

Targeted Surveys for the Striped Legless Lizard: Lawrie Emmins Reserve, Laverton

Report prepared for Alluvium Consulting



Document Information

Assessment:	Targeted Surveys for the Striped Legless Lizard: Lawrie Emmins Reserve, Laverton
Project #:	19-032
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Prepared for:	Alluvium Consulting
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File:	Striped Legless Lizard Surveys_Lawrie-Emmins_TactEcol_final_14Aug20

Document History

Version:	Changes:	Author:	Date:
Draft	Draft report	J. Urlus, M. Braakhuis	19 April 2020
Final	Final report	J. Urlus	14 August 2020

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Acknowledgements

- Stuart Cleven Alluvium Consulting
- Angela Simms Field Herpetologist
- Matthew Clancy Field Herpetologist

1. Introduction

1.1. Background

TactEcol Consulting Pty Ltd (TactEcol) was commissioned by Alluvium Consulting in July 2019 to undertake targeted surveys for the Striped Legless Lizard *Delma impar*, at Lawrie Emmins Reserve in Laverton, Victoria. This species is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), Threatened under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act), and is considered Endangered in Victoria (DSE 2013).

The current assessment follows on from a previous ecological assessment of the study area in November/December 2018 (Biosis 2019), which identified the presence of potentially suitable Striped Legless Lizard habitat and recommended targeted surveys for this, and two other, threatened species. Targeted surveys for the other two species, Growling Grass Frog *Litoria raniformis* and Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*, were undertaken previously (TactEcol Consulting 2019; 2020).

The site has been proposed for the development of a wetland, retarding basin, and associated infrastructure. The objectives of the current surveys were to:

- Determine the presence/absence of Striped Legless Lizard within the project area by undertaking targeted surveys in line with established survey guidelines.
- Outline implications of Commonwealth environmental legislation and policy requirement, including whether a referral under the EPBC Act is required.
- Provide advice on mitigation measures that may be undertaken to avoid and/or minimise potential adverse impacts on the species.

This report presents the findings of the surveys undertaken at the site, and the implications thereof.

1.2. Study Area

Lawrie Emmins Reserve occurs in Laverton, Victoria, approximately 25 km west of the Melbourne CBD. The site is approximately 20 ha in area, including a small area (c. 2 ha) of Commonwealth land at the RAAF Base Laverton; the remainder of the site comprises public land, currently zoned as Public Park and Recreation (PPRZ) and Public Use – Education (PUZ2) (Figure 1).

The study area is within the Victorian Volcanic Plains Bioregion, and the management area of Melbourne Water and the Port Phillip Catchment Management Authority (CMA). The site supports a number of patches of vegetation classified in Victoria as the Ecological Vegetation Community (EVC) Plains Grassland, and nationally as Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP) (Biosis 2019). Plains Grassland EVC is listed as Endangered by DELWP, and NTGVVP is listed as Critically Endangered under the Commonwealth EPBC Act (Commonwealth of Australia 2011).

These native grassland areas form the bulk of potential suitable habitat for Striped Legless Lizard within the study area, and were considered to have a medium likelihood of occurrence (Biosis 2019). Potential habitat for Striped Legless Lizard may also extend into adjacent grassland vegetation that is dominated by non-native species and no longer qualifies as Plains Grassland EVC, but retains a similar vegetation structure. The balance of the site is dominated by introduced vegetation and has been highly modified by past disturbances, including clearing and weed invasion (Biosis 2019).

1.3. Striped Legless Lizard

The Striped Legless Lizard is a small, cryptic lizard in the family Pygopodidae. The species is legless, with the hind-limbs reduced to two scaly flaps. It has black to dark brown dorso-lateral and lateral longitudinal stripes, extending from the tympanum down to the tail (Plate 1).

Habitat for the Striped Legless Lizard consists of lowland temperate native grasslands (including derived grasslands) and grassy woodlands across south-eastern Australia, typically on basalt soils with a high content of cracking clays (Hadden 1995). Suitable habitat is typically dominated by tussock-forming grasses such as Kangaroo Grass *Themeda triandra*, Tussock Grasses *Poa* spp. and Spear Grasses *Austrostipa* spp. (DSEWPaC 2011b). The species has recently been found to occupy modified and degraded grasslands, including sites with a high cover of exotic grasses; the presence of Striped Legless Lizards is now thought to be more dependent on past management practices and disturbances, in particular soil

disturbance, than floristics (Hadden 1995, O'Shea 2005). Land management practices causing significant disturbance, including ploughing, rock removal and fertiliser application (linked to heavy grazing), have been found to limit the occurrence of this species (Dorrough and Ash 1999, Webster et al. 2003).

The species has suffered a severe decline in its distribution, primarily as a result of the destruction, degradation and fragmentation of native grassland habitats. In Victoria, it is likely that less 1% of its primary grassland habitat, Western Basalt Plains Grassland remains (Scientific Advisory Committee 1991). Remaining habitat for the species is highly fragmented and most remnant populations are likely to be small and isolated (Webster et al. 2003). The species appears to have limited dispersal capabilities, and isolated populations are unlikely to be re-colonised following local extinctions (Webster et al. 2003; O'Shea 2005).

The Striped Legless Lizard is diurnal and active on the ground surface during the day, retreating beneath the soil layer or to grass tussocks at night (Hadden 1995, O'Shea 2005). The period of peak activity for the Striped Legless Lizard extends from September to December (O'Shea 2005); cooler months are generally spent over-wintering beneath the soil layer or in soil cracks. Striped Legless Lizards typically enter a hibernation-like state in late March to early April, and re-emerge in September (O'Shea 2005). They feed on a variety of invertebrates, with crickets, noctuid moth larvae and spiders being the most commonly taken prey items (Kutt et al. 1998).



Plate 1 Striped Legless Lizard *Delma impar* (J. Urlus 2010)

2. Methodology

The survey guidelines for Striped Legless Lizard under the EPBC Act (DSEWPC 2011) recommend a three step survey process. The first two steps, being a desktop assessment and habitat assessment, were undertaken by Biosis (2019). Accordingly, this project consisted of the third step of the assessment process, targeted surveys.

2.1. Targeted survey methodology

Targeted surveys for Striped Legless Lizard were undertaken in accordance with the field survey guidelines for this species under the EPBC Act (DSEWPC 2011) and with regard to relevant scientific literature (e.g. O’Shea 2005; Thompson 2006). The principal survey technique was artificial refuge surveys, using tile grids; this is typically the most effective and benign survey approach for this species in areas with surface rock. Active searching (e.g. rock and log rolling) was also undertaken as a secondary technique during the targeted surveys, where suitable ground refuge occurred. This technique can be detrimental to species dwelling under such substrates, and hence was used in a limited and targeted manner.

Five roof tile grids, of 50 tiles each, were established on 18 July 2019 in areas of suitable habitat for the Striped Legless Lizard at the site. The DEWSPC (2011) survey guidelines for this species stipulate one tile grid for every 3 ha at ‘sites’ between 2 to 30 ha in size. The study area is approximately 20 ha in size, with potential habitat including remnant grassland vegetation (c. 4 ha) as well as exotic-dominated grassland vegetation (with a relatively undisturbed soil structure). We note that over a quarter of the 20 ha area consists of wetlands, drainage lines and areas of significantly disturbed soils, including soil-compacted tracks; all of which did not support suitable habitat. Therefore, five tile grids were considered sufficient to survey the area of less than 15 ha of potential habitat for the species at the site.

The DSEWPC survey guidelines state that artificial shelter sites should be checked at least twice a month, and ideally once a week between September and December; i.e. a minimum of eight checks. Checks can also extend into January and February, when sloughed skins are more commonly found, although the incidence of live individuals decreases (O’Shea 2005). Tile checks commenced from 12 September, approximately two months after they had been established, and concluded on 23 February 2020; there were 16 tile checks in total. This survey effort aligns with the Commonwealth survey guidelines, and accords with recommendations for six months of tile surveys by the Victorian (then) Department of Sustainability and Environment.

Tile checks were undertaken in early to late morning, depending upon the prevailing conditions. Dates, start times and weather conditions for each survey are outlined in Table 1. Vertebrate fauna beneath tiles were captured where possible and safe to do so; not all animals were able to be captured, with some escaping down burrows located underneath tiles, down soil cracks or into the surrounding vegetation. All vertebrates observed were identified to the lowest taxonomic level (i.e. species/subspecies) possible.

Locations of tile grids and significant species were recorded using a Garmin MAP64S GPS (+/- 3 m accuracy) and recorded to MGA 94, Zone 55 coordinate system. Species nomenclature for flora follows the Victorian Biodiversity Atlas (DELWP).

Table 1 Timing and weather conditions during Striped Legless Lizard artificial shelter surveys at Lawrie Emmins Reserve, September 2019 – February 2020

Date	Start Time	Temperature (°C)	Relative Humidity (%)	Cloud Cover (%)	Wind Speed (km/h)
12/09/2019	10.15	19	33	75	25
18/09/2019	11.05	14.1	52	0	13
26/09/2019	11.00	15.5	78	20	7
01/10/2019	10.15	14	53	0	11
14/10/2019	09.30	19	45	80	8
18/11/2019	09.50	18.9	41	15	13
16/12/2019	10.45	18	68	80	9
20/12/2019	08.20	19.3	61	0	11

Date	Start Time	Temperature (°C)	Relative Humidity (%)	Cloud Cover (%)	Wind Speed (km/h)
27/12/2019	09.15	17.3	66	20	13
08/01/2020	09.50	19	70	70	13
17/01/2020	10.00	16.8	75	100	26
24/01/2020	10.00	17.9	58	10	24
26/01/2020	10.30	21	67	50	9
30/01/2020	08.30	25.2	17	0	30
11/02/2020	09.45	21.5	80	100	13
23/02/2020	09.00	17	90	0	7

2.2. Limitations

The targeted surveys were undertaken at the appropriate time of year and survey effort was consistent with the DSEWPC (2011) survey guidelines for this species; specifically five tile grids of 50 tiles each, checked 16 times over the active period (c. 4,000 tile checks; though see below). Hence, the surveys were considered appropriate to meet the objectives of the assessment.

We note that the site has an apparently relatively high rate of unauthorised recreational 4WD use, which resulted in the substantial loss and breakage of tiles over the course of the surveys (e.g. Plate 1). The approximate rates and periods of breakages were as follows:

- Grid 1: approximately 30% of tiles broken by mid-September at the start of the survey period, and 50% by December, roughly halfway through surveys.
- Grid 2: approximately 60% of tiles broken by mid-September, and 80% by mid-December. The bulk of the tile grid was also largely underwater for two checks, following heavy summer rainfall.
- Grid 3: approximately 10% of tiles broken in December.
- Grid 4: six tiles (c. 12% of the grid) broken by tyres between 16 and 20 December.
- Grid 5: two tiles (c. 4% of the grid) broken by tyres between 16 and 20 December.

Tiles with only one or two breaks were still able to be checked with some degree of efficacy; tiles broken into smaller fragments were no longer effective as a survey technique. The cumulative loss of tiles over time resulted in a reduction in survey effort of approximately 25%, with 3,008 tile checks achieved out of the planned 4,000. The land managers were notified of the loss of survey tiles and potential damage to grassland vegetation at the site in September 2019; we understand that action to restrict vehicle entry to the site was undertaken subsequently.

Notwithstanding the limitations and qualifications above, we believe the artificial shelter survey effort that was able to be undertaken, in combination with some active searching, desktop information (Biosis 2019) and assessment of the distribution and apparent quality of habitat, was sufficient to be confident in making a determination of the likelihood of the Striped Legless Lizard to occur on the site.

3. Results

The study area appears to support potentially suitable habitat for the Striped Legless Lizard, as noted by Biosis (2019). The quality of habitat at the site was quite variable, and was generally considered to be of low to moderate quality, due primarily to observed threatening factors including soil disturbance, vehicle traffic, dumping of refuse/littering and weed infestations in some areas. The presence of domestic dogs and exotic Red Fox *Vulpes vulpes* were noted; although considered potential threatening processes, whether these species pose a material threat to Striped Legless Lizards at a site is uncertain.

3.1. Targeted Surveys

Ten vertebrate fauna species were recorded during the artificial refuge surveys at the study area, including seven reptiles, two frogs, and one introduced mammal species (Table 2; Plates 4 to 8).

The Striped Legless Lizard was not recorded within the project area during targeted surveys, either under artificial refuges or during active searches. One threatened species, the Tussock Skink *Pseudemoia pagenstecheri* was recorded in three of the tile grids (Figure 1; Appendix 1; Plate 3); this species is classified as Vulnerable in Victoria (DSE 2013). One individual Tussock Skink was found deceased under a broken tile, which had been driven over, presumably by recreational 4WD use at the site (Plate 5).

The Tussock Skink is a small, terrestrial skink which occurs on the basalt plains and temperate highlands of south-eastern Australia (Robertson and Coventry 2019). Habitat of this species consists primarily of tussock grassland with little tree cover. As with the Striped Legless Lizard, the vegetation structure of grasslands appears more important for Tussock Skinks than the floristic composition per se; individuals are recorded relatively regularly in exotic-dominated grassland vegetation. Tussock Skinks use surface and embedded rock for shelter and basking, as well as fallen tree limbs and other ground debris (Turner 2012). There appears to have been a substantial decline in the distribution and abundance of this species over the last few decades (e.g. Sullivan 1999).

The Tussock Skink is likely to occur throughout much or all of the tussock grassland remnants at the site; as the species' habitat preference appears to be driven more by vegetation structure than floristics per se, this includes tussock grassland dominated by exotic species (i.e. not qualifying as native vegetation).

A list of species recorded at each tile grid during surveys is provided in Appendix 1. A selection of photos is shown in Plates 2 to 8.

Table 2 Fauna species recorded during Striped Legless Lizard artificial shelter surveys at Lawrie Emmins Reserve, September 2019 – February 2020

Common Name	Scientific Name	Status
Reptiles		
Garden Skink	<i>Lampropholis guichenoti</i>	
Tiger Snake	<i>Notechis scutatus</i>	
Little Whip Snake	<i>Parasuta flagellum</i>	
Tussock Skink	<i>Pseudemoia pagenstecheri</i>	vu
Southern Grass Skink	<i>Pseudemoia entrecasteauxii</i>	
Eastern Brown Snake	<i>Pseudonaja textilis</i>	
Common Blue-tongue Lizard	<i>Tiliqua scincoides</i>	
Frogs		
Common Eastern Froglet	<i>Crinia signifera</i>	
Spotted Marsh Frog	<i>Limnodynastes tasmaniensis</i>	
Mammals		
House Mouse	<i>Mus musculus</i>	*

* - Species introduced to Australia

vu – Vulnerable in Victoria (DSE 2013)



Figure 1. Striped Legless Lizard surveys: Lawrie Emmins Reserve, Laverton



- Study area
- SLL tile grids
- Tussock Skink (single record)
- ▲ Tussock Skink (x3 records)
- Natural Temperate Grassland of the VVP
- EVC132 Plains Grassland
- Road
- Works footprint
- Watercourse
- Commonwealth land

TactEcol Consulting
 Map version: 01
 Date: 17 April 2020
 Scale: 1: 5,600 @ A4
 Coordinate system: GDA94 MGA Zone 55

0 100 200 300 m

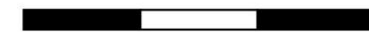




Plate 2 Examples of native tussock grassland surveyed for Striped Legless Lizard, including tile broken by vehicle



Plate 3 Tile checking, with a modified tub to prevent reptile escapes



Plate 4 Threatened Tussock Skink *Pseudemoia pagenstecheri* captured during artificial shelter surveys



Plate 5 Deceased Tussock Skink, found under a survey tile broken by vehicle use



Plate 6 Little Whip Snake recorded under a roof tile



Plate 7 Common Blue-tongue recorded under a roof tile



Plate 8 Juvenile Tiger Snake recorded under a roof tile

4. Discussion and Recommendations

The current targeted surveys did not detect the presence of the Striped Legless Lizard within the study area. The absence of the species currently, assuming a historical presence, may be attributed to habitat modification as a result of disturbance from both previous (clearing, earthworks) and current land use activities (including ongoing weed invasion, and recreational vehicle use including trail-bikers and four-wheel drivers).

There is a low likelihood of occurrence of the Striped Legless Lizard within the project area currently, based on the following considerations:

- The species was not detected during targeted surveys undertaken in accordance with federal survey guidelines and scientific literature on the species.
- The habitat was generally of low to moderate quality and comprised areas of modified cover of *Heavier-soils* Plains Grassland, consisting largely of native grasses that have colonised areas of disturbed ground (TactEcol Consulting 2019), and exotic dominated grassland.
- The majority of the site has been extensively modified from previous land use activities and supports a modified landform/substrate over imported fill; disturbance of the soil structure is considered to be highly deleterious for Striped Legless Lizard, which utilises soil cracks for shelter and refuge (O'Shea 2005).
- The site was observed to be accessed by trail-bikers and four-wheel drivers, which is likely an ongoing source of disturbance and degradation of potential habitat at the site.
- Patches of *Heavier-soils* Plains Grassland are isolated and fragmented between areas of exotic-dominated vegetation and disturbed ground, and have little connectivity to other known populations of Striped Legless Lizard in the local area.
- The Striped Legless Lizard has poor dispersal and recolonising potential following habitat disturbance (O'Shea 2005).

Given the low likelihood of occurrence of the Striped Legless Lizard, a referral of the proposed action to the Commonwealth Department of Agriculture, Water and Environment for potential impacts to the Striped Legless Lizard is not required. We understand that a referral will be submitted for the proposed removal of areas of the ecological community Natural Temperate Grassland of the Victoria Volcanic Plain (NTGVVP), which occurs on the site and is listed as Critically Endangered under the EPBC Act.

The threatened Tussock Skink was recorded on the site, and likely occurs throughout much of the native and exotic tussock grassland remnants on the site. This species is not listed under the Victorian FFG Act or the Commonwealth EPBC Act; however, it is classified as Vulnerable in Victoria by the Victorian Government (DSE 2013), and specific protection or management measures for this species may be required by DELWP during the permit approval process.

In line with the recommendations of TactEcol Consulting (2019) and Biosis (2019), we recommend that avoidance and minimisation of the removal of areas of Plains Grassland and NTGVVP is considered and incorporated into planning (i.e. functional and detailed design) for the site, wherever possible. Areas retained should be maintained and enhanced for the ecological values present, including particularly NTGVVP and Tussock Skink habitat.

In addition, we make the following recommendations:

- Access by unauthorised recreational vehicles should be restricted as far as possible, both in the interim and in the long-term following the proposed works, including through the erection of sturdy fencing where required. Recreational vehicle use is currently posing a material risk to ecological values present at the site.
- The prevention of impacts to retained native vegetation and species habitat should be addressed in a site-specific Construction Environmental Management Plan (CEMP). This will include issues such as environmental inductions, drainage and sediment management, weed control and installation of temporary fencing and signage.
- We concur with the recommendation made by Biosis (2019), for the development of an Ecological Management Plan by an ecological consultancy to provide detailed advice on the ongoing protection and long-term management of retained vegetation and habitat, linkages/connectivity and potential habitat features such as wetlands.

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Appendix 1 Fauna Survey Records

Vertebrate fauna recorded at the Lawrie Emmins Reserve study area during artificial shelter surveys in 2019-20.

Tussock Skink, in bold, classified as 'vulnerable' under the Advisory List of Threatened Vertebrate Fauna (DSE 2013).

Date	Grid 1	Grid 2	Grid 3	Grid 4	Grid 5	Incidental Site Records
12/09/2019	Spotted Marsh Frog (x4)		Spotted Marsh Frog (x6)	Spotted Marsh Frog (x2)		
18/09/2019	Spotted Marsh Frog (x3), Common Eastern Froglet	Spotted Marsh Frog	Tiger Snake	Skink (unidentified)	Spotted Marsh Frog	
26/09/2019	Spotted Marsh Frog	Spotted Marsh Frog	Spotted Marsh Frog	Spotted Marsh Frog	Spotted Marsh Frog	<i>Eastern Brown Snake, Common Blue-tongue Lizard</i>
01/10/2019		Spotted Marsh Frog	<i>Pseudemoia</i> sp.		Spotted Marsh Frog	
14/10/2019				Garden Skink	Little Whip Snake	<i>Common Blue-tongue Lizard</i>
18/11/2019				Little Whip Snake	Little Whip Snake, <i>Pseudemoia</i> sp.	
16/12/2019	Common Blue-tongue Lizard		Tussock Skink (x3; 1 juvenile, 1 gravid)	Tussock Skink (likely gravid)		
20/12/2019	Tussock Skink					<i>Common Blue-tongue Lizard</i>
27/12/2019	<i>Pseudemoia</i> sp.					
08/01/2020		Common Blue-tongue Lizard			Little Whip Snake	
17/01/2020	Southern Grass Skink	Common Blue-tongue Lizard			Little Whip Snake, Eastern Brown Snake	<i>Common Blue-tongue Lizard</i>

Date	Grid 1	Grid 2	Grid 3	Grid 4	Grid 5	<i>Incidental Site Records</i>
24/01/2020			Tussock Skink	House Mouse		Little Whip Snake, Eastern Brown Snake
26/01/2020				Common Blue-tongue Lizard, House Mouse		Eastern Brown Snake (x2, juveniles)
30/01/2020		Common Blue-tongue Lizard		Common Blue-tongue Lizard (juvenile)		
11/02/2020	Common Blue-tongue Lizard, Southern Grass Skink		Southern Grass Skink	Tussock Skink		
23/02/2020				Tussock Skink, Eastern Brown Snake		