledgements

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Photo credit

Cover photo: Jamie Molloy 2018 (Southern Water Skink, Nariel Valley, Victoria)

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Reptile

Context

The reptiles that may be the targets for survey for the Forest Protection Survey Program are those species that are the subject of a prescription in the Code of Practice for Timber Harvesting, and/or have been identified as being at risk of impacts of timber harvesting when conservation status and taxonomic knowledge is considered.

Reptiles can be a very difficult group of fauna to survey due to relatively low abundance, low detectability, and often restricted distribution and habitat preference.

The Code of Practice for Timber Harvesting 2014 outlines prescriptions that may be applied upon detection of specified species or employed to establish a Special Protection Zone of at least 10 hectares at sites verified to be particularly rich in reptiles or amphibians in East Gippsland Forest Management Area.

Objectives

To detect the presence or infer the absence of target and other reptile species within, and near, specified coupes planned for timber harvesting.

Survey effort

Analysis of the habitat requirements, range and distribution, and the potential impacts of timber harvesting are considered in determining which species will be prioritised for survey.

Reptiles to be targeted in the FPSP reptile surveys include the following target species (without current management prescriptions):

- Eastern She-oak Skink *Cyclodomorphus michaeli*
- Swamp Skink *Lissolepis coventryi*

Opportunistic observations are to be recorded of the species listed below.

Reptile species with management prescriptions:

- Alpine Water Skink *Eulamprus kosciuskoi*
- Alpine She-oak Skink *Cyclodomorphus praealtus*
- Diamond Python *Morelia spilota*

Reptile species without current management prescriptions:

- Mountain Skink *Liopholis montana*
- Alpine Bog Skink *Pseudemoia cryodroma*
- Tree Goanna (Lace Monitor) *Varanus varius*
- Rosenberg's Goanna *Varanus rosenbergi*

Scientific name	Common name	Survey methods	Prescription?	Survey Distance from coupe
<i>Cyclodomorphus michaeli</i>	Eastern She-oak Skink	Refuge Survey	No	
<i>Lissolepis coventryi</i>	Swamp Skink	Refuge Survey	No	

Contractors are provided with the detection probabilities of the target species for each survey technique. Contractors are to target those reptile species with the highest detection probabilities in each coupe. The species with higher detection probabilities will inform survey parameters, such as preferred habitat for survey.

Reptile surveys are to be conducted by a minimum of two observers working together.

Surveys are required to be conducted during peak activity/breeding season, typically spring-early summer prioritising areas of observed or, where available, modelled habitat. Surveys will only be conducted at other times of the year when directed.

Contractors are required to record a track log of each day of survey effort in each coupe from the start to the end. The track log is to be converted to a GIS shapefile and submitted as a GIS shapefile with the shapefile attributes as outlined in the FPSP Standard Operating Procedure (note that a shapefile template is provided by FPSP).

Good quality, georeferenced, colour photographs should be taken wherever possible to confirm identifications. Photos should show distinguishing characteristics, including length across a ruler as necessary. Contractors are required to submit at least one georeferenced photo of fauna observations of target species or other observed species of interest.

Staff requirements

A field survey team of at least two people is required for all surveys. More observers may be used to increase detection probabilities.

Observers must be familiar, via first-hand experience, with identification features and habitat preferences of all the reptile species likely, or possibly present, in the program area, including shelter locations and behaviour.

Observers must possess sound identification skills to reliably identify all the reptile fauna that may be encountered and be familiar with the latest taxonomic revisions to ensure correct identification.

Equipment list

- | | |
|--|--|
| <input type="checkbox"/> Snake bandages | <input type="checkbox"/> Cloth handling bags |
| <input type="checkbox"/> Thermometer | <input type="checkbox"/> Thin handling gloves |
| <input type="checkbox"/> 1x GPS unit per observer | <input type="checkbox"/> Digital camera (with carry case, spare batteries, spare storage card) suitable for high quality macro-photography and, where possible, capable of including georeferencing data with each photo |
| <input type="checkbox"/> Bright torch or headlamp | <input type="checkbox"/> Time-keeping devices |
| <input type="checkbox"/> High-powered binoculars | <input type="checkbox"/> FPSP Reptile Survey Datasheets/forms |
| <input type="checkbox"/> Light-weight tripod | <input type="checkbox"/> Back-up hard copies of datasheets/forms on waterproof paper on clipboards |
| <input type="checkbox"/> Leather gloves | |
| <input type="checkbox"/> Short-handled three pronged rake or similar | |
| <input type="checkbox"/> Small jemmy-bar | |

Site selection

The FPSP will identify coupes that are to be scheduled for reptile survey based on detection likelihoods, availability of time to survey before proposed harvest and a range of other factors. The contractor is required to identify potential survey sites within and adjacent to the coupe for reptile survey. A survey site is the location where a survey is to be conducted. Each grid or visual search area is to be considered a separate survey site.

Habitat Distribution Models (HDMs)(see <http://maps.biodiversity.vic.gov.au/viewer/?viewer=NatureKit>) for target species should be used to assist with identifying potential habitat and thus candidate survey area within and adjacent to coupes prioritised for survey.

The location of potential survey sites should be pre-determined via desktop assessment where possible and confirmed in the field. Sites may be moved as necessary (e.g. to take advantage of habitat features).

Contractors should spend some time at each coupe conducting an initial search of preferred habitat and confirming that suitable habitat exists for the target species, before conducting the required survey effort.

The survey focus should be on the habitats, where present, of the target species within or up to 50 m from the coupe including:

- rocky habitats such as rock outcrops, areas of scree and tors
- edges of forest and forest clearings, heath and tussocks bordering wetlands

- riparian, wet heath and bog associations
- dense ground cover in low-lying marshes, lagoon margins, swamps, near permanent water or in areas subject to periodic inundation

The habitat distribution models used to prioritise surveys are sometimes based on few records. In the absence of suitable habitat for the target species on a coupe, the survey should be abandoned due to “unsuitable habitat”.

Conducting the survey

All necessary precautions should be taken to avoid injury to animals when attempting capture. As far as possible be mindful of where hands, elbows, knees and feet are placed, and the force with which they are placed, when chasing down a fleeing individual. Be mindful of other, unseen individuals present in the microhabitat disturbed.

Any captured animals should be released at the point of capture as soon as possible after identification if capture is necessary. Carefully replace any refuge features that were moved, avoiding injury to the returned animal.

At least one observation record shall be recorded for unique observations of threatened and non-threatened reptile species. It is not necessary to record all observations of all individuals of all reptile species. Note that survey effort is to be spent searching for the target taxa in preference to spending time conducting a general reptile survey.

Wash hands in water without soap after handling each reptile. Before leaving the coupe area wash hands with an appropriate disinfectant.

The start and end times of the reconnoitre/visual searches and effort spent checking grids shall be recorded.

Refuge surveys for the Swamp Skink should be augmented by patient stalking with the aid of binoculars.

Reconnoitre/Visual searches

When conducting an initial reconnoitre of a coupe prioritised for reptile survey, contractors are required to conduct an active visual search to identify the best available habitat for further survey effort, and to record any opportunistic observations of reptile species.

For heliothermic species, visual searches are to be undertaken during warm weather. Ideally surveys should be conducted in the morning as temperatures rise when reptiles are basking in the open and becoming active. When extreme heat is forecast then searches must commence earlier in the morning. Cold temperatures, strong winds, rain or overcast conditions must be avoided.

Two observers will work together for safety, to employ complementary techniques at the site, and to help each other capture animals or confirm identifications as necessary.

When conducting a visual search, contractors may conduct some active hand searching to detect reptiles that are listed as potential targets. Contractors are required to carry tools and wear gloves appropriate to pushing ground-cover vegetation aside, raking leaf litter, rolling rocks and logs, and capturing animals for identification.

Contractors shall visually scan ahead, around and above for basking/resting individuals.

Microhabitat disturbance should be kept to a minimum, e.g. rolled rocks and logs should be returned to their original positions. Contractors should not remove large sections of bark or broken sheet rock unnecessarily.

Refuge Survey

Refuge surveys that use artificial refuges are a common method for collecting and surveying amphibians and reptiles (e.g. Brown et al. 2011; Batson et al. 2015; Hodges and Seabrook 2016; Lettink and Monks 2016; Sutherland et al. 2016). Artificial refuges, also known as artificial retreats, cover boards or artificial cover objects are especially effective for herpetofauna that regularly use some form of cover. The main advantages of artificial refuges compared with other sampling methods (e.g. pitfall trapping, active searches) are that they are easy to use, relatively economical, insensitive to observer bias, and result in little habitat disturbance.

Several types of artificial refuges have been used, depending on habitat and target species, including roof tiles, roofing felt, concrete pavers, corrugated metal, railway sleepers, and Onduline (corrugated bitumen roofing) (e.g. Hampton 2007; Lettink and Cree 2007; Homan 2012; Michael et al. 2012; Hodges and Seabrook 2016). Terra cotta roof tiles have proved successful in south-eastern Australia for detecting grassland reptile species, notably the Striped legless Lizard *Delma impar* and She-oak Skinks *Cyclodomorphus* spp. (Clemann and Nelson 2005; O'Shea 2005; Thompson 2006; Homan 2012; DELWP 2015; Scroggie et al. 2019), and the Swamp Skink *Lissolepis coventryi* (Humphrey et al. 2017).

When prioritised for survey, Eastern She-oak Skink *Cyclodomorphus michaeli* or the Swamp Skink *Lissolepis coventryi* shall be surveyed using refuge surveys consisting of 25 terracotta roofing tiles. The minimum number of tile grids per coupe for both species should be five, preferably more if logistically feasible.

Tiles shall be deployed for at least two weeks, and up to four weeks, before the commencement of surveys to allow a 'bedding-in' period.

Each grid should comprise a rectangle of 5 x 5 tiles (c. 42cm x 25cm size), tiles spaced 5 m apart. Alternative configurations may be deployed where the target habitat does not easily accommodate a grid (e.g. tile line/s where habitat is linear and narrow).

Contractors should record the location of the most south eastern corner of a grid or the southern most point of a line where tiles are arranged. If using a line please describe the reason for the alternative configuration in the comments section of the Survey Details worksheet.

Grids shall be positioned to target habitat most likely to support the Eastern She-oak Skink in or adjacent to the coupe, notably heathy or grassy areas in lowland forests, woodlands or heathland; often found in suitable habitat at the edges of tracks or clearings (Cogger 2018; Robertson and Coventry 2019).

Potential habitat for the Swamp Skink should also be targeted; it is typically associated with damp environments, including densely vegetated wetlands, swamps, heathlands, sedgeland and salt marshes, although areas likely to be inundated during the survey period should be avoided.

Contractors are required to describe the broad habitat type surveyed when setting up each grid.

Tiles are to be laid upside down, allowing lizards to use the grooved surfaces. Tiles should be checked by quickly flipping them over and any evidence of lizard presence, including sloughed skins, recorded as an observation; photographs of this evidence should be taken where possible.

Environmental conditions shall be recorded for each survey, including ambient air temperature and the temperature under tiles (an average of samples from beneath 2 or 3 tiles per grid per check visit shall suffice).

Surveys should take place in spring to early summer, although tile deployment and subsequent survey commencement dates may differ slightly between high- and low-altitude environments because the optimal conditions (i.e. ambient air temperature range of 15-30°C and under-tile temperature range of 18-40°C) will vary according to elevation.

Tiles should be inspected at least three times, and up to five times, during the survey period with an interval of at least one week between inspections. Inspections should not occur at the same time of day for any given tile grid; tile grids should be randomly allocated to a check order. Tiles should be left in situ for the duration of the survey and retrieved at the end of the survey. Broken or missing tiles should be replaced during the survey as required and moved a short distance if colonised by ants.

Opportunistic searches

Opportunistic searches are only required within and near coupes where the HDM and recent or historical records occur and these records indicate the presence of likely habitat for Diamond Python *Morelia spilota spilota* (generally the Cann River to Mallacoota area), Tree Goanna (Lace Monitor) *Varanus varius* (not uncommon in foothill forests of Victoria) and Rosenberg's Goanna *Varanus rosenbergi* (generally but unlikely in the far North East)

Contractors are required to conduct opportunistic searches, when conducting other reptile search methods, by examining areas of potential habitat within the coupe search areas. For Diamond Python, contractors may also opportunistically examine potential resting, ambush, and nest sites for this species up to 50m away from the edges of the coupe (based on a 100 ha special protection zone prescription) within or close to the known distribution in East Gippsland. Contractors should inspect burrows, culverts, bridges, hollows in fallen trees etc. Such searches should be made on an opportunistic basis along roads whilst driving within the vicinity of the coupe, when encountering bridges and other habitat features, and during spotlighting surveys for other nocturnal taxa e.g. arboreal mammals on warm nights, etc.

Data reporting requirements

Data requirements are outlined throughout this guideline and in the FPSP “DataEntry_Reptile’ datasheets/forms.

- Where opportunistic observations of non-target reptiles observed during survey effort are to be recorded, record these observations in the reptile datasheet/form after any records of target species.
- Where opportunistic observations of any reptiles observed outside of survey effort, or other species that are not targets of the reptile survey, record these observations in an Opportunistic Observations datasheet/form.
- Data are to be reported in accordance with the procedures outlined in the SOP
- Record a track log for all reconnaissance work on coupe and submit as a Track Log shapefile.
- Record and submit (georeferenced where possible) photos
- Assign and record a unique Site ID to each location surveyed. Record one site ID for a recce/visual search survey, and a separate site ID for each grid.
- Record weather conditions at the time of the survey (minimum of air temperature during each survey, wind on the Beaufort scale, and cloud cover)
- Ensure the coupelD is entered correctly according to the survey package and in the right format of xxx-xxx-xxxx
- Record your observations in the ObsAttributes page, with each observation being entered on a separate row.
- Ensure all mandatory fields are completed and in the correct format, failure to do so will result in an incomplete survey.
- A comprehensive list explaining the data entry fields and whether they are mandatory or optional can be found in the DataFieldsExplained page.
- Ensure the CommonName field in ObsAttributes is entered correctly according to the TaxalDLookup
- Spelling of species common name in the CommonNameField must match the spelling in the Victorian Biodiversity Atlas reference list otherwise the TaxonID column will not be automatically populated.

Please Note: As per the standard operating procedure, contractors are expected to submit highest quality data. Please ensure you double check your data entry before submitting data. Submitting incorrect or incomplete information will result in a delay to reporting and may impact on the program outcomes.

References

- Batson, W. G., O'Donnell, C. F. J., Nelson, N. J., and Monks, J. M. (2015). Placement period of artificial retreats affects the number and demographic composition but not the body condition of skinks. *New Zealand Journal of Ecology* 39, 273-279.
- Brown, G. W., Dorrrough, J. W., and Ramsey, D. S. L. (2011). Landscape and local influences on patterns of reptile occurrence in grazed temperate woodlands of southern Australia. *Landscape and Urban Planning* 103, 277-288.
- Chapple, D.G., Tingley, R., Mitchell, N., Macdonald, S., Keogh, J.S., Shea, G., Bowles, P., Cox, N., and Woinarski, J., (eds) (2019). *The action plan for Australian lizards and snakes 2017*. CSIRO Publishing, Clayton, Victoria.
- Clemann, N. (2002). Notes on the threatened endemic Victorian Alpine Bog Skink *Pseudemoia cryodroma* Hutchinsonson and Donnellan 1992 (Scincidae: Lygosominae): a range extension, habitat preferences and identification difficulties. *Herpetofauna* 32: 49-53.
- Clemann, N., and Nelson, J. (2005). Developing a survey and monitoring technique for the threatened Alpine She-oak Skink *Cyclodomorphus praealtus* - artificial cover object deployment and initial survey. Unpublished report to the North East Catchment Management Authority and the National Heritage Trust, Arthur Rylah Institute for Environmental Research, Department of Sustainability and Environment, Heidelberg, Victoria.
- Cogger, H. G. (2018) 'Reptiles and amphibians of Australia. Updated seventh edition.' (CSIRO Publishing: Collingwood, Victoria.)
- DELWP (2015). Conservation Area Inventory Guidelines. Melbourne Strategic Assessment. Department of Environment, Land, Water and Planning. (East Melbourne, Victoria.)
- Department of Sustainability and Environment. (2003). Action Statement No. 175 Inland Carpet Python *Morelia spilota metcalfei*. DSE. East Melbourne, Victoria.
- Dixon, K.M., Cary, G.J., Worboys, G.L., and Gibbons, P. (2018). The disproportionate importance of long-unburned forests and woodlands for reptiles. *Ecology and Evolution* 8: 10952-10963.
- Haines, M.L., Stuart-Fox, D., Sumner, J., Clemann, N., Chapple, D.G., and Melville, J. (2017). A complex history of introgression and vicariance in a threatened montane skink (*Pseudemoia cryodroma*) across an Australian sky island system. *Conservation Genetics* 18: 939-950.
- Hampton, P. (2007). A comparison of the success of artificial cover types for capturing amphibians and reptiles. *Amphibia-Reptilia* 28, 433-437. doi: <https://doi.org/10.1163/156853807781374809>.
- Hodges, R. J. and Seabrook, C. (2016). Use of artificial refuges by the northern viper *Vipera berus* 1. Seasonal and life stage variations on chalk downland. *Herpetological Bulletin* 137, 6-12.
- Homan, P. (2012). The use of artificial habitat during surveys of small, terrestrial vertebrates at three sites in Victoria. *The Victorian Naturalist* 129, 128-137.
- Humphrey, J. E., Robert, K. A., and Leonard, S. W. J. (2017). Elliott traps found to be ineffective for the survey of swamp skink *Lissolepis coventryi*: a cautionary tale of outdated survey guidelines. *Wildlife Research* 44, 514-522. doi: <https://doi.org/10.1071/WR17012>.
- Lettink, M. and Monks, J. M. (2016). Survey and monitoring methods for New Zealand lizards. *Journal of the Royal Society of New Zealand* 46, 16-28. doi: 10.1080/03036758.2015.1108343.
- Michael, D. R., Cunningham, R. B., Donnelly, C. F., and Lindenmayer, D. B. (2012). Comparative use of active searches and artificial refuges to survey reptiles in temperate eucalypt woodlands. *Wildlife Research* 39, 149-162. doi: <http://dx.doi.org/10.1071/WR11118>.
- O'Shea, M. (2005) *Methods for assessment and techniques for management of Striped Legless Lizard *Delma impar* populations in south-eastern Australia*. PhD thesis Thesis. (Victoria University: Melbourne, Victoria.)
- Pascoe, J.H., Flesch, J.S., Duncan, M.G., le Pla, M., and Mulley, R.C. (2019). Territoriality and seasonality in the home range of adult male free-ranging lace monitors (*Varanus varius*) in South-eastern Australia. *Herpetological Conservation and Biology* 14: 97-104.
- Pianka, E.R., King, D.R., and King, R.A., (eds) (2004). *Varanoid Lizards of the World*. Indiana University Press, Bloomington, Indiana.
- Robertson, P. and Coventry, A. J. (2019) 'Reptiles of Victoria. A Guide to Identification and Ecology.' (CSIRO Publishing: Clayton South, Victoria.)

- Sato, C.F., Schroder, M., Green, K., Michael, D.R., Osborne, W.S., and Lindenmayer, D.B. (2014a). Managing ski resorts to improve biodiversity conservation: Australian reptiles as a case study. *Ecological Management & Restoration* **15**: 147-154.
- Sato, C.F., Wood, J.T., Schroder, M., Green, K., Osborne, W.S., Michael, D.R., and Lindenmayer, D.B. (2014b). An experiment to test key hypotheses of the drivers of reptile distribution in subalpine ski resorts. *Journal of Applied Ecology* **51**: 13-22.
- Scroggie, M. P., Peterson, G. N. L., Rohr, D. H., Nicholson, E., and Heard, G. W. (2019). Disturbance has benefits as well as costs for fragmented populations of a cryptic grassland reptile. *Landscape Ecology*. doi: 10.1007/s10980-019-00865-0.
- Scroggie, M., Steane, D., and Gillespie, G. (2004). An assessment of methods for monitoring the effects of wildlife and habitat disturbance on threatened alpine fauna in Victoria. Arthur Rylah Institute for Environmental Research, Department of Sustainability and Environment, Heidelberg, Victoria.
- Shea, G. (2004). Sheoak skinks (*Cyclodomorphus casuarinae* complex). In Hitz, R., Shea, G., Hauschild, A., Henle, K., and Werning, H. (eds) *Blue-tongued skinks: Contributions to Tiliqua and Cyclodomorphus*. Matthias Schmidt Publications, USA.
- Shea, G.M. (1995). A taxonomic revision of the *Cyclodomorphus casuarinae* complex (Squamata: Scincidae). *Records of the Australian Museum* **47**: 83-115.
- Sutherland, C., Muñoz, D. J., Miller, D. A. W., and Grant, E. H. C. (2016). Spatial capture–recapture: A promising method for analyzing data collected using artificial cover objects. *Herpetologica* **72**, 6-12. doi: 10.1655/herpetologica-d-15-00027.
- Thompson, M. J. (2006) The use of artificial refuges to census populations of the 'threatened' Striped Legless Lizard, *Delma impar* in Western Victoria. BSc (Hons) Thesis. (La Trobe University: Bundoora, Victoria.)