

### Supplementary Material

#### **Spatial prioritisation of survey and management efforts for a threatened pygopodid in south-western New South Wales**

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**Table S1. Environmental variables considered for predictor variables for the *Aprasia inaurita* species distribution model.**

The NSW Department of Planning and Environment (DPE) has developed a regional scale map of Plant Community Types (PCT) for NSW called the State Vegetation Type Map (SVTM). Development of the SVTM involved the use of aerial (ADS40/80) and satellite imagery (SPOT 5, SRTM, Landsat and Sentinel) and a collection of environmental variables. These environmental layers are used in the species distribution models, which informed the map outputs.

<b>Group</b>	<b>Predictor variable</b>	<b>Predictor description</b>	<b>Units</b>	<b>Original resolution</b>	<b>Reference/source</b>
Climate/Energy	ce_radann	Annual Mean Radiation (bio20)	Wm <sup>2</sup>	1 sec	Xu and Hutchinson (2011). Generated DPE.
Climate/Energy	ce_radhp	Highest Period Radiation (bio21)	Wm <sup>2</sup>	1 sec	Xu and Hutchinson (2011). Generated DPE.
Climate/Energy	ce_radlp	Lowest Period Radiation (bio22)	Wm <sup>2</sup>	1 sec	Xu and Hutchinson (2011). Generated DPE.
Climate/Energy	ce_radseas	Radiation of Seasonality: Coefficient of Variation (bio23)	C of V	1 sec	Xu and Hutchinson (2011). Generated DPE.
Climate/Temp	ct_frostdays_lt0	Number of days/annum with minimum temperature less than 0 degrees	°C	0.05 degrees (~ 5km)	Bureau of Meteorology
Climate/Temp	ct_frostdays_lt2	Number of days/annum with minimum temperature less than 2 degrees	°C	0.05 degrees (~ 5km)	Bureau of Meteorology
Climate/Temp	ct_temp_maxann	Average daily max temperature - Annual	°C	3 sec (~ 90 m)	Bureau of Meteorology
Climate/Temp	ct_temp_maxsum	Average daily max temperature - Summer	°C	3 sec (~ 90 m)	Bureau of Meteorology

Climate/Temp	ct_temp_maxwin	Average daily max temperature - Winter	°C	3 sec (~ 90 m)	Bureau of Meteorology
Climate/Temp	ct_temp_minann	Average daily min temperature - Annual	°C	3 sec (~ 90 m)	Bureau of Meteorology
Climate/Temp	ct_temp_minsum	Average daily min temperature - Summer	°C	3 sec (~ 90 m)	Bureau of Meteorology
Climate/Temp	ct_temp_minwin	Average daily max temperature - Winter	°C	3 sec (~ 90 m)	Bureau of Meteorology
Climate/Temp	ct_tempann	Annual Mean Temperature (bio1)	°C	1 sec	Xu T. and Hutchinson M. (2011). Generated DPE.
Climate/Temp	ct_tempannrnge	Temperature Annual Range: difference between bio5 and bio6 (bio7)	°C	1 sec	Xu and Hutchinson (2011). Generated DPE.
Climate/Temp	ct_tempdiurn	Mean Diurnal Range (Mean(period max-min)) (bio2)	°C	1 sec	Xu and Hutchinson (2011). Generated DPE.
Climate/Temp	ct_tempiso	Isothermality 2/7 (bio3)	unitless	1 sec	Xu and Hutchinson (2011). Generated DPE.
Climate/Temp	ct_tempmtcp	Min Temperature of Coldest Period (bio6)	°C	1 sec	Xu and Hutchinson (2011). Generated DPE.
Climate/Temp	ct_tempmtwp	Max Temperature of Warmest Period (bio5)	°C	1 sec	Xu and Hutchinson (2011). Generated DPE.

Climate/Temp	ct_tempseas	Temperature Seasonality: Coefficient of Variation (bio4)	C of V	1 sec	Xu and Hutchinson (2011). Generated DPE.
Climate/Water	cw_etaaann	Average areal actual evapotranspiration - Annual	mm	3 sec (~ 90 m)	Bureau of Meteorology
Climate/Water	cw_etapann	Average areal potential evapotranspiration - Annual	mm	3 sec (~ 90 m)	Bureau of Meteorology
Climate/Water	cw_precipann	Annual Precipitation (bio12)	mm	1 sec	Xu and Hutchinson (2011). Generated DPE.
Climate/Water	cw_precipdp	Precipitation of Driest Period (bio14)	mm	1 sec	Xu and Hutchinson (2011). Generated DPE.
Climate/Water	cw_precipseas	Precipitation of Seasonality: Coefficient of Variation (bio15)	C of V	1 sec	Xu and Hutchinson (2011). Generated DPE.
Climate/Water	cw_precipwp	Precipitation of Wettest Period (bio13)	mm	1 sec	Xu and Hutchinson (2011). Generated DPE.
Climate/Water	cw_prescott	Prescott Index	index	3 sec (~ 90 m)	Soil and Landscape Grid of Australia
Climate/Water	cw_rain_sumwinr	Average Rainfall - Summer Winter Ratio	mm	3 sec (~ 90 m)	Soil and Landscape Grid of Australia
Climate/Water	cw_rain1mm	Average Number of days with rainfall greater than 1mm Annual	mm	3 sec (~ 90 m)	Bureau of Meteorology
Climate/Water	cw_rainspr	Average Rainfall - Spring	mm	3 sec (~ 90 m)	Bureau of Meteorology
Climate/Water	cw_rainsum	Average Rainfall - Summer	mm	3 sec (~ 90 m)	Bureau of Meteorology

Climate/Water	cw_rainwin	Average Rainfall - Winter	mm	3 sec (~ 90 m)	Bureau of Meteorology
Drainage	dl_strmdstall	Euclidean distance to all streams (i.e. all orders: 1 to 9)	m	30 m	NSW Office of Water. Derived DPE
Drainage	dl_strmdstge2	Euclidean distance to 2 <sup>nd</sup> order streams and above	m	30 m	NSW Office of Water. Derived DPE
Drainage	dl_strmdstge4	Euclidean distance to 4 <sup>th</sup> order streams and above	m	30 m	NSW Office of Water. Derived DPE
Drainage	dl_strmdstge6	Euclidean distance to 6 <sup>th</sup> order streams and above	m	30 m	NSW Office of Water. Derived DPE
Landscape	lf_aspect_tr	Beer's Aspect- transformation of aspect to a continuous scaled variable. Changed for the southern hemisphere by setting maximum value (2) to SE slopes (coolest) and minimum (0) to NW slopes (warmest).	index	1 sec (~30 m)	derived smoothed 1 sec SRTM
Landscape	lf_cti	Compound topographic index or CTI also known as wetness index, topographic wetness index. Based on DEM-H (for flow direction and accumulation)	index	1 sec (~30 m)	derived smoothed 1 sec SRTM
Landscape	lf_curv	Curvature or slope of the slope: defines concave, convex and flat. A positive curvature indicates the surface is upwardly convex at that cell. A negative curvature indicates the surface is upwardly concave at that cell. A value of 0 indicates the surface is flat.	index	1 sec (~30 m)	derived smoothed 1 sec SRTM
Landscape	lf_curv_plan	Curvature in plan (is perpendicular to the direction of maximum slope)	index	1 sec (~30 m)	derived smoothed 1 sec SRTM
Landscape	lf_curv_prof	Curvature in profile (the direction of the maximum slope)	index	1 sec (~30 m)	derived smoothed 1 sec SRTM

Landscape	lf_dems1s	1 sec SRTM smoothed DEM (DEM-S)	mm	1 sec (~30 m)	CSIRO, GeoScience Australia
Landscape	lf_exp315	Exposure to the NW (low = exposed (drier forests); high = sheltered (moister forests)).	index	1 sec (~30 m)	Ashcroft and Gollan (2012)
Landscape	lf_logre10	Cold air drainage	index	1 sec (~30 m)	Ashcroft and Gollan (2012)
Landscape	lf_rough0100	Neighbourhood topographical roughness based on the standard deviation of elevation in a circular 100 m neighbourhood. Derived from DEM-S	index	1 sec (~30 m)	derived smoothed 1 sec SRTM
Landscape	lf_rough0500	Neighbourhood topographical roughness based on the standard deviation of elevation in a circular 500 m neighbourhood. Derived from DEM-S	index	1 sec (~30 m)	derived smoothed 1 sec SRTM
Landscape	lf_rough1000	Neighbourhood topographical roughness based on the standard deviation of elevation in a circular 1000 m neighbourhood. Derived from DEM-S	index	1 sec (~30 m)	derived smoothed 1 sec SRTM
Landscape	lf_slope_deg	Slope in degrees	degrees	1 sec (~30 m)	derived smoothed 1 sec SRTM
Landscape	lf_tpi_multiscale	Topographic position index at multiple scales	index	1 sec (~30 m)	derived smoothed 1 sec SRTM
Landscape	lf_tpi0120	Topographic position index using neighbourhood of 120m radius	index	1 sec (~30 m)	derived smoothed 1 sec SRTM
Landscape	lf_tpi0250	Topographic position index using neighbourhood of 250m radius	index	1 sec (~30 m)	derived smoothed 1 sec SRTM
Landscape	lf_tpi0500	Topographic position index using neighbourhood of 500m radius	index	1 sec (~30 m)	derived smoothed 1 sec SRTM
Landscape	lf_tpi1000	Topographic position index using neighbourhood of 1000m radius	index	1 sec (~30 m)	derived smoothed 1 sec SRTM

Landscape	lf_tpi2000	Topographic position index using neighbourhood of 2000m radius	index	1 sec (~30 m)	derived smoothed 1 sec SRTM
Location	dl_distcoast	Distance from coastline	degrees	30 m	DPE
Remote imagery	rs_fpc	Foliage projective cover or the percentage of ground cover occupied by the vertical projection of foliage. Predicted using a time series of SPOT images between 2008-2011	%	30 m	DPE
Remote imagery	rs_sfc	Seasonal Fractional Cover representing proportions of green (g), bare (b), and non-green or senescent (b). Derived from Landsat imagery over the period of 1998 to 2012, for each season (summer, winter, spring and autumn) and for 5th, 50th and 95th percentiles. A total of 36 layers.	% cover	30 m	DPE
Remote imagery	rs_waterobs_euc	Euclidean distance to water observations	m	30 m	DPE
Soil/Geology	sg_soil_fert	Soil fertility (1-5 low to high); derived from GSG	ranking	100K - 500K	DPE
Soil/Geology	sg_soil_gsg	Great Soil Group (GSG)	categorical	100K - 500K	DPE
Soil/Geology	sg_geola	Single dominant lithology type	categorical	250K	NSW Department Mineral Resources
Soil/Geology	sg_silicaindex	Parent material classification based on chemical composition and percent sileaceous: extremely siliceous (>85% silica) to ultra-mafic (<45% silica)	ordered categorical	30 m	DPE
Soil/Geology	sp_awc000_100prop	Available water capacity proportionally combined depths from 0 to 100 cm	%	3 sec (~ 90 m)	Soil and Landscape Grid of Australia. Proportion derived DPE.
Soil/Geology	sp_awc100_200	Available water capacity	%	3 sec (~ 90 m)	Soil and Landscape Grid of Australia

Soil/Geology	sp_bdw000_100prop	Bulk density proportionally combined depths from 0 to 100 cm	g/m3	3 sec (~ 90 m)	Soil and Landscape Grid of Australia. Proportion derived DPE.
Soil/Geology	sp_bdw100_200	Bulk density (100 - 200cm)	g/m3	3 sec (~ 90 m)	Soil and Landscape Grid of Australia
Soil/Geology	sp_cly000_100prop	Clay content proportionally combined depths from 0 to 100 cm	%	3 sec (~ 90 m)	Soil and Landscape Grid of Australia. Proportion derived DPE.
Soil/Geology	sp_cly100_200	Clay content (%) (100 - 200cm)	%	3 sec (~ 90 m)	Soil and Landscape Grid of Australia
Soil/Geology	sp_des000_200	Depth of Soil Profile (A and B horizons) 0 to 200 cm depths	m	3 sec (~ 90 m)	Soil and Landscape Grid of Australia
Soil/Geology	sp_ece000_100prop	Effective Cation Exchange Capacity proportionally combined depths from 0 to 100 cm.	meq/100g	3 sec (~ 90 m)	Soil and Landscape Grid of Australia. Proportion derived DPE.
Soil/Geology	sp_ece100_200	Effective Cation Exchange Capacity (100 - 200 cm)	meq/100g	3 sec (~ 90 m)	Soil and Landscape Grid of Australia
Soil/Geology	sp_nton000_100prop	Total nitrogen proportionally combined depths from 0 to 100 cm	%	3 sec (~ 90 m)	Soil and Landscape Grid of Australia. Proportion derived DPE.
Soil/Geology	sp_nton100_200	Total nitrogen (%) (100 - 200cm)	%	3 sec (~ 90 m)	Soil and Landscape Grid of Australia
Soil/Geology	sp_phc000_100prop	pH (calcium chloride) proportionally combined depths from 0 to 100 cm	pHCa	3 sec (~ 90 m)	Soil and Landscape Grid of Australia. Proportion derived DPE.
Soil/Geology	sp_phc100_200	pH (calcium chloride) (100 - 200cm)	pHCa	3 sec (~ 90 m)	Soil and Landscape Grid of Australia



Soil/Geology	sp_pto000_100prop	Total phosphorus proportionally combined depths from 0 to 100 cm	%	3 sec (~ 90 m)	Soil and Landscape Grid of Australia. Proportion derived DPE.
Soil/Geology	sp_pto100_200	Total phosphorus (%) (100 - 200cm)	%	3 sec (~ 90 m)	Soil and Landscape Grid of Australia
Soil/Geology	sp_slt000_100prop	Silt content proportionally combined depths from 0 to 100 cm	%	3 sec (~ 90 m)	Soil and Landscape Grid of Australia. Proportion derived DPE.
Soil/Geology	sp_slt100_200	Silt content (%) (100 - 200cm)	%	3 sec (~ 90 m)	Soil and Landscape Grid of Australia
Soil/Geology	sp_snd000_005prop	Sand content proportionally combined depths from 0 to 5 cm	%	3 sec (~ 90 m)	Soil and Landscape Grid of Australia. Proportion derived DPE.
Soil/Geology	sp_snd0_010prop	Sand content proportionally combined depths from 0 to 10 cm	%	3 sec (~ 90 m)	Soil and Landscape Grid of Australia. Proportion derived DPE.
Soil/Geology	sp_snd0_030prop	Sand content proportionally combined depths from 0 to 30 cm	%	3 sec (~ 90 m)	Soil and Landscape Grid of Australia. Proportion derived DPE.
Soil/Geology	sp_snd010_030prop	Sand content proportionally combined depths from 0 to 10 cm	%	3 sec (~ 90 m)	Soil and Landscape Grid of Australia. Proportion derived DPE.
Soil/Geology	sp_snd000_100prop	Sand content proportionally combined depths from 0 to 100 cm	%	3 sec (~ 90 m)	Soil and Landscape Grid of Australia. Proportion derived DPE.
Soil/Geology	sp_snd100_200	Sand content (%) (100 - 200cm)	%	3 sec (~ 90 m)	Soil and Landscape Grid of Australia

Soil/Geology	sp_soc000_100	Organic Carbon proportionally combined depths from 0 to 100 cm	%	3 sec (~ 90 m)	Soil and Landscape Grid of Australia. Proportion derived DPE.
Soil/Geology	sp_soc100_200	Organic Carbon	%	3 sec (~ 90 m)	Soil and Landscape Grid of Australia
Soil/Geology	sp_weath_ind	A weathering intensity index using airborne gamma-ray spectrometry and digital terrain analysis	index	100 m	Wilford J (2012)

## References

Ashcroft MB, Gollan JR (2012) Fine-resolution (25 m) topoclimatic grids of near-surface (5 cm) extreme temperatures and humidities across various habitats in a large (200 x 300 km) and diverse region. *International Journal of Climatology* 32, 2134-2148.

Wilford J (2012) A weathering intensity index for the Australian continent using airborne gamma-ray spectrometry and digital terrain analysis. *Geoderma* **183–184**, 124–142

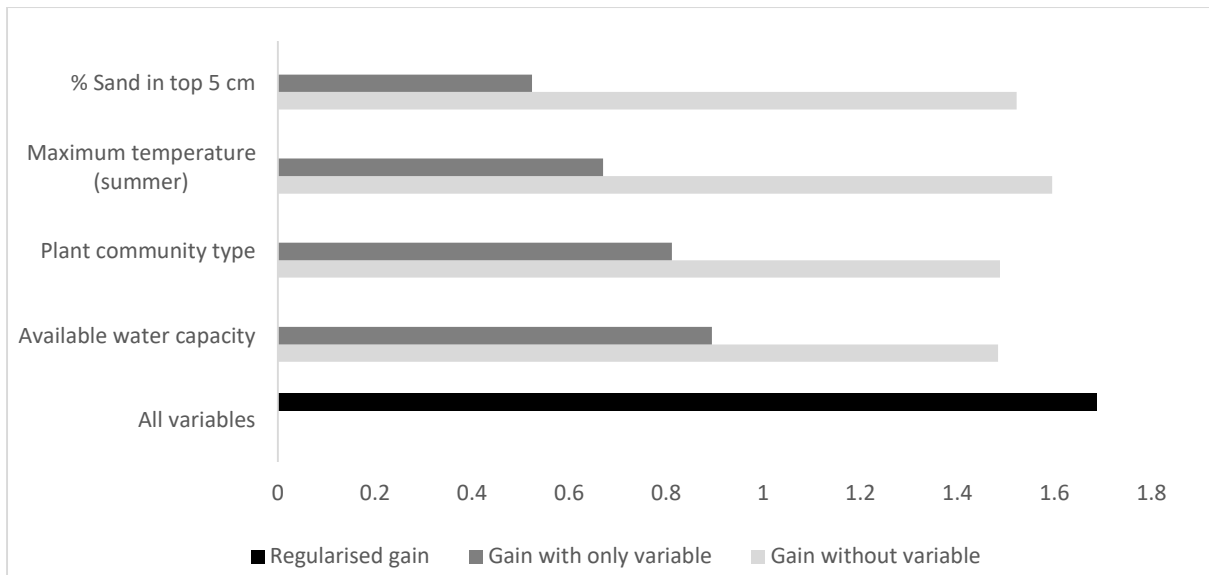
Xu T Hutchinson M (2011) ANUCLIM version 6.1 user guide. The Australian National University, Fenner School of Environment and Society, Canberra.

**Table S2.** Species detected by pitfall traps, terracotta tiles, or both.

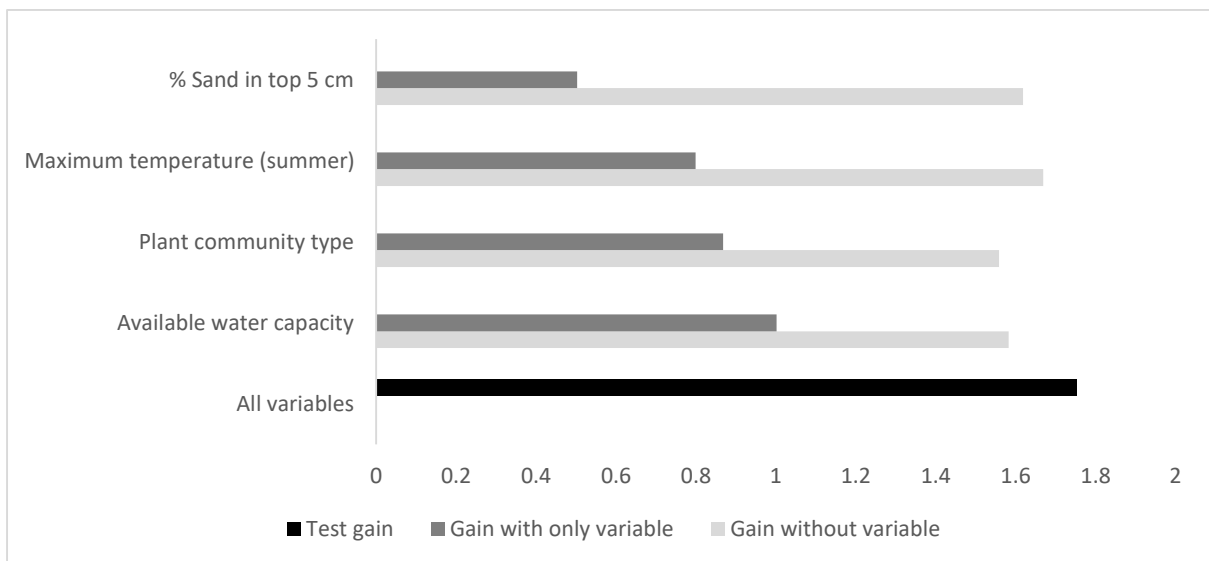
<b>Species</b>	<b>Detection method</b>
<b>Frogs</b>	
Myobatrachidae	
<i>Neobatrachus sudellae</i>	Pitfall
<b>Mammals</b>	
Burramyidae	
<i>Cercartetus concinnus</i>	Pitfall
Dasyuridae	
<i>Ningauai yvonneae</i>	Pitfall
<i>Sminthopsis crassicaudata</i>	Pitfall
<i>Sminthopsis macroura</i>	Pitfall
<i>Sminthopsis murina</i>	Pitfall
Muridae	
<i>Mus musculus</i>	Pitfall
<i>Pseudomys bolami</i>	Pitfall
<i>Pseudomys hermannsburgensis</i>	Pitfall
<b>Reptiles</b>	
Agamidae	
<i>Ctenophorus spinodomus</i>	Both
<i>Pogona vitticeps</i>	Pitfall
<i>Ctenophorus pictus</i>	Both
<i>Diporiphora nobbi</i>	Pitfall
Typhlopidae	
<i>Anilius australis</i>	Pitfall
<i>Anilius sp.</i>	Pitfall
Elapidae	
<i>Brachyuropsis australis</i>	Pitfall
<i>Pseudonaja modesta</i>	Pitfall
<i>Parasuta nigriceps</i>	Pitfall
<i>Pseudonaja textilis</i>	Pitfall
<i>Vermicella annulata</i>	Pitfall
Gekkonidae	
<i>Diplodactylus vittatus</i>	Pitfall
<i>Strophurus elderi</i>	Pitfall
<i>Rhynchoedura angusta</i>	Pitfall
<i>Gehyra versicolor</i>	Pitfall
<i>Heteronotia binoei</i>	Pitfall
<i>Lucasium damaeum</i>	Both
<i>Strophurus williamsi</i>	Pitfall
<i>Nephrurus levis levis</i>	Pitfall
Pygopodidae	
<i>Pygopus lepidopus</i>	Pitfall
<i>Lialis burtonis</i>	Pitfall
<i>Delma australis</i>	Pitfall

<i>Delma butleri</i>	Pitfall
Scincidae	
<i>Ctenotus atlas</i>	Pitfall
<i>Ctenotus brachyonyx</i>	Both
<i>Ctenotus regius</i>	Pitfall
<i>Ctenotus schomburgkii</i>	Both
<i>Cyclodomorphus melanops</i>	Pitfall
<i>Egernia striolata</i>	Pitfall
<i>Eremiascincus richardsonii</i>	Pitfall
<i>Lerista aericeps</i>	Pitfall
<i>Lerista punctatovittata</i>	Pitfall
<i>Lerista labialis</i>	Pitfall
<i>Liopholis inornata</i>	Pitfall
<i>Menetia greyii</i>	Pitfall
<i>Morethia boulengeri</i>	Pitfall
<i>Morethia obscura</i>	Pitfall
<i>Tiliqua occipitalis</i>	Pitfall
<i>Ctenotus sp.</i>	Tile
Varanidae	
<i>Varanus gouldii</i>	Pitfall

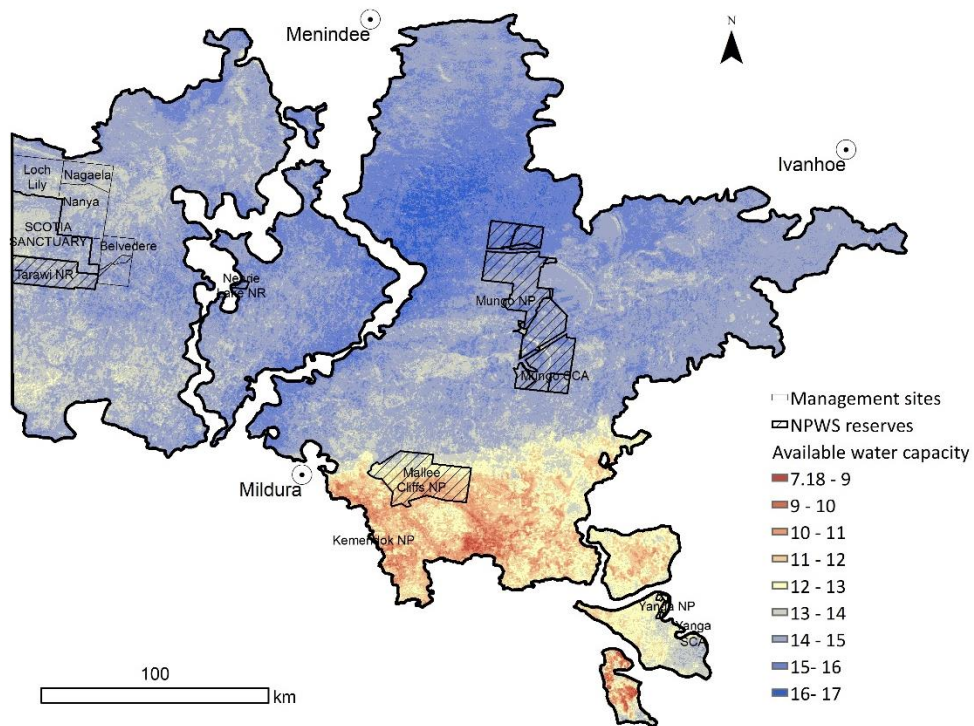
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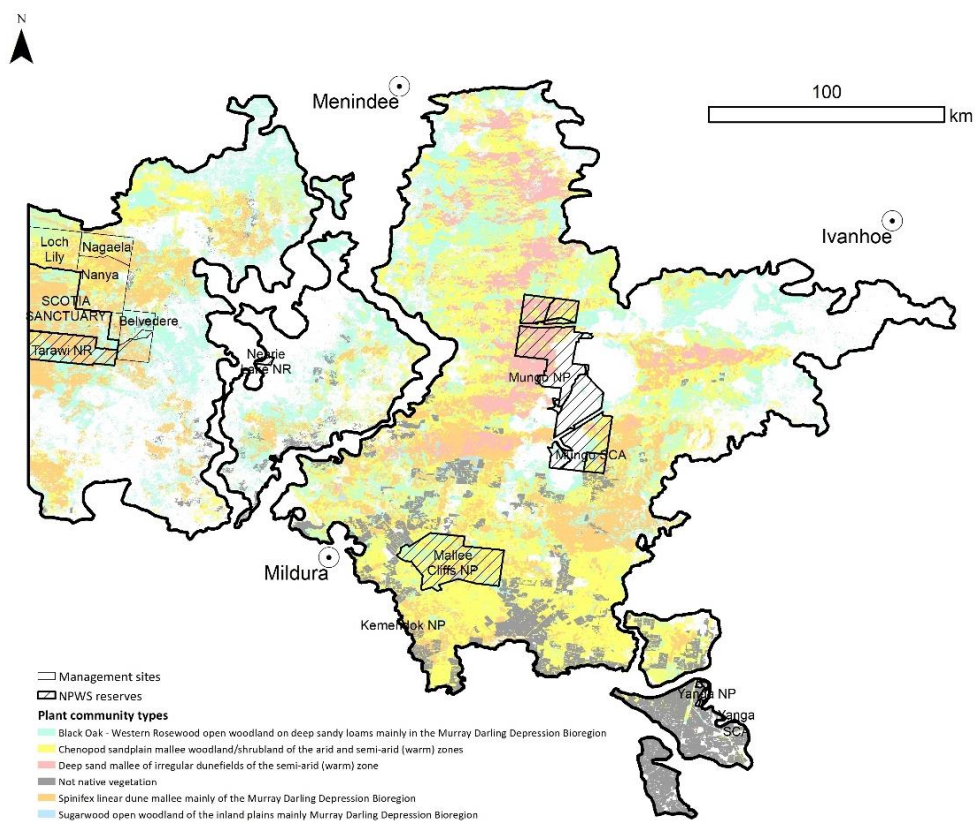
**Fig. S1.** Results of the jackknife test of variable importance for the training dataset. These results show the gain when a model is constructed with an individual model (dark grey bars) and the loss of gain when that variable is left out of the model (light grey bars) in comparison with the model using all four variables (black bar). Values represent averages over 20 replicate runs.



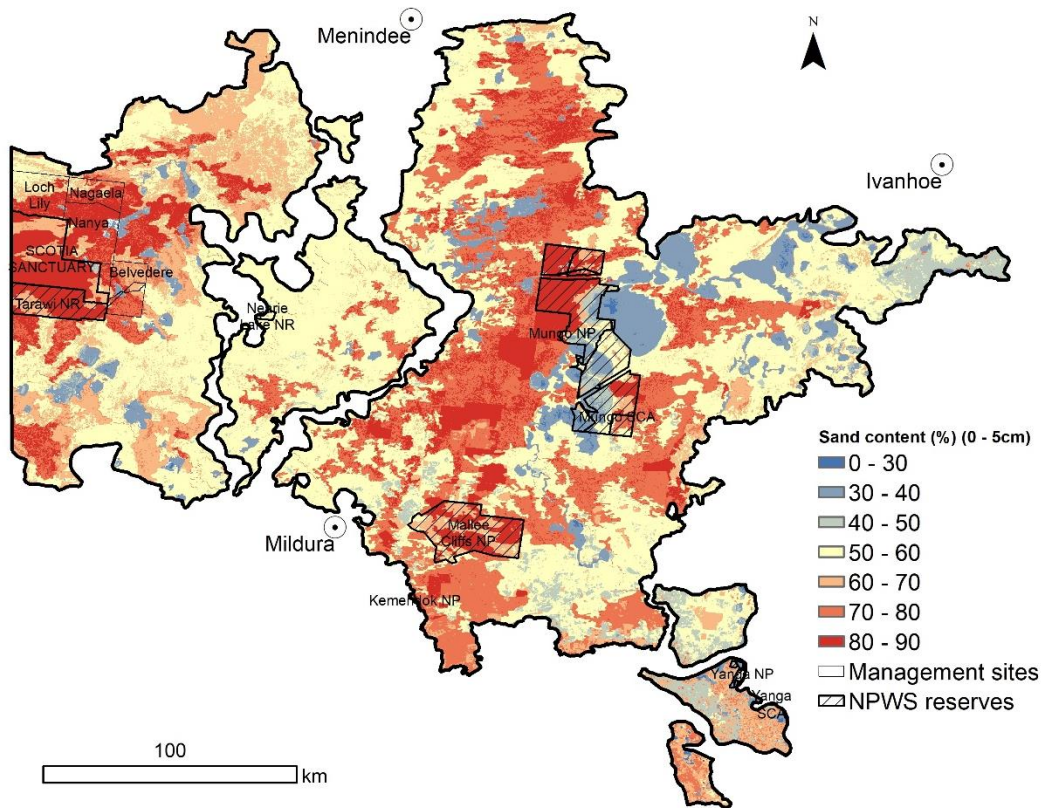
**Fig. S2.** Results of the jackknife test of variable importance for the test data. Values represent averages over replicate runs.



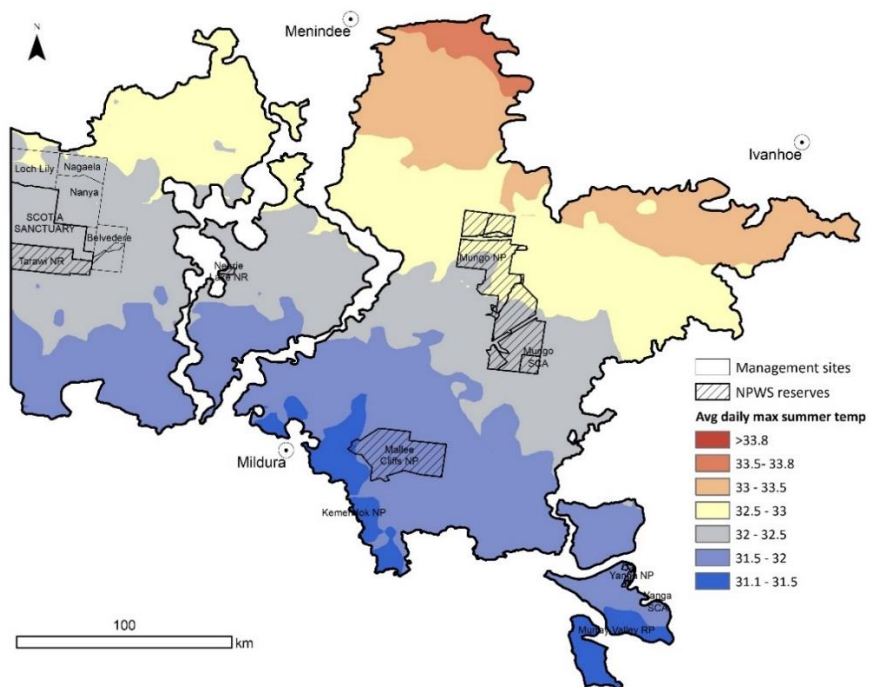
**Fig. S3.** Available water capacity proportionally from combined depths ranging from 0 to 100 cm, in the modelled area.



**Fig. S4.** Distribution of the six plant community types from which the mallee worm-lizard had been recorded in the modelled area.



**Fig. S5.** Sand content (%) (0 - 5cm) across the modelled area.



**Fig. S6.** Patterns in average daily max. summer temperatures across the modelled area.