Forest Protection Survey Program

Survey Guideline - Reptile Survey (V5.0)

Environment, Land, Water and Planning

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Reptile

Context

The reptiles that may be the targets for survey for the Forest Protection Survey Program are generally those species that are of high conservation value.

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.

Objectives

To detect the presence or infer the absence of target and other reptile species within and near specified sites.

Survey effort

Analysis of the habitat requirements, range and distribution, and many other factors are considered in determining which species and sites will be prioritised for survey.

Reptiles to be targeted in the reptile surveys may include the following target species:

Common Name	Scientific Name	Survey Method
Eastern She-oak Skink	*Cyclodomorphus michaeli*	Refuge Survey
Swamp Skink	*Lissolepis coventryi*	Refuge Survey
Alpine Water Skink	*Eulamprus kosciuskoi*	Diurnal Transect or Spot Census
Alpine She-oak Skink	*Cyclodomorphus praealtus*	Refuge Survey
Diamond Python	*Morelia spilota spilota*	Opportunistic/Active Searching
Mountain Skink	*Liopholis montana*	Active visual searching followed by Spot Census,
Alpine Bog Skink	*Pseudemoia cryodroma*	Diurnal Transect or Spot Census
Tree Goanna (Lace Monitor)	*Varanus varius*	Opportunistic Active Searching
Rosenberg's Goanna	*Varanus rosenbergi*	Opportunistic Active Searching

Contractors are provided with the detection probabilities of the target species for each survey technique. Surveyors are to target those reptile species with the highest detection probabilities in each survey area. 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.

Surveyors are required to record a track log of each day of survey effort in each site 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 shapefile template provided.

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. Surveyors are required to submit at least one georeferenced photo of fauna observations of target species or other observed species of interest.

Surveyor 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

- ☐ Snake bandages
- ☐ Thermometer
- ☐ 1x GPS unit per observer
- ☐ Bright torch or headlamp
- ☐ High-powered binoculars
- ☐ Light-weight tripod
- ☐ Leather gloves
- ☐ Short-handled three ponged rake or similar
- ☐ Small jemmy-bar
- ☐ Cloth handling bags
- ☐ Thin handling gloves
- ☐ 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
- ☐ Time-keeping devices
- ☐ Reptile Survey Datasheets
- ☐ Back-up hard copies of datasheets/forms on waterproof paper on clipboards

Site selection

Survey sites will be scheduled for reptile survey based on detection likelihoods, availability of time to survey and a range of other factors. The surveyor is required to identify potential survey sites within and adjacent to the survey area for reptile survey based on suitable habitat for eth target species. A survey site is the location where a survey is to be conducted. Each grid or active 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 sites within and adjacent to survey areas or sites 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 suitable habitat features).

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

The survey focus should be on the habitats, where present, of the target species within or up to 50 m from the survey site 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 site, 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 all 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 species in preference to spending time conducting a general reptile survey.

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

The start and end times of the reconnoitre/active 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/Active searches

Active searching may involve visual only searches, or searches that involve some destructive habitat searching. Species specific guidelines may be provided to advise which active search techniques are required. Generally destructive searches will not be permitted for smaller threatened reptiles species such as skinks and geckos.

When conducting an initial reconnoitre of a site prioritised for reptile survey, surveyors are required to conduct an active visual (non-destructive) search to identify the best available habitat for more intensive survey effort e.g. Refuge survey or spot census, and to record any opportunistic observations of reptile species.

For heliothermic species, active 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.

Surveyors may conduct some active hand searching to detect reptiles that involves impacts on habitat. If such surveys are required, surveyors 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.

Microhabitat disturbance should be kept to a minimum, e.g. rolled rocks and logs should be returned to their original positions. Absolute care should be taken if moving rocks to avoid injuring any animals that may be using the rocks for shelter. Surveyors should not remove large sections of bark or broken sheet rock unless directed specifically to do so.

When conducting active visual only searching, surveyors shall visually scan ahead, around and above for basking/resting individuals.

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 site 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).

Surveyors should record the location of the most southeastern corner of a grid or the southernmost 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 site, 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, sedgelands and salt marshes, although areas likely to be inundated during the survey period should be avoided.

Surveyors are required to describe the broad habitat and microhabitat being 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 sites 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 (or Lace Monitor) *Varanus varius* (not uncommon in foothill forests of Victoria) and Rosenberg's Goanna *Varanus rosenbergi* .

Surveyors are required to conduct opportunistic searches, when conducting other reptile search methods, by examining areas of potential habitat within the site search areas. For Diamond Python, surveyors may also opportunistically examine potential resting, ambush, and nest sites for this species up to 50m away from the edges of the site. Surveyors 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 site, when encountering bridges and other habitat features, and during spotlighting surveys for other nocturnal taxa e.g. arboreal mammals on warm nights, etc.

Spot Census

Spot censuses are employed to survey heliothermic reptiles, typically in forested locations and can provide a means to assess the abundance of reptiles e.g. number of individuals per unit area. Census points are established either along a transect (e.g. 100m or 200m) or at locations within the study area that typify reptile habitat. Censuses are carried out after a 1-2 minute 'settling' and description period. The size of the census plot, determined by the density of the vegetation and thus visibility, should be large enough to accommodate active reptiles; observers typically sit quietly in the centre of a plot with, say, a 10 m radius, although the use of binoculars may permit a larger census plot.

Spot censuses should be undertaken when reptiles are usually active — during the appropriate season and under suitable weather conditions: sunny, dry weather with no wind and an ambient temperature above 18°C is recommended.

A census duration shall be a standard 10 minutes. Durations up to 20 minutes may be required for large census plots or surveys of shy or cryptic taxa that may require more time to be observed.

The number of census plots per survey location will depend on survey effort, extent of habitat, project budget etc.

Mountain Skink survey

Habitat

The Mountain Skink occurs in rocky (mostly granite) terrain in grassy areas, heathland, woodland and open forest at elevations of 600 m-1700 m a.s.l. (DCCEEW 2022; Donnellan *et al.* 2002). The lizard tends to inhabit relatively open areas in such environments, such as the rain-shadowed side of a ridge (Donnellan *et al.* 2002).

The lizard inhabits rock outcrops, screes and tors (Cogger 2018), hilltops and ridges, and utilises rocks and logs (DCCEEW 2022). Locations with these characteristics should be surveyed, particularly those along or just below ridge-lines, and those that are mid-slope, open and predominantly north-facing.

The lizard shelters in burrows beneath rocks and/or logs, often beneath exfoliated rock (both slabs and smaller semi-embedded rocks) and sometimes in crevices, within and beneath logs and fallen timber, beneath groundcover plants, and at the base of trees. Burrow entrances are often cryptic.

The Mountain Skink is a documented anteater, although ants are not its exclusive prey, so colonies of small ants will probably co-occur with the lizard.

Identifying features

The Mountain Skink and White's Skink *Liopholis whitii* are morphologically similar, reach 95 mm adult snout-vent length, have a rounded tapering tail that comprises 160% of snout-vent length, and both species occur in similar, generally rocky, habitats (Cogger 1960; Robertson and Coventry 2019). There are records of both White's Skink and Mountain Skink from the Wombat State Forest (Victorian Biodiversity Atlas), so extra care needs to be taken when identifying these two *Liopholis* species in the area.

The Mountain Skink comprises two distinct colour morphs, patterned morph and plain-backed morph, the latter significantly more abundant and widespread (Chapple *et al.* 2008). Both morphs have been recorded in the Wombat State Forest (Farquhar *et al.* 2021). White's Skink also exhibits colour pattern polymorphism, embracing patterned morph, plain-backed morph and patternless morph (Chapple *et al.* 2008).

The Mountain Skink differs from White's Skink in having a blackish upper lateral zone and the absence of dark-edged pale ocellate markings along the flanks (Donnellan *et al.* 2002; Robertson and Coventry 2019). The upper lateral zone is black, often with paler speckling, while the same zone in White's Skink is greyish, usually with many large dark-edged cream patches ('ocelli'); those patches often coalesce above the forelimb to form a vertical dark bar, missing in the Mountain Skink (Robertson and Coventry 2019).

Lizards in the hand can be more positively identified by checking scalation. The Mountain Skink has 30-40 rows of mid-body scales *c.f.* 30-44 in White's Skink, and the number of sub-digital lamellae (scales) under the fourth toe also differs in adults: 19-25 for Mountain Skink *c.f.* 16-28 for White's Skink (Robertson and Coventry 2019).

Survey Method

The required survey method is:

1. initial active non-destructive visual searching in most suitable habitat focusing on characteristic micro habitat, under suitable environmental conditions.
2. active search surveys for Mountain Skink (and for other threatened species) shall be conducted with minimum site disturbance (i.e. checking for active or basking lizards, no rock-rolling).
3. Followed by 10 minute spot census 100m transects where individuals have been detected.

The Mountain Skink is colonial, diurnal and terrestrial. It is an active heliotherm and needs a suitable temperature regime for basking, foraging etc. The skinks are most likely to be active once the ambient temperature reaches ~18°C, provided other environmental conditions remain settled (i.e. no rain or winds other than a light breeze).

Spring-early autumn provide the greatest likelihood of suitably warm days, although the lizard is likely to retire to its burrow during low and very high temperatures and under windy or wet conditions. The lizard will shelter continuously underground during the colder months, between late autumn and early spring.

During summer the lizard is likely to emerge from its burrow relatively early in the day, especially if burrow entrances are exposed to sunlight, as ambient temperature rises rapidly. Early - mid morning and late afternoon - early evening are the best times to observe the lizard on very hot days.

The species has a relatively broad thermal tolerance range when compared with ecologically similar congenerics (Senior et al. 2019). This range may be even broader at relatively low elevations, so the Mountain Skink population in the Wombat State Forest could be active at slightly lower temperatures than populations at higher elevations, although microhabitat temperature variability may influence lizard emergence and activity.

Surveys shall target potential habitat using the Habitat Distribution Model and outcomes of local observations. The Mountain Skink inhabits rock outcrops, screes and tors (Cogger 2018), hilltops and ridges and utilises rocks and, logs (DCCEEW 2022), fallen timber, groundcovers and the base of standing trees. Locations with these characteristics should be surveyed, particularly those along or just below ridge-lines, and those that are mid-slope, open and predominantly north-facing.

The collection of habitat description and prevailing weather conditions, is required as outlined in the Reptile datasheet. Please include a description, using the Habitat free text field, of:

- General forest structure e.g. Open Forest, Heathy Woodland, etc,

- General ground cover e.g. tussock grasses, sparse rocky, rocks absent, bare ground, shrubby groundcover, moderate/high/no coarse woody debris, coarse litter/fine litter, etc.
- Signs of disturbance e.g. browsing, fire, clearing etc
- Whether observations of Mountain Skink included observations of the species using burrows or logs

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.
- Record a track log for all reconnaissance work on site and submit as a Track Log shapefile.
- Record and submit georeferenced where possible photos of the target species for species verification.
- Assign and record a unique Site ID to each location surveyed. Record one site ID for a recce/active 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 siteID 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 TaxaIDLookup
- 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: Surveyors 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.

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