

Text S1. Variable information for MaxEnt analysis

Pygmy bluetongue (*T. adalaidensis*) occurrence data was provided by the Department for Environment and Water, South Australia; brush wire grass (*A. behriana*) occurrence data was sourced from Atlas of Living Australia, and Adelaide trapdoor spider (*B. aurea*) data was sourced from database and literature searches (ala.org.au accessed 16/7/2022 & 18/2/2022, GBIF.org accessed 14/9/2022, Harrison et al. 2018), and observations of occupied trapdoor spider burrows made opportunistically (obs. by KHM) during field work.

A total of 25 environmental variables were used as predictor variables. Nineteen bioclimatic variables were downloaded from the WorldClim CMIP6 dataset modelled for 2081–2100 (representative concentration pathway = 4.5). Landcover modelled for 2015–2016 and native vegetation floristic areas were downloaded from the South Australian Data Directory (data.sa.gov.au accessed 15/6/2022) Also, land use for 2015–2016 was downloaded from the Department of Agriculture, Fisheries, Forestry. Land slope was downloaded from GeoScience Australia. Mean clay percent 30–60 cm deep, and soil type was downloaded from the Australian Soil Resource Information System.

Table S1. Predictor variables used for MaxEnt analysis. “1” represents variable was included and “0” variable was excluded. Annual mean temperature (Bio 1); Mean diurnal range (Bio 2); isothermality (Bio 3); maximum temperature of warmest month (Bio 5); minimum temperature of coldest month (Bio 6); mean temperature of wettest quarter (Bio 8); mean temperature of driest quarter (Bio 9); mean temperature of coldest quarter (Bio 11); annual precipitation (Bio 12); precipitation of driest month (Bio 14); precipitation of wettest quarter (Bio 16); precipitation of driest quarter (Bio 17); precipitation of warmest quarter (Bio 18); precipitation of coldest quarter (Bio 19); clay mean percentage 30–60 cm deep (clay), land cover, land use (categorical variable), soil (categorical variable), vegetation (veg).

	Bio 1	Bio 2	Bio 3	Bio 5	Bio 6	Bio 8	Bio 9	Bio 11	Bio 12	Bio 14	Bio 16	Bio 17	Bio 18	Bio 19	Clay	Land cover	Land use	Soil	Veg
<i>A. behriana</i>	0	0	1	0	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1
<i>B. aurea</i>	0	1	1	0	0	1	1	1	1	0	0	1	0	0	1	1	1	1	1
<i>T. adelaidensis</i>	1	0	1	1	1	1	1	1	0	0	0	1	1	0	1	1	1	1	1

Table S2. Summary table of criteria used to assess the potential translocation sites (pbt; pygmy bluetongue).

	Does the site have an abundance of spider burrows and are they high-quality?	Was there a difference in invertebrate composition between the site and pygmy bluetongue sites? Were grasshoppers caught?	How does the soil structure compare to the pygmy bluetongue sites?	What land management actions currently exist?	How large is the survey area? What is in close proximity to the site?	Is the vegetation similar to pygmy bluetongue sites? (E.g. are trees absent? What is the main vegetation community? How patchy is the landscape?)
Hallett Headland	No suitable burrows found.	NA (not tested).	NA (not tested).	Slashing.	17.5 hectares. Public walking tracks, roads.	No, there are trees present and the landscape is not patchy.
Dry Creek	Yes, there was an abundance (although lower than pbt sites), however had a higher proportion of high-quality trapdoor burrows than pbt sites.	Invertebrate composition did not significantly vary, but no grasshoppers were caught.	Had the lowest average percentage of sand out of all sites tested.	Unknown.	0.5 hectares. Public walking tracks, wetlands, highway, rail tracks.	No, there is an abundance of trees and shrubs with only small patches of tussocks.
Parafield Airport	No, although spider burrows were present they were of poor quality.	Invertebrate composition did not significantly vary and grasshoppers were caught.	Similar soil to the pbt sites, but soil was not consistent at 0, 10, 20 cm depths.	Slashing.	92 hectares. Airport, roads.	No, there is abundance of shrubs and the main vegetation community is different.

Private property	Yes, there was an abundance (although lower than pbt sites), however had a higher proportion of high-quality trapdoor burrows.	Invertebrate composition did not significantly vary and grasshoppers were caught.	Similar soil to pbt sites.	Sheep grazing.	267 hectares. Private property with fences. Houses >1 km away.	Yes, there is a lack of trees and the main vegetation community is similar to pbt sites.
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Table S4. PERMANOVA results of the pairwise comparisons of soil depths from the mastersizer analysis at Jamestown.

Groups	t	<i>P</i>
0 cm, 10 cm	8.788	0.004
0 cm, 20 cm	13.573	0.0006
10 cm, 20 cm	5.067	0.0046

Table S5. PERMANOVA results of the pairwise comparisons of soil depths from the mastersizer analysis at Parafield Airport.

Groups	t	<i>P</i>
0 cm, 10 cm	4.198	0.027
0 cm, 20 cm	5.784	0.012
10 cm, 20 cm	6.784	0.005

Table S6. PERMANOVA results of the pairwise comparisons of soil depths from the mastersizer analysis at Kulpara.

Groups	t	<i>P</i>
0 cm, 10 cm	2.946	0.064
0 cm, 20 cm	2.911	0.070
10 cm, 20 cm	0.780	0.547

Table S7. PERMANOVA results of the pairwise comparisons of soil depths from the mastersizer analysis at Dry Creek.

Groups	t	<i>P</i>
0 cm, 10 cm	1.663	0.322
0 cm, 20 cm	5.732	0.059
10 cm, 20 cm	2.865	0.126

Table S8. PERMANOVA results of the pairwise comparisons of soil depths from the mastersizer analysis at Peterborough.

Groups	t	<i>P</i>
0 cm, 10 cm	0.761	0.553
0 cm, 20 cm	1.805	0.188
10 cm, 20 cm	1.947	0.164

Table S9. PERMANOVA results of the pairwise comparisons of soil depths from the mastersizer analysis at the private property.

Groups	t	<i>P</i>
0 cm, 10 cm	1.549	0.237
0 cm, 20 cm	1.445	0.264
10 cm, 20 cm	1.106	0.381

References

- Atlas of Living Australia occurrence download at <https://biocache.ala.org.au/occurrences/search?q=qid:1657897535211> (accessed on 16 July 2022)
- Atlas of Living Australia occurrence download at <https://biocache.ala.org.au/occurrences/search?q=lsid%3Ahttps%3A%2F%2Fid.biodiversity.org.au%2Fnode%2Fapni%2F2887947&qualityProfile=ALA> (accessed on 18 July 2022)
- GBIF.org. GBIF Occurrence Download doi: 10.15468/dl.4yg79c (accessed on 14 September 2022).
- Harrison SE, Rix MG, Harvey MS, Austin AD (2018) Systematics of the Australian spiny trapdoor spiders of the genus *Blakistonia* Hogg (Araneae: Idiopidae). *Zootaxa* 4518(1): 1-76
- South Australian Government Data Directory. data.sa.gov.au (accessed 15/6/2022)