

Albury Wodonga
Threatened Species
Monitoring Program
2022 Annual Report



Albury
Conservation
Company



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The report has been prepared by Dylan McWhinney (DM Ecological) who is an experienced ecologist and project environmental manager. He has over 10 years' experience in environmental management and consulting and is a Certified Environmental Practitioner (CEnvP) as administered by the Environmental Institute of Australia and New Zealand (EIANZ). The CEnvP scheme:



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Executive Summary

The Albury Wodonga Threatened Species Monitoring Program (TSMP) has been strategically monitoring Albury Wodonga's wildlife since 2018, with a focus on arboreal mammals and in particular the Squirrel Glider (*Petaurus norfolcensis*). Albury Conservation Company (ACC) has engaged DM Ecological to implement the program, which started in Albury (Thurgoona – Wirlinga) and expanded into Wodonga in 2020.

In 2022, the program monitored wildlife at over 120 sites using motion-sensing cameras as the primary survey tool. Two monitoring periods occurred in the Thurgoona - Wirlinga study area in 2022, Autumn and Spring. The survey effort in each period was 64 sites and 60 sites monitored respectively. Results showed:

- 27 Squirrel Glider detections in the Autumn monitoring period (detection rate of 42%)
- 19 glider detections in the Spring monitoring period (detection rate of 32%).

Since 2019 gliders have been most frequently detected in riparian sites within the proposed development land use zone. Across the rural and urban land use zones, remnant habitat types have provided the most frequent glider detections. Similarly, gliders have been detected in remnants across all three land use zones during all survey periods, highlighting the importance of this habitat type for the species.

Two monitoring periods occurred in the Wodonga study area in 2022, Autumn and Spring. The survey effort in each period was 59 and 53 sites monitored respectively. Results showed:

- 25 glider detections in the Autumn monitoring period (detection rate of 42%)
- 26 glider detections in the Spring monitoring period (detection rate of 49%)

Roadside and riparian habitat types appear to account for more glider detections in the rural and urban land use zones than they do in the proposed development zone. The habitat types are most often linear in shape and can provide effective wildlife movement corridors throughout highly fragmented landscapes.

Recommended actions include:

1. Continue implementing the TSMP in both Thurgoona – Wirlinga and Wodonga to improve knowledge of threatened species and identify critical habitats, linkages, and management interventions to ensure the populations remain viable in the face of urbanisation.
2. Detection images captured during the TSMP should be uploaded to the Wildlife Insights artificial intelligence program to assist in the platform's ability to detect and recognise glider species from images captured via motion sensing cameras.
3. Prioritise the delivery of the three-year funded '*Applying science to on-ground action for conservation of Albury Wodonga's threatened wildlife*' project. In particular, commence monitoring of sites with habitat interventions to facilitate BACI experiment.
4. Ensure the timely and effective delivery of the '*Applying science to inform on-ground actions for conserving Wodonga's threatened wildlife*'.
5. This program and its associated projects should be supported by Councils and other key stakeholders. It aligns with the Regional Natural Environment Strategy (RNES) and meets many of the actions in the RNES Action Plan (2020-24).
6. The TSMP should collaborate with PhD candidate funded by Albury Conservation Company to ensure beneficial relationship and outcomes for both parties;
7. The replacement of twenty cameras should be prioritised by Albury Conservation and its investors to ensure the project can be delivered efficiently.

The Albury Wodonga Threatened Species Monitoring Program has been made possible with funding from Albury City Council, Ross Trust, Wottenhall Environment Trust, Wodonga Council and others.

1 Introduction

1.1 Project background

DM Ecological has been engaged by Albury Conservation Company (ACC) since April 2018 to implement a Squirrel Glider Monitoring Program (SGMP) in the greater Thurgoona / Wirlinga area of New South Wales (NSW). The SGMP at its inception had the following objectives:

- 1 To determine the impact of urbanisation on Squirrel Glider (*Petaurus norfolcensis*) populations within key 'stronghold' patches (as indicated in previous studies).
- 2 To evaluate the effectiveness of management actions designed to improve the persistence of Squirrel Glider populations in 'lower quality' patches.
- 3 Engage the community in the protection and enhancement of Squirrel Glider populations by providing avenues to participate in monitoring and restoration works.
- 4 Maintain a strong base program but be amenable to incorporating complementary research projects as funding and opportunities become available.

In line with objective four (above), the program was extended across the State border to include sites within the Wodonga Council local government area (LGA) in Victoria, after funding was received from both the Wodonga Council and the Ross Trust. This provided a substantial increase in geographic area, monitoring sites and potential threatened species presence to the work previously being funded by Albury City Council and the Wettenhall Environment Trust in the Thurgoona – Wirlinga landscape. With this extension to the program, the SGMP was renamed the Albury Wodonga Threatened Species Monitoring Program (TSMP) to account for the potential of encountering other threatened arboreal or semi-arboreal mammals such as the Brush-tailed Phascogale (*Phascogale tapoatafa*) and Spotted-tailed Quoll (*Dasyurus maculatus*).

Monitoring across the study areas (hereafter referred to as Thurgoona - Wirlinga and Wodonga) occurs biannually in Autumn and Spring. Due to delays in obtaining relevant permits/licences in Victoria, the Wodonga monitoring commenced in Winter 2020. Select sites are monitored using arboreal mounted motion sensing cameras (trail cams), paired with a scent lure (honey, water, and sugar mix) with the purpose of attracting target species in front of the camera and recording their presence. Records are verified and uploaded to publicly available datasets via the NatureMapr (<https://naturemapr.org/home>) citizen science platform ([Albury Wodonga Nature Map](#)), which feeds into the Atlas of Living Australia (ALA) (<https://www.ala.org.au/>).

In Thurgoona – Wirlinga a total of 74 sites have now been monitored at least once across the ten monitoring periods (biannually 2018-22). In Wodonga, 60 sites have been monitored at least once across the six monitoring periods (biannually 2020-22). No threatened species other than the Squirrel Glider have been detected using the motion sensing cameras so far.

1.2 Location of study area

The study area includes major growth corridors within the Albury City Council LGA and the Wodonga Council LGA. It is focused in Thurgoona – Wirlinga in NSW and the Leneva growth corridor in Victoria (VIC) extending from White-Box rise in Thurgoona to Baranduda in Wodonga (Figures 1, 2 and 3).

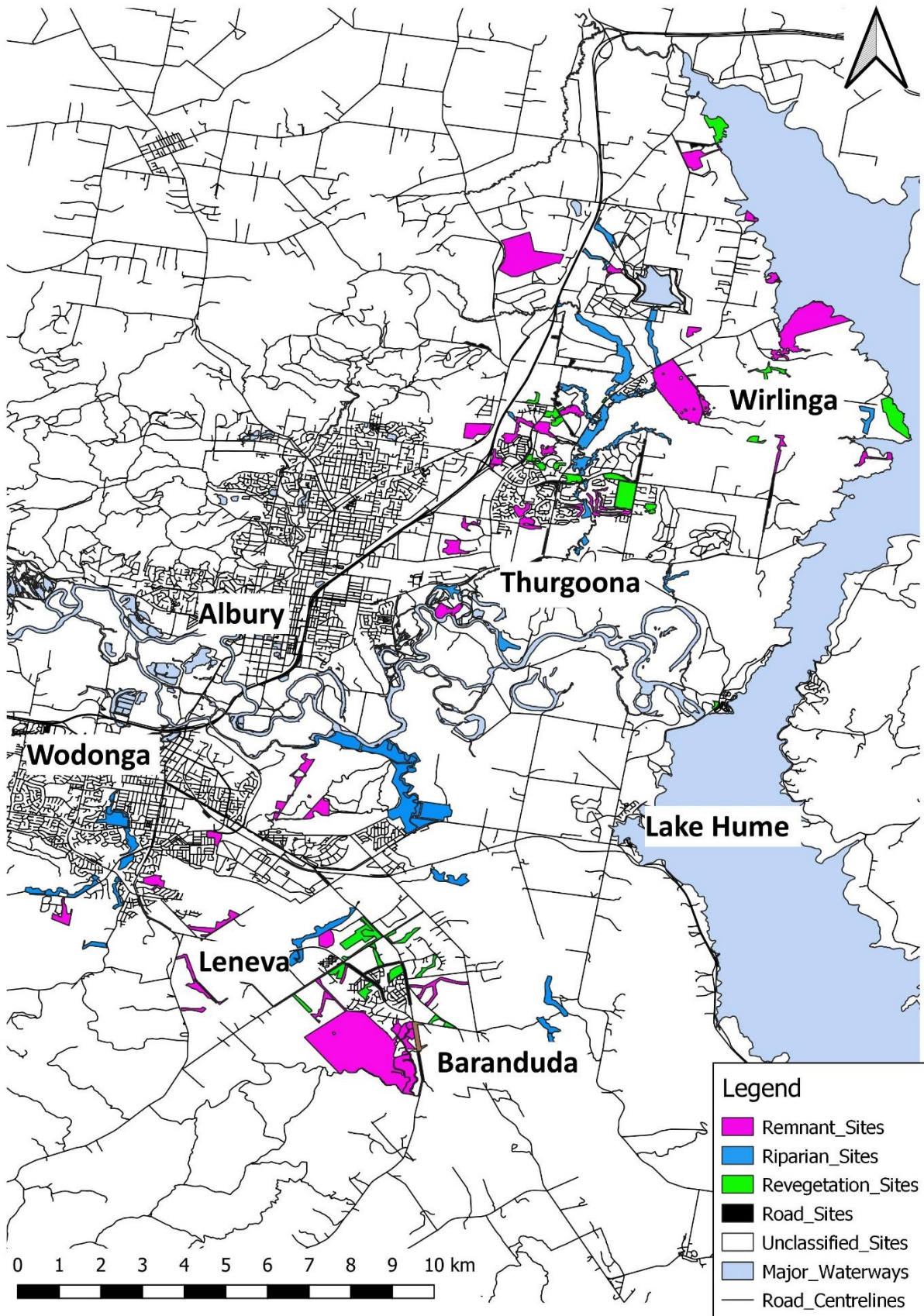


Figure 1: Entire study area including Thurgoona - Wirringa and Wodonga study areas

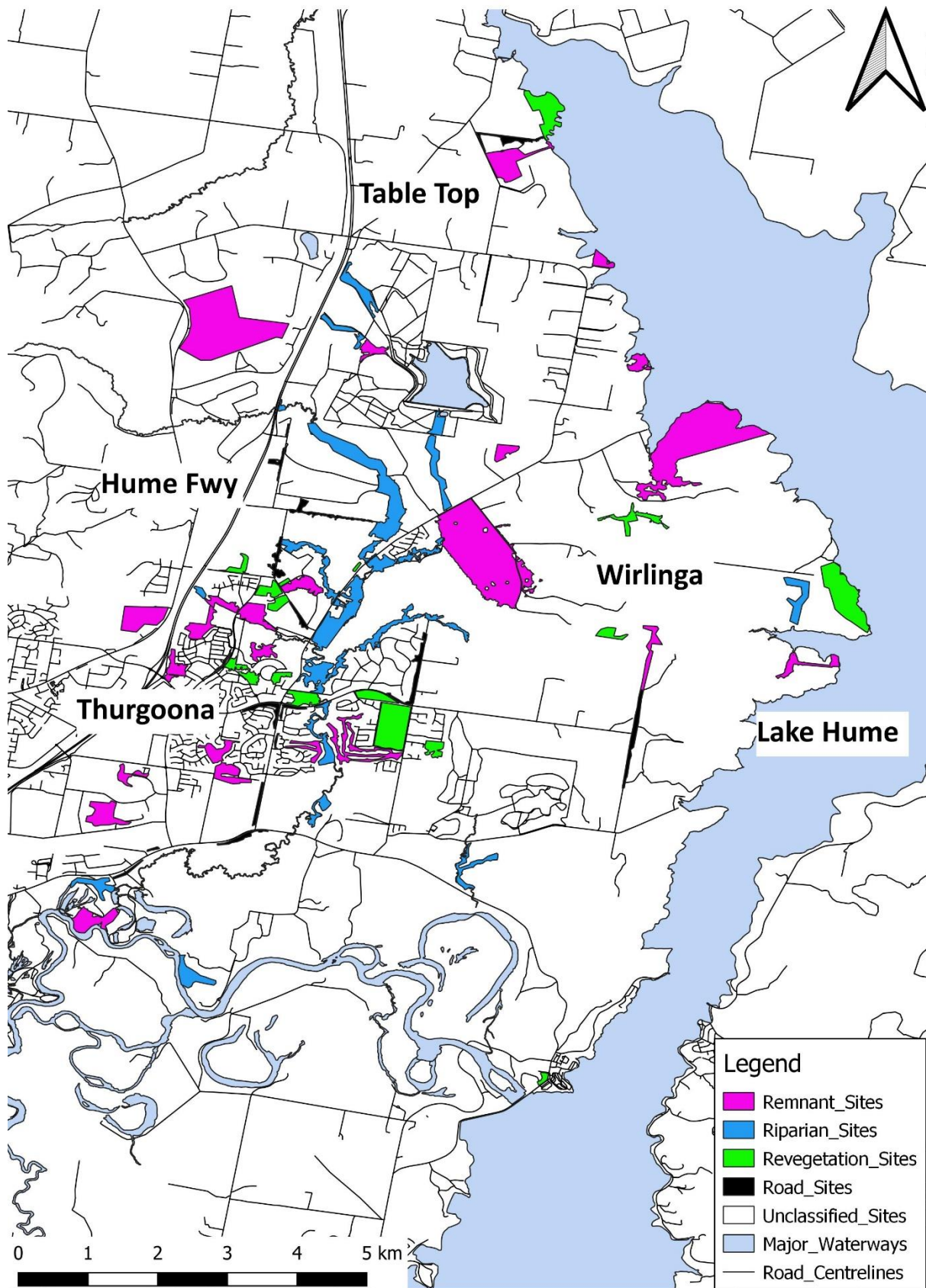


Figure 2: Thurgoona - Wirlinga study area

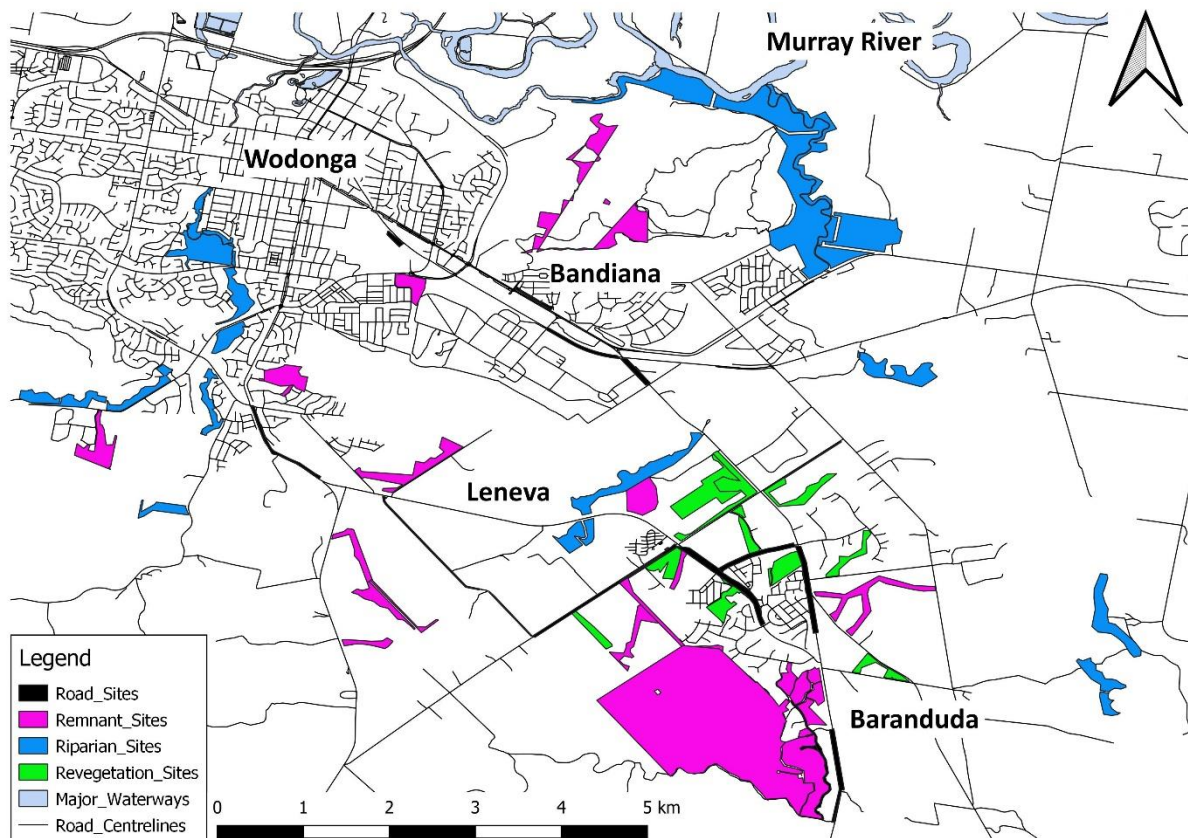


Figure 3: Wodonga study area

2 Methodology

2.1 Study Design

The TSMP involves 85 potential survey sites in Thurgoona – Wurlinga and 60 potential survey sites in Wodonga. Native vegetation greater than 5 ha was mapped and stratified by:

Habitat type:

- roadside verges,
- patches of remnant vegetation,
- riparian corridors, and
- forward tree plantings,

and land zone:

- urban,
- peri-urban (future development)
- and rural (agricultural land).

Sites delineated from this exercise were randomly selected weighted to locations with pre-existing Squirrel Glider records (Michael et al. 2021). Further potential survey sites have been identified in the field and where these are incorporated into the program, they are also defined by their broad habitat type, minimum 5ha size and zoned land use.

2.2 Threatened Species Monitoring Protocol

The primary survey method used in the TSMP is motion sensing wildlife cameras (Little Acorn LTL-5610 Series and the Little Acorn LTL-6310 Series). The cameras can take 12MP High-Definition images and store up to 12GB of data. The zero-glow technology makes them ideally suited for monitoring nocturnal species. The cameras are deployed in trees at heights between 3-10 m depending on tree suitability, target area, reach, safety, and to minimise the potential for theft.

Cameras were typically placed on an auxiliary branch facing a target area on the main trunk or another branch with significant surface area. The distance from camera to target area was 1-2 m to ensure the best chance of capturing a clear image that could be positively identified. Care was taken to minimise the likelihood of leaves triggering images. With the camera installed, the target area on the tree was sprayed with an attractant mix comprised of water, honey and sugar to provide a scent lure and improve the likelihood of detecting the target species at each location. Figure 4 (page 11) demonstrates a typical camera installation.

Basic data was captured at each initial site visit, including Site ID, Camera ID, Tree Species, Approximate Height (meters), Tree Circumference (cm) and a waypoint taken using Garmin Etrex 10 Global Positioning System (GPS).

Cameras were deployed for a minimum of 10 nights and a maximum of 14 nights at each location. After cameras were retrieved, the images were downloaded and analysed by ecologists to identify wildlife observations and calculate detection rates per site. Priority is given to target (threatened species) identification and once confirmed, each record (images and GPS location) is uploaded to [Albury Wodonga Nature Map](#) where it can be verified by expert moderators. This record is accessible to Albury Wodonga Nature Map users only, however data is regularly harvested and uploaded to the Atlas of Living Australia where the records become publicly accessible.

During camera installation and retrieval, staff also recorded opportunistic bird observations with the purpose of documenting other threatened species. The bird surveys provide an opportunity to identify and record other threatened species in the study area and contribute data to publicly accessible data bases (e.g. Albury Wodonga Nature Map and Atlas of Living Australia), where it will provide value in planning assessments or other population monitoring/distribution research. Birds are recorded after being directly observed or identified via their call.



Figure 4: Typical camera placement

2.3 Limitations

ACC set the target for sites monitored at 68 in the NSW study area and 60 in the VIC study area during each monitoring period. So far, the greatest number of sites monitored as been 67 and 59 in each study area respectively. Table 1 (below) shows the monitoring efforts of the 2022 monitoring periods.

Table 1: 2022 TSMP Survey efforts (no. of sites monitored)

Monitoring Period	No. of sites monitored NSW	No of sites monitored VIC
Autumn 2022	64	59
Spring 2022	60	53

Limitations to achieving the desired survey effort has primarily been due to access restrictions on private property. There have been several occasions where monitoring sites have been cleared for development and no longer provide a viable site (n=3). Wet weather associated with the third consecutive year of La Niná caused widespread flooding, particularly in Victoria and a limiting factor preventing access to some sites in 2022. Over the course of the TSMP, seven cameras have been stolen whilst deployed in the field resulting in a reduction in survey effort for the associated monitoring period.

Sites not monitored in 2022 and their associated information are shown in Table 2

Table 2: 2022 TSMP Survey limitations

Study Area	Site ID	Monitoring Period	Land Use Type	Habitat Type	Limitation
NSW	1	Spring	Rural	Riparian	Too wet to access during monitoring period
NSW	3	Spring	Rural	Remnant	
NSW	7	Spring	Rural	Riparian	
NSW	14	Autumn Spring	Urban	Revegetation	Site was cleared for development prior to Autumn 2019 period.
NSW	29	Autumn	Urban	Remnant	Nearby construction associated with residential development prevented access to site during monitoring period.
NSW	30	Autumn	Urban	Riparian	
NSW	33	Autumn	Urban	Revegetation	
NSW	53	Autumn Spring	Proposed Development	Revegetation	Landholder not contactable for access
NSW	57	Autumn Spring	Rural	Revegetation	Too wet to access during monitoring period
NSW	59	Autumn Spring	Rural	Riparian	Landholder did not permit access
NSW	62	Autumn Spring	Rural	Riparian	Landholder not contactable for access
NSW	66	Autumn Spring	Proposed Development	Roadside	Landholder did not permit access
NSW	68	Spring	Rural	Riparian	Too wet to access during monitoring period
NSW	69	Autumn Spring	Rural	Remnant	
NSW	72	Spring	Rural	Riparian	
NSW	73	Spring	Rural	Riparian	
NSW	74	Spring	Rural	Revegetation	
VIC	127	Spring	Proposed Development	Remnant	
VIC	128	Spring	Proposed Development	Remnant	
VIC	143	Spring	Rural	Riparian	
VIC	150	Spring	Rural	Riparian	
VIC	157	Autumn Spring	Rural	Riparian	
VIC	158	Spring	Rural	Riparian	
VIC	159	Spring	Rural	Riparian	

In the Victorian study area, there is the added limitation of accurate species identification with the potential overlap in distribution between the Squirrel Glider (*Petaurus norfolcensis*) and Krefft's Glider (*Petaurus notatus*) which are visually similar species. The main distinguishing features between the two species the overall size, underbelly fur colour, tail size and colour and muzzle shape (See Table 3). These distinguishing features can be difficult to discern on the black and white images captured, which do not provide scale or a consistent pose amongst individuals for comparisons. Where a distinction could not be made between the two species, the records were uploaded as a glider species only, and do not contribute towards the threatened species detections. This may result in a lower detection rate within the Wodonga study area when compared to Thurgoona - Wirlinga.

Table 3: Squirrel Glider (*Petaurus norfolcensis*) and Krefft's Glider (*Petaurus notatus*) distinguishing features.

Species	Head Body Length	Tail Length	Weight	Underbelly Fur	Other
<i>P. norfolcensis</i>	170-240mm	220-300mm	190-300g	Clear White	Muzzle longer, pointed. Tail never white tipped.
<i>P. notatus</i>	160-200mm	165-210mm	90-150g	Cream White	Muzzle shorter, rounded. Tail frequently white tipped

Table source: Menkhorst and Knight 2011

Examples of discerning features between the two species as well as an image captured during the monitoring program where differentiation is not possible are provide in Figures 5-7 below.



Figure 5: Squirrel Glider displaying long, pointed muzzle and tail length significantly longer than head body length. Tail fur is long and all black (Albury Wodonga Nature Map- User WingsToWander, 2020)



Figure 6: Krefft's Glider displaying shorter, rounded muzzle with a tail length comparable to head body length. Tail fur is noticeably shorter and white-tipped (Albury Wodonga Nature Map - User WingsToWander, 2020)



Figure 7: Example of an image captured by a motion sensing camera where it was not possible to definitively differentiate between the two *Petaurus* species (Albury Wodonga Nature Map - User DMeco, 2020)

3 Results

3.1 New South Wales – Albury (Thurgoona - Wirlinga)

3.1.1 Survey effort and Squirrel Glider detection rate

Two monitoring periods occurred in the Thurgoona - Wirlinga study area in 2022, Autumn and Spring. The survey effort in each period was 64 sites and 60 sites monitored respectively. They resulted in 27 Squirrel Glider (hereafter referred to as glider) detections in the Autumn monitoring period (detection rate of 42%) and 19 glider detections in the Spring monitoring period (detection rate of 32%). There was an increase in overall glider detection rate from the previous monitoring period (Spring 2021), where the detection rate was 37% before decreasing to 32% in the Spring 2022 period. The 2022 monitoring periods have resulted in ten successive monitoring periods with glider detection rates greater than 30%, within a range of 30-45%. Table 4 (below) shows the overall survey efforts and glider detection rates in the Thurgoona-Wirlinga study area since the beginning of the program. Maps that present key data in this section spatially are provided in Appendix A.

Table 4: TSMP survey effort and associated Squirrel Glider detection rates between Winter 2018 and Spring 2022

Monitoring Period	Sites Monitored	Sites with Squirrel Glider Detections	Detection Rate	Trend
Winter 2018	65	26	40%	
Spring 2018	64	21	33%	↓
Autumn 2019	62	20	32%	↓
Spring 2019	63	19	30%	↓
Autumn 2020	62	22	35%	↑
Spring 2020	60	23	38%	↑
Autumn 2021	66	30	45%	↑
Spring 2021	67	25	37%	↓
Autumn 2022	64	27	42%	↑
Spring 2022	60	19	32%	↓

3.1.2 Trends in detection rates among habitat types and land use zones

Over the course of the TSMP in Thurgoona - Wirlinga, there has been an overall downward trend in glider detection rates at roadside sites (50% in Winter 2018 to 29% in Spring 2021). Conversely, riparian sites have shown an overall upward trend in glider detection rates between the Winter 2018 and Spring 2021 periods with the rates increasing from 17% to 33%. Detection rates at remnant sites have fluctuated over the course of the

TSMP. After Spring 2021 it is the habitat type with the highest detection rate (50%) as it was at the commencement of the TSMP in Winter 2018 (53%). In 2020, results showed a moderate reduction in glider detection rates at remnant and roadside sites, a stable rate at riparian sites and a significant decrease in glider detection rates at revegetation sites (Table 5). The glider detection rates per habitat type for each monitoring period are shown in Figure 8.

Table 5: Detection rates according to habitat type in 2022

Habitat	Autumn		Spring		Trend
	Sites Monitored	Detection Rate	Sites Monitored	Detection Rate	
Remnant	17	58.82%	17	41.18%	↓
Revegetation	13	30.77%	13	30.77%	→
Riparian	17	35.29%	13	15.38%	↓
Roadside	17	41.18%	17	35.29%	↓
All	64	42.19%	60	31.67%	↓

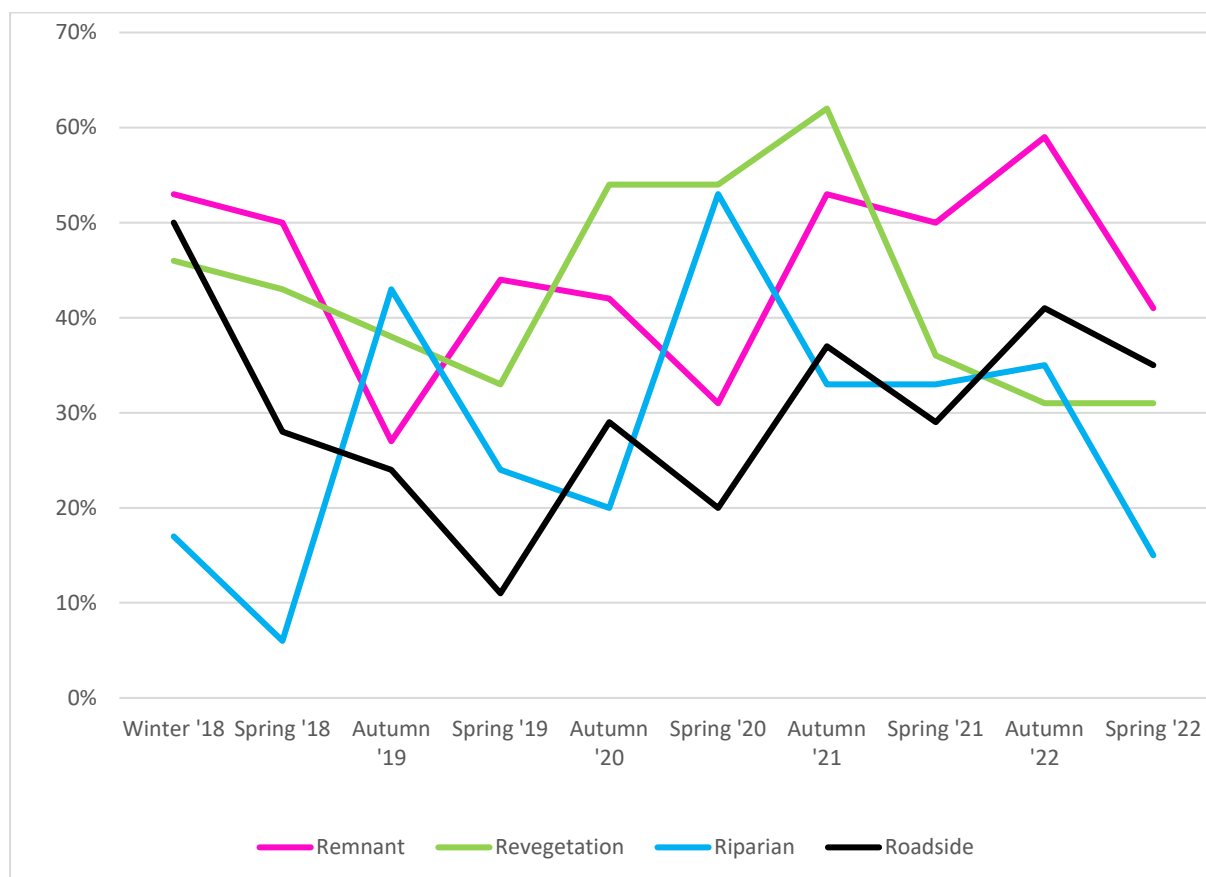


Figure 8: Squirrel Glider detection rates according to each habitat type in each monitoring period in Thurgoona - Wirlinga

Within a study period (calendar year) it is difficult to discern any real habitat preference or change thereof by gliders, with detection rates showing significant variation within habitat type and land use zone across the two

monitoring periods. This is not unexpected, with studies showing that Squirrel Glider home ranges are on average 5.6 - 6.2 ha, cover multiple vegetation types, often overlap and consist of multiple den sites (Sharpe and Goldingay 2007). In a study of the denning behaviour of Squirrel Gliders occupying road reserves at Euroa VIC, individuals radio tracked for an average of 44 days used from 1–15 den sites, but the average was around 5–6 (van der Ree 2000). The Squirrel Gliders mobility and propensity to change den sites within their home range, combined with the monitoring sites being static (i.e., the same tree is monitored each monitoring period) means there is a strong probability of recording a false absence within a monitoring site, habitat type or even land use zone. That is gliders may be utilising a different part of their home range to the monitoring site at the time of monitoring.

Figures 9 and 10 demonstrate the difference in detection rates at each habitat and land use type within the study period (2022 calendar year).

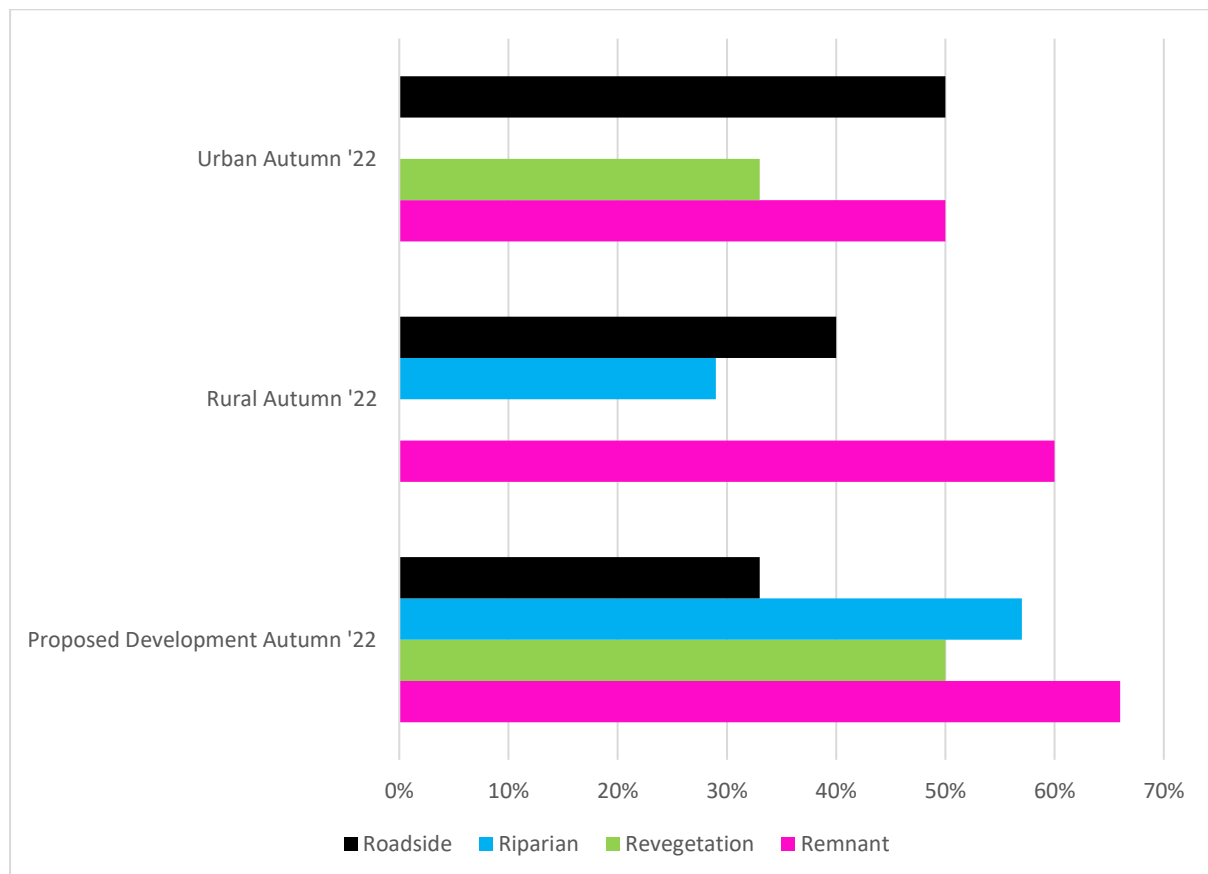


Figure 9: Squirrel Glider detection rates of each habitat type according to land use zone for the Autumn 2022 monitoring period in Thurgoona - Wirlinga

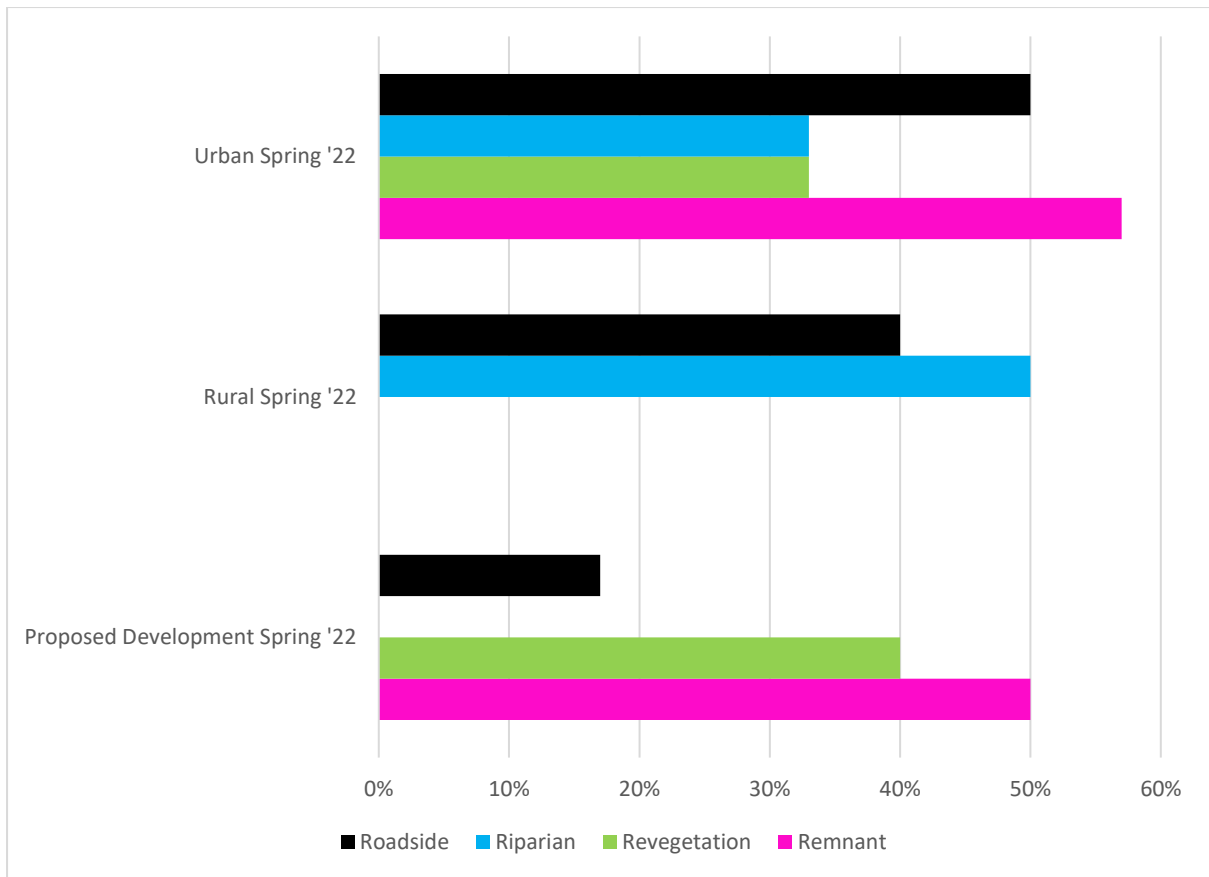


Figure 10: Squirrel Glider detection rates in each habitat type and land use zone during the Spring 2022 monitoring period in Thurgoona - Wirlinga.

Figures 9 and 10 show some variances, highlighted by riparian sites in the proposed development land use zone going from a glider detection rate of 57% in Autumn 2022 to 0% in Spring 2022, remnant sites in the rural land use zone decreasing from 60% detection rate to 0% and riparian sites in the urban land use zone increasing from 0% to 33% in the same period. Roadside sites were the only habitat type that detected gliders in each land use zone across both monitoring periods.

Figure 11 shows the glider detection rates within each land use zone (across all habitat types) since the start of the program. This data may be able to assist in detecting landscape scale land-use changes, disturbances, events, seasonality etc.

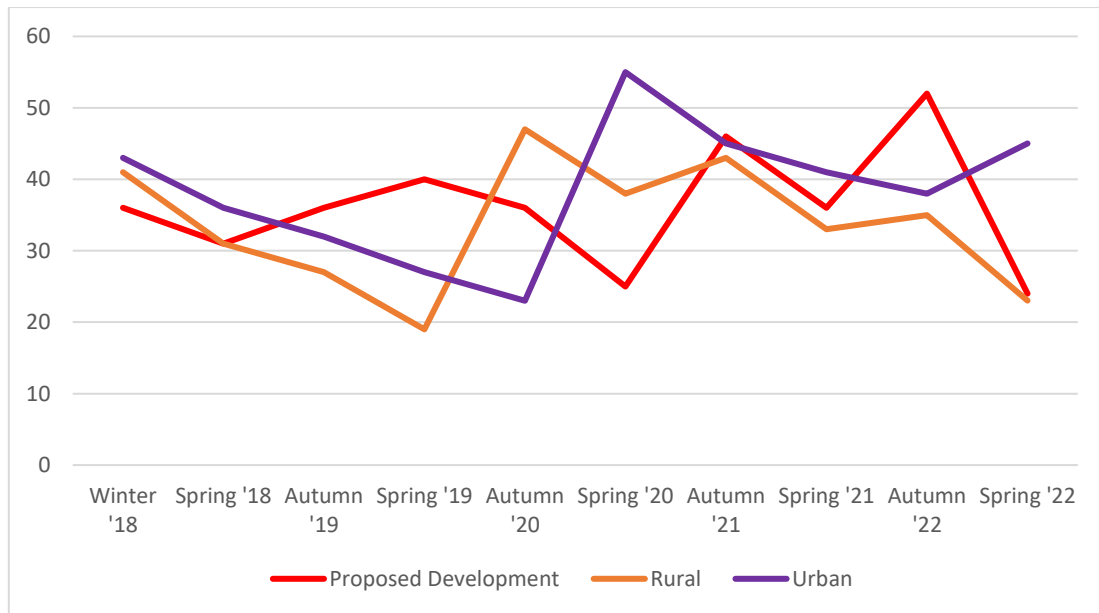


Figure 11: Squirrel Glider detection rates in Thurgoona-Wirlinga within each land use zone across life of program.

The actual number of glider detections has been tracked over each of the monitoring periods to give a visual representation of the habitat type in each land use zone where gliders are recorded (see Figure 12). This data is more representative of species habitat use given that it now extends over six years (ten monitoring periods), allowing for the identification of any geographical or seasonal trends. Since 2019 gliders have been most frequently detected in riparian sites within the proposed development land use zone. Across the rural and urban land use zones, remnant habitat types have provided the most frequent glider detections. Similarly, gliders have been detected in remnants across all three land use zones during all survey periods, highlighting the importance of this habitat type for the species.

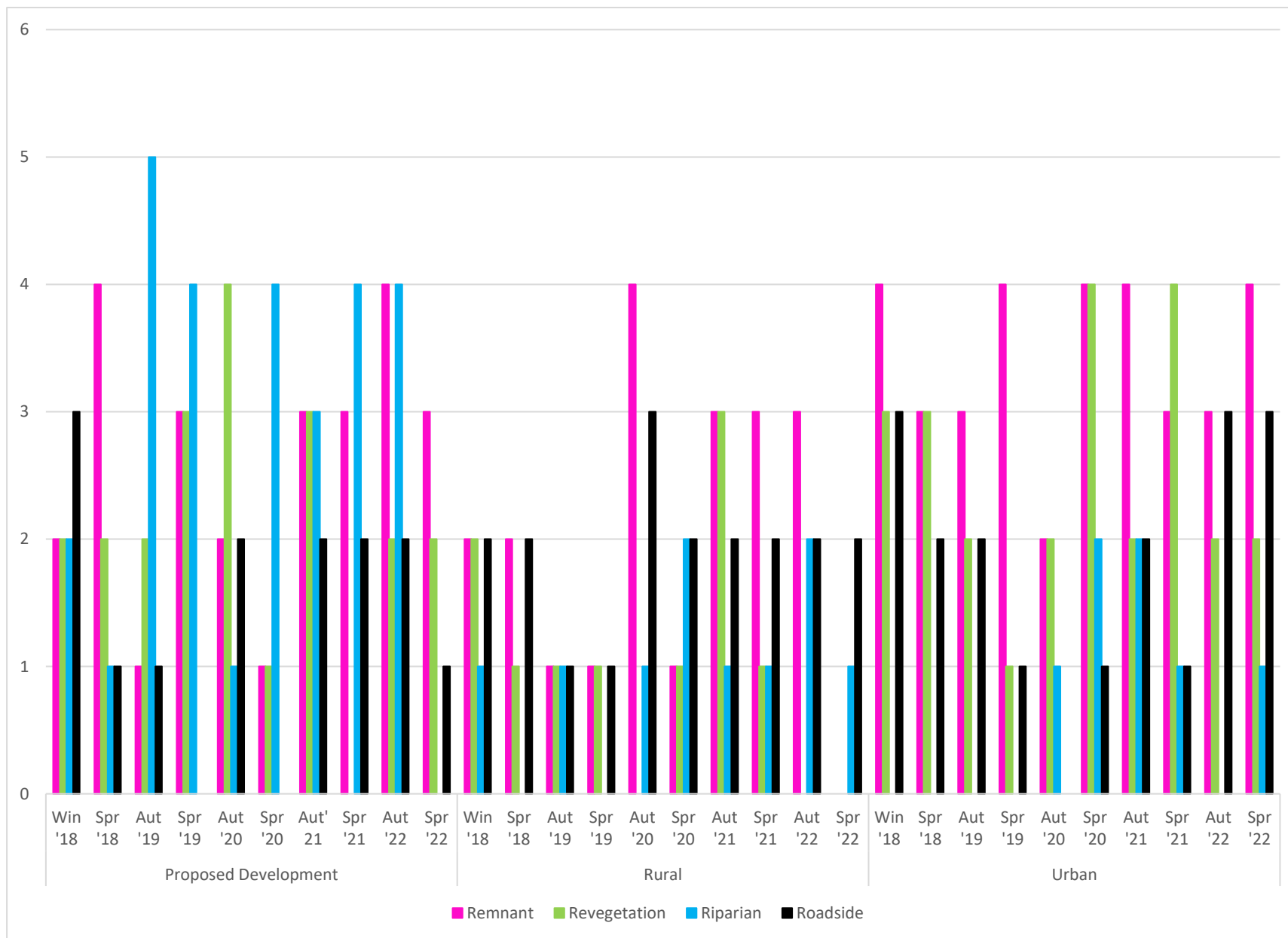


Figure 12: Total number of Squirrel Gliders detected across each monitoring period according to habitat type and land use zone in Thurgoona - Wurlinga

3.1.3 Trends in nightly detection rates

Positive identifications were recorded at 27 of the 65 sites monitored during Winter 2018, 21 of the 64 sites in Spring 2018, 20 of 62 sites in Autumn 2019, 19 of 63 sites in Spring 2019, 22 of 62 sites in Autumn 2020, 23 of 60 sites in Spring 2020, 30 of 66 sites in Autumn 2021, 25 of 67 sites in Spring 2021, 27 of 64 sites in Autumn 2022 and 19 of 60 sites in Spring 2022. Records (images and GPS location) from each of the sites detecting Squirrel Gliders in 2022 have been uploaded to the citizen science platform, [Albury Wodonga Nature Map](#).

The number of detection nights per site from across each monitoring period is displayed in Figure 13. Gliders were detected on a maximum of 10 out of 14 monitoring nights at some sites and as few as one night at others. None of the 74 total sites monitored have detected gliders across all survey efforts (Winter and Spring 2018, Autumn and Spring 2019, Autumn and Spring 2020, Autumn and Spring 2021 and Autumn and Spring 2022). One site (Site 030) has detected gliders in nine out of ten monitoring periods. At sites where gliders were detected, the number of detection nights averaged per monitoring period ranged from 2 (Autumn 2019) to 4.2 (Spring 2022). This data may enable future monitoring at these sites to identify changes in population density, distribution and other characteristics.

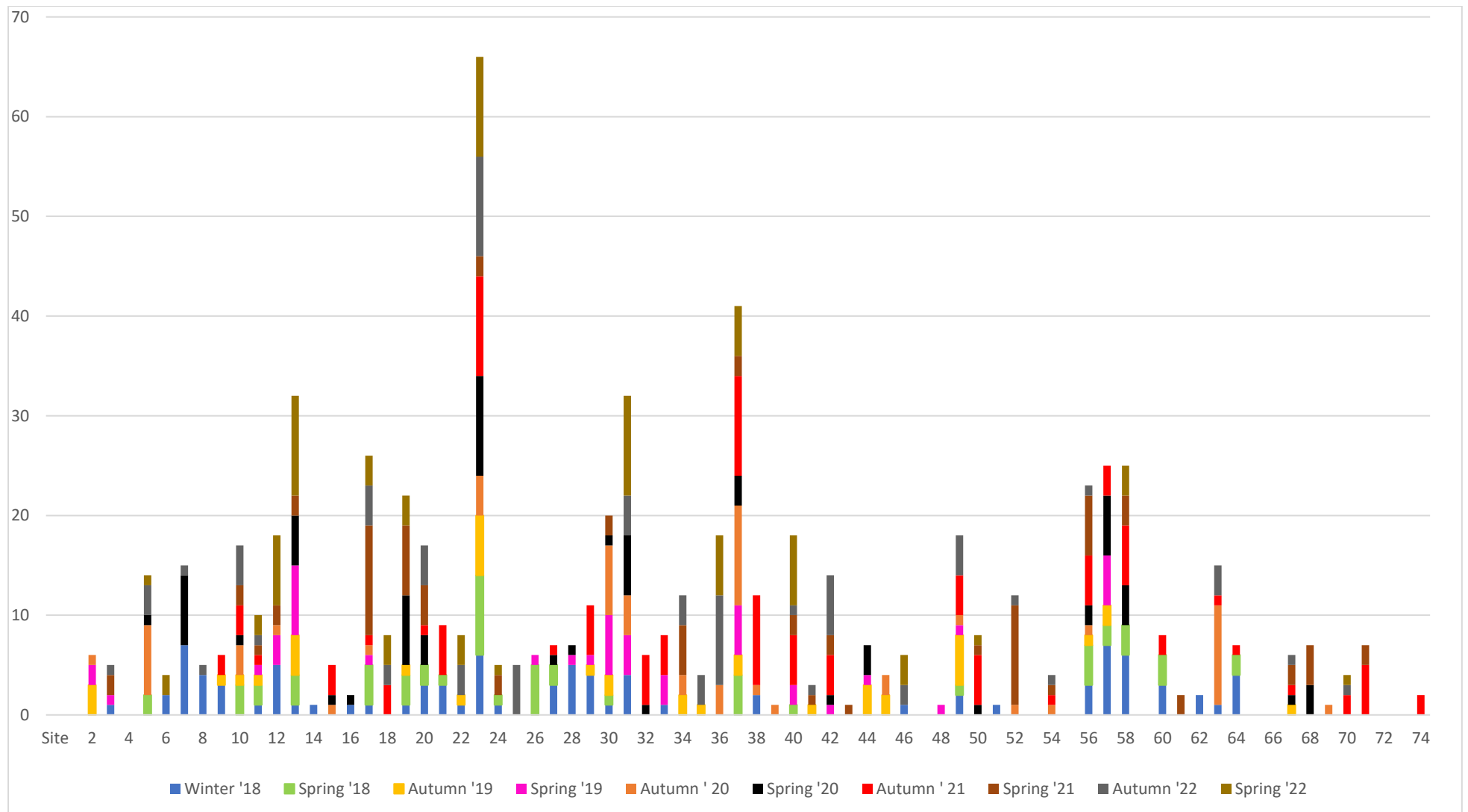


Figure 13: Total number of Squirrel Glider detection nights in each monitoring period (n=10-14nights) per site between 2018 and 2022 in Thurgoona Wirlinga.

3.2 Victoria – Wodonga (Leneva – Baranduda)

3.2.1 Survey effort and Squirrel Glider detection rate

Two monitoring periods occurred in the Wodonga study area in 2022, Autumn and Spring. The survey effort in each period was 59 and 53 sites monitored respectively. They resulted in glider detection rates of 36% in Autumn 2022 and 43% in Spring 2022. 2022 monitoring showed a minor decrease in detection rates initially (36% down from 37% the previous year), before recording the highest detection rate yet at 43% in Spring 2022. Table 6 shows the overall survey efforts and glider detection rates in the Wodonga study area from the initial year of monitoring. Included in Table 6 is an additional figure showing total *Petaurus sp.* detected, which includes the sites where a determination between Squirrel Glider and Krefft's Glider could not be made. Maps that present key data in this section spatially are provided in Appendix A.

Table 6: TSMP survey efforts and associated Squirrel Glider detection rates between Winter 2020 and Spring 2022 in the Wodonga study area (total *Petaurus sp.* in brackets)

Monitoring Period	Sites Monitored	Sites with Squirrel Glider Detections	Detection Rate	Trend
Winter 2020	48	13 (16)	27% (33%)	
Spring 2020	53	13 (15)	25% (28%)	↓
Autumn 2021	59	22 (23)	37% (39%)	↑
Spring 2021	59	22 (28)	37% (47%)	→
Autumn 2022	59	21 (25)	36% (42%)	↓
Spring 2022	53	23 (26)	43% (49%)	↑

3.2.2 Trends in detection rates among habitat and land use types

In Autumn, gliders were detected in 24% of remnant sites (n = 4), 30% of revegetation sites (n = 3), 44% of riparian sites (n = 7) and 69% of roadsides monitored (n = 11). Detection rates in three of the hour habitat types increased from Autumn to Spring monitoring periods (Table 7). The glider detection rates per habitat type for each monitoring period are shown in Figure 14.

Table 7: Detection rates according to habitat type in 2022

Habitat	Autumn		Spring		Trend
	Sites Monitored	Detection Rate	Sites Monitored	Detection Rate	
Remnant	17	23.52%	15	40.00%	↑
Revegetation	10	30.00%	10	40.00%	↑

Habitat	Autumn		Spring		Trend
	Sites Monitored	Detection Rate	Sites Monitored	Detection Rate	
Riparian	16	43.75%	12	50.00%	↑
Roadside	16	68.75%	16	62.50%	↓
All	59	42.37%	53	49.05%	↑

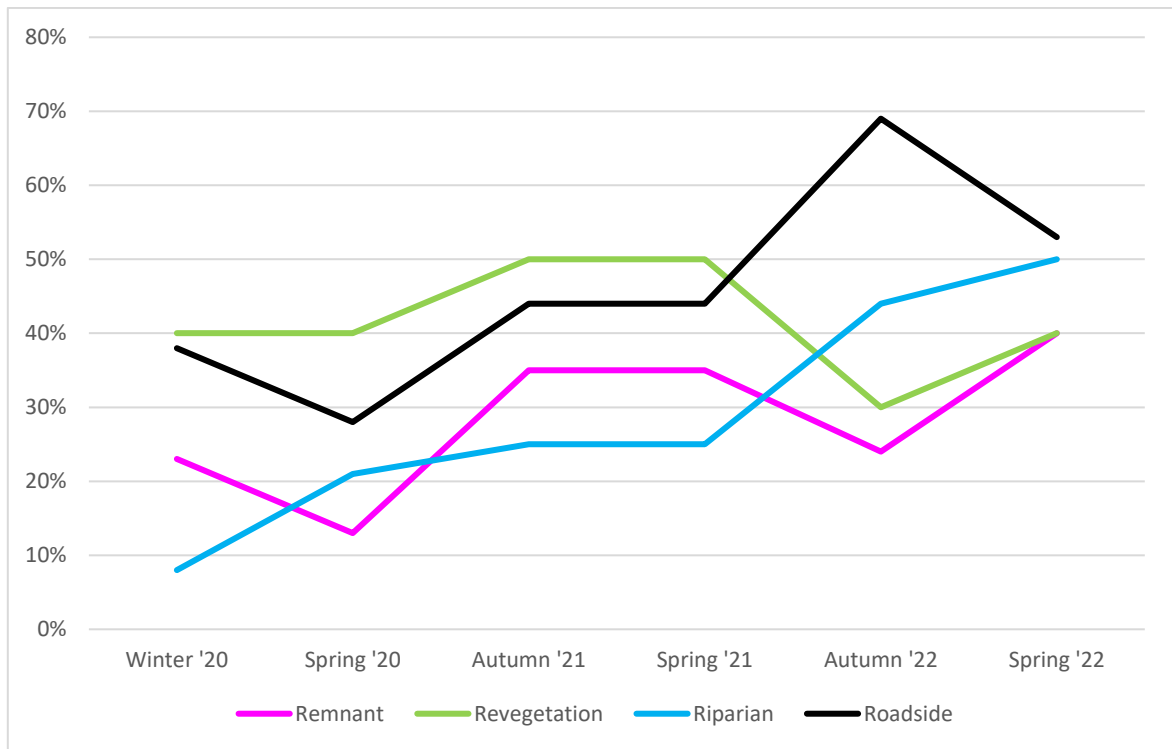


Figure 14: Squirrel Glider detection rates according to each habitat type across both monitoring periods in Wodonga

Figure 14 shows that detection rates at roadside and riparian habitat type increased from the previous year (Spring 2021), with detection rates at remnant and revegetation habitat types both decreasing since Spring 2021, before remnant sites then exceeded 2021 detection rates during the Spring 2022 monitoring period.

Figures 15 and 16 demonstrate the difference in detection rates at each habitat type and land use zone within the study period (2022 calendar year).

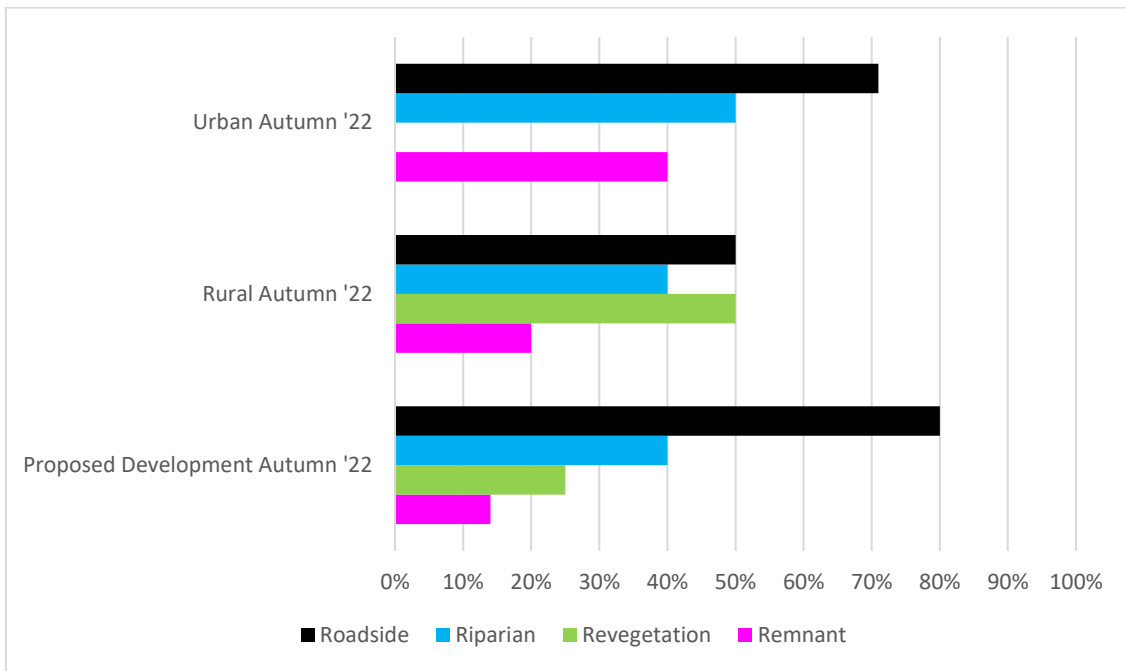


Figure 15: Squirrel Glider detection rates of each habitat type according to land use zone for the Autumn 2022 monitoring period in Wodonga

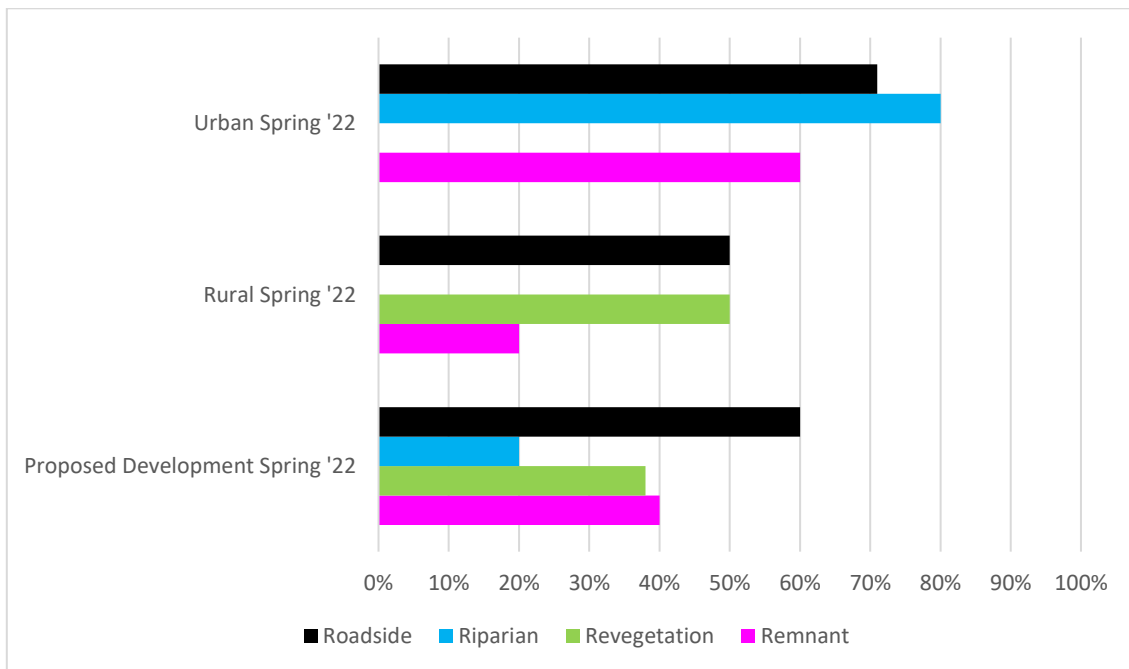


Figure 16: Squirrel Glider detection rates of each habitat type according to land use zone for the Spring 2022 monitoring period in Wodonga

Figures 15 and 16 show some variances, highlighted by a lack of detections in riparian habitat types within the rural land use zone in the Spring monitoring period, having been 40% in the Autumn period. There are no urban revegetation sites in the study area. Roadsides and remnants recorded detections across all land use zones through both monitoring periods. As discussed in Section 3.1.2, the data in these figures provides an indication of glider detections within the given year but it is difficult to discern any significant trends in their habitat preference or movement patterns.

Figure 17 shows the glider detection rates within each land use zone (across all habitat types) since the start of the program. This data may be able to assist in detecting landscape scale land-use changes, disturbances, events, seasonality etc. Glider detections in the proposed development and rural land use zone have been relatively stable over six monitoring periods so far however, glider detections within the urban land use zone have continually increased over the course of the program.

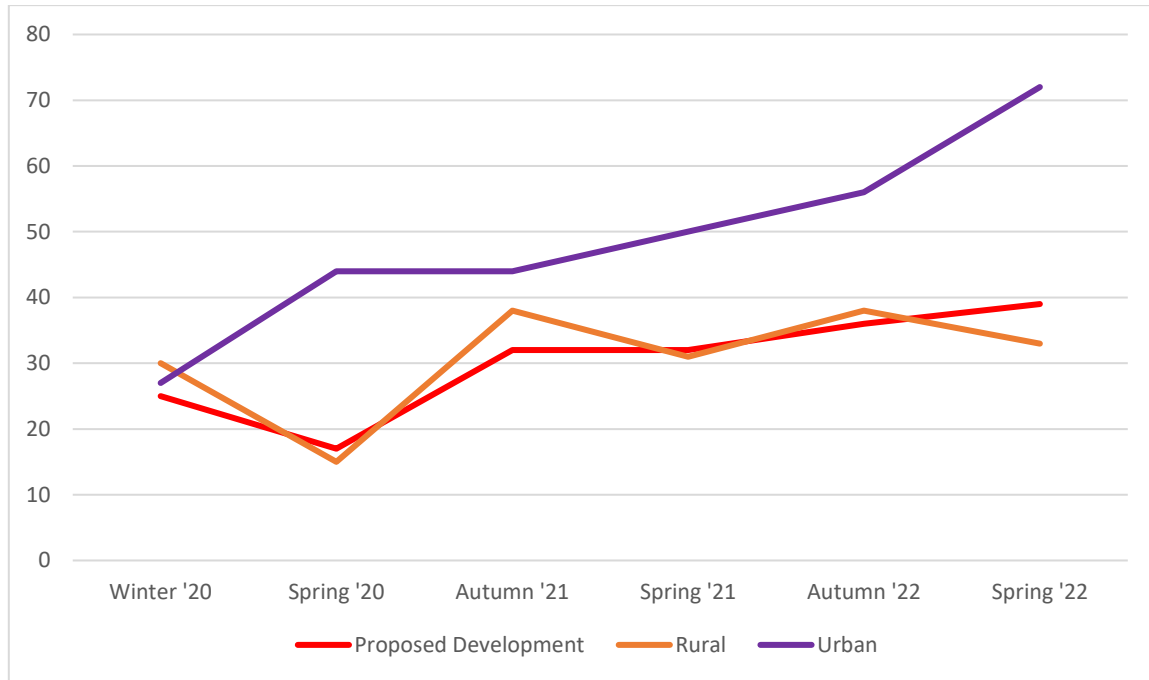


Figure 17: Squirrel Glider detection rates in Wodonga within each land use zone across life of program

As per the Thurgoona - Wirlinga study area (Section 3.1.2), the actual number of glider detections will be tracked over each of the monitoring periods to give a visual representation of the habitat type in each land use zone where gliders are recorded (Figure 16). This data is more representative of species habitat use given that it will account for multiple years' worth of data, allowing for the identification of any geographical or seasonal trends.

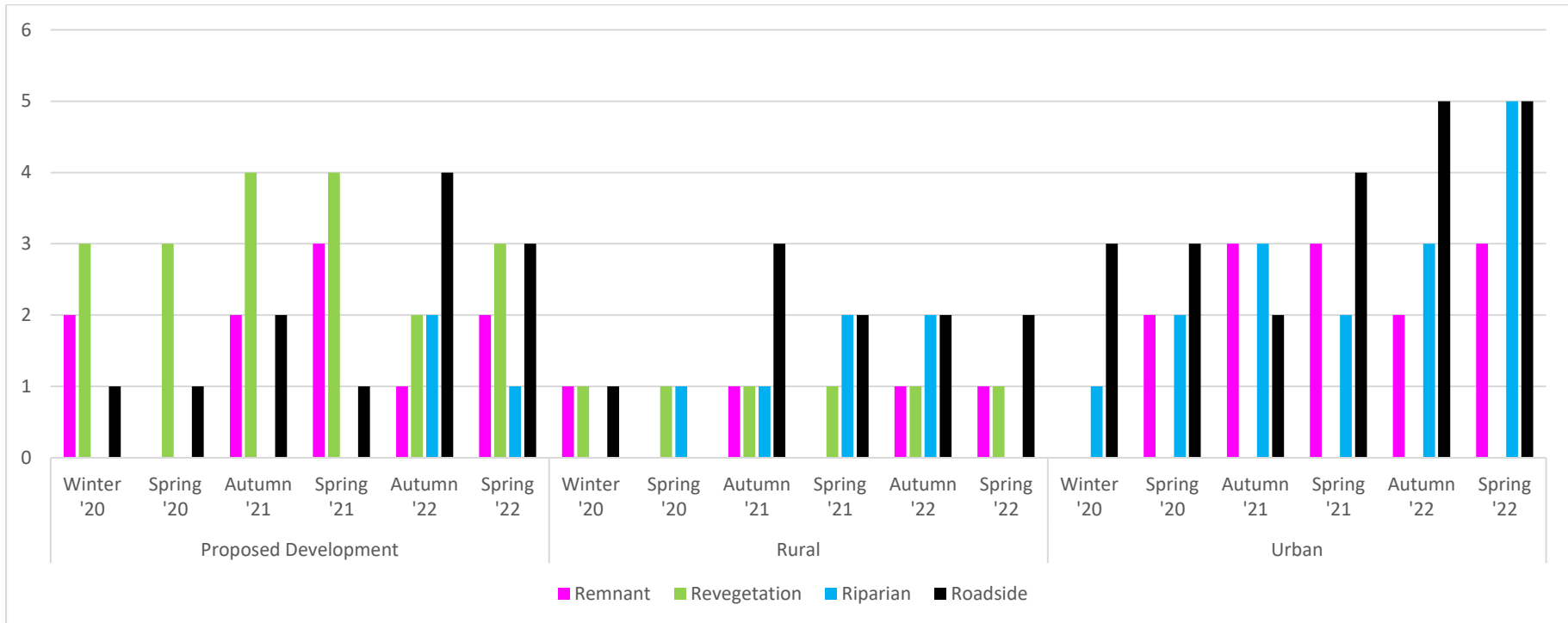


Figure 18: Number of glider detections in each land use zone and habitat type over time from Winter 2020 to Spring 2022.

Roadside and riparian habitat types appear to account for more glider detections in the rural and urban land use ones than they do in the proposed development zone. The habitat types are most often linear in shape and can provide effective wildlife movement corridors throughout highly fragmented landscapes.

3.2.3 Trends in nightly detection rates

Positive identifications were recorded at 25 of the 59 sites monitored in Autumn 2022 and 26 of 53 sites monitored during Spring 2022. Records (images and GPS location) from each of the sites detecting Squirrel Gliders in 2021 have been uploaded to [Albury Wodonga Nature Map](#).

The number of detection nights per site from across each monitoring period is displayed in Figure 17. Gliders were detected on a maximum of ten monitoring nights at some sites and as few as one night at others. One of the 59 total sites monitored has detected gliders across all six monitoring periods. At sites where gliders were detected, the number of detection nights averaged per monitoring period ranged from 1.8 (Winter 2020) to 4.4 (Autumn 2021). This data may enable future monitoring at these sites to identify changes in population density, distribution and other characteristics.

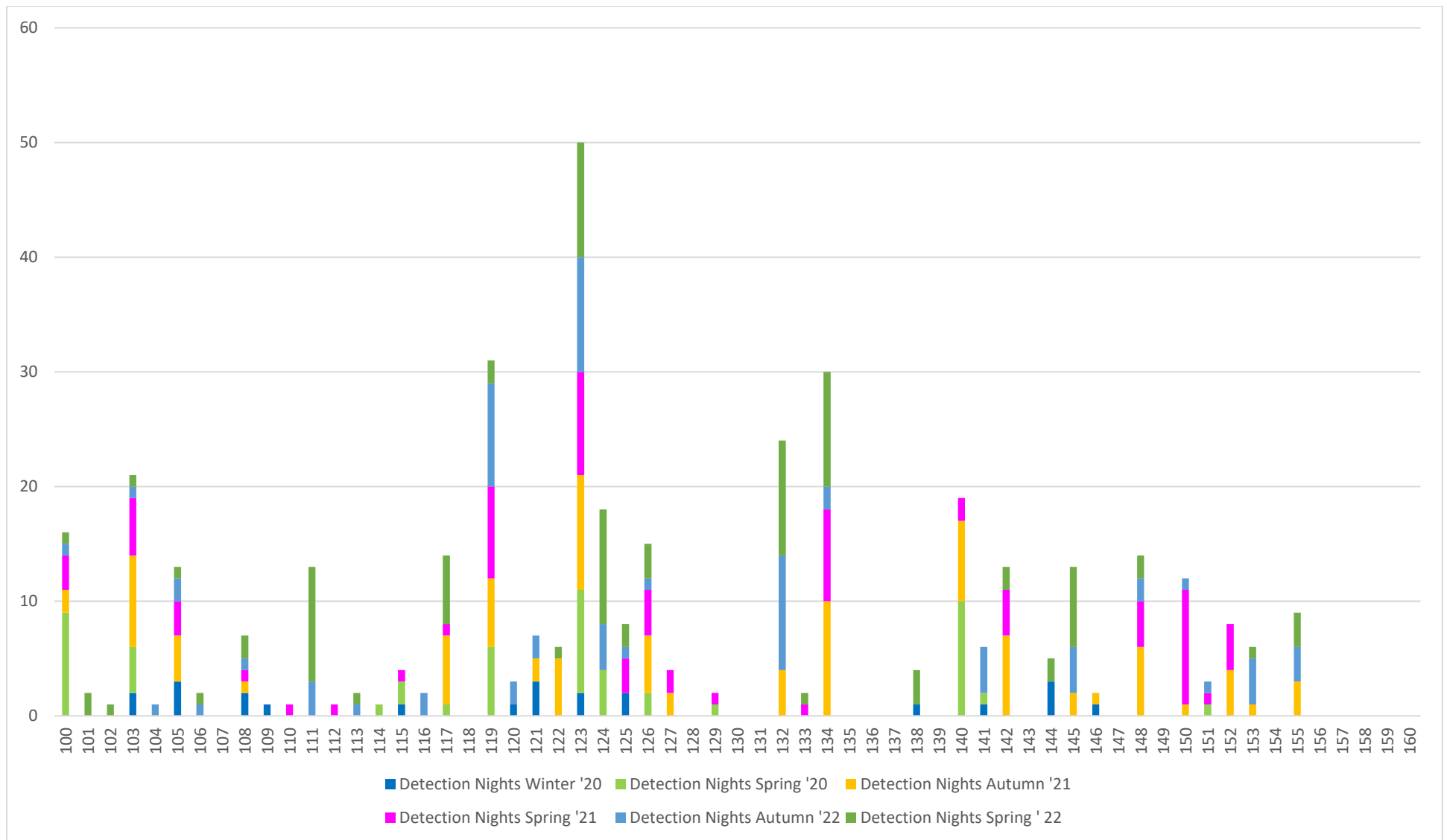


Figure 19: Total number of Squirrel Glider detection nights in each monitoring period (n = 10-14 nights) per site in Wodonga

3.3 Other fauna species

Several other non-threatened fauna species were detected using the motion sensing cameras during the monitoring period, none of which are listed under Commonwealth or State threatened species legislation. Species listed below were recorded on the arboreally mounted cameras, that were set to operate during nocturnal hours only.

- Common Brushtail Possum (*Trichosurus vulpecula*)
- Common Ringtail Possum (*Pseudocheirus peregrinus*)
- Feathertail Glider (*Acrobates pygmaeus*)
- Krefft's Glider (*Petaurus notatus*)
- Southern Boobook (*Ninox boobook*)
- Tawny Frogmouth (*Podargus strigoides*)
- Yellow-footed Antechinus (*Antechinus flavipes*)

Records of non-target fauna are uploaded to the Albury-Wodonga Nature Map. Should threatened species be recorded during the monitoring program, records will be detailed in the report including information on location, habitat types, land use zones and recommendations for further monitoring as appropriate.

3.4 Bird observations

Bird species observations were recorded at TSMP sites as described in Section 2.2. These observations revealed predominantly common species occupied sites across the study area, as per the species list in Table 8 (below). A Black Falcon (*Falco subniger*) was observed at site 072 in the NSW study area. This species is listed as Vulnerable under the Threatened Species Conservation Act 1995 (NSW). A total of 72 bird species were recorded between March 2021 and December 2021, three of those being a non-native species (Common Blackbird, Common Starling and Indian Myna).

Table 8: Species list compiled from bird observations across the TSMP area in 2022

Common Name	Scientific Name	Monitoring Period Detected			
		NSW Autumn	NSW Spring	Vic Autumn	VIC Spring
Australian Magpie	<i>Cracticus tibicen</i>	✓	✓	✓	✓
Australian Pelican	<i>Pelecanus conspicillatus</i>		✓		
Australian Raven	<i>Corvus coronoides</i>	✓	✓		✓
Australian Reed Warbler	<i>Acrocephalus australis</i>			✓	✓
Australian White Ibis	<i>Threskiornis molucca</i>		✓		✓
Australian Wood Duck	<i>Chenonetta jubata</i>		✓	✓	
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>	✓	✓	✓	
Black Swan	<i>Cygnus atratus</i>			✓	
Blue-faced Honeyeater	<i>Entomyzon cyanotis</i>	✓	✓		
Cattle Egret	<i>Bubulcus ibis</i>	✓			
Collared Sparrowhawk	<i>Accipiter cirrocephalus</i>			✓	

Common Name	Scientific Name	Monitoring Period Detected			
		NSW Autumn	NSW Spring	Vic Autumn	VIC Spring
Crested Pigeon	<i>Ocyphaps lophotes</i>	✓	✓	✓	✓
Crested Shrike-tit	<i>Falcunculus frontatus</i>	✓	✓		
Crimson Rosella	<i>Platycercus elegans</i>	✓	✓	✓	✓
Common Blackbird *	<i>Turdus merula</i>	✓	✓	✓	✓
Common Starling *	<i>Sturnus vulgaris</i>	✓	✓		✓
Dusky Woodswallow	<i>Artamus cyanopterus</i>		✓	✓	
Eastern Rosella	<i>Platycercus eximius</i>	✓	✓	✓	✓
Galah	<i>Eolophus roseicapillus</i>	✓	✓	✓	✓
Gang-gang Cockatoo ^	<i>Callocephalon fimbriatum</i>			✓	
Great Egret ^	<i>Ardea modesta</i>		✓		
Grey Butcherbird	<i>Cracticus torquatus</i>	✓	✓		
Grey Fantail	<i>Rhipidura albiscapa</i>	✓		✓	
Grey Shrike-thrush	<i>Colluricincla harmonica</i>			✓	
Grey Teal	<i>Anas gracilis</i>		✓		
House Sparrow *	<i>Passer domesticus</i>		✓		✓
Indian Myna *	<i>Acridotheres tristis*</i>		✓		✓
King Parrot	<i>Alisterus scapularis</i>		✓	✓	
Laughing Kookaburra	<i>Dacelo novaeguineae</i>	✓	✓	✓	✓
Little Corella	<i>Cacatua sanguinea</i>		✓		
Little Friarbird	<i>Philemon citreogularis</i>	✓			
Magpie-lark	<i>Grallina cyanoleuca</i>	✓	✓	✓	✓
Masked Lapwing	<i>Vanellus miles</i>	✓	✓		
Nankeen Kestrel	<i>Falco cenchroides</i>		✓		
Noisy Friarbird	<i>Philemon corniculatus</i>	✓	✓		
Noisy Miner	<i>Manorina melanocephala</i>	✓	✓	✓	✓
Oriental Dollarbird	<i>Eurystomus orientalis #</i>		✓		
Pacific Black Duck	<i>Anas superciliosa</i>	✓	✓		✓
Peaceful Dove	<i>Geopelia placida</i>			✓	

Common Name	Scientific Name	Monitoring Period Detected			
		NSW Autumn	NSW Spring	Vic Autumn	VIC Spring
Pied Currawong	<i>Strepera graculina</i>	✓		✓	✓
Purple Swamp Hen	<i>Porphyrio porphyrio</i>	✓	✓		
Rainbow Bee-eater #	<i>Merops ornatus</i>		✓		
Rainbow Lorikeet	<i>Trichoglossus moluccanus</i>	✓	✓	✓	
Red-browed Finch	<i>Neochima temporalis</i>			✓	✓
Red Wattlebird	<i>Anthochaera carunculata</i>	✓	✓	✓	✓
Red-rumped Parrot	<i>Psephotus haematonotus</i>	✓	✓	✓	✓
Restless Flycatcher	<i>Myiagra inquieta</i>			✓	
Satin Bowerbird	<i>Ptilonorhynchus violaceus</i>		✓	✓	
Striated Pardalote	<i>Pardalotus striatus</i>			✓	
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>	✓	✓	✓	✓
Superb Fairy-wren	<i>Malurus cyaneus</i>	✓	✓	✓	✓
Welcome Swallow	<i>Hirundo neoxena</i>	✓	✓	✓	✓
White-bellied Sea-eagle ^	<i>Haliaeetus leucogaster</i>			✓	
White-breasted Woodswallow	<i>Artamus leucorhynchus</i>		✓		
White-faced Heron	<i>Egretta novaehollandiae</i>	✓	✓	✓	✓
White-plumed Honeyeater	<i>Lichenostomus penicillatus</i>	✓	✓	✓	✓
White-winged Chough	<i>Corcorax melanorhamphos</i>	✓	✓	✓	✓
Willie Wagtail	<i>Rhipidura leucophrys</i>	✓	✓	✓	✓
Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>				✓

* Indicates introduced species. # Indicates migratory species. ^ Indicates conservation listed species

4. Discussion and Recommendations

The expansion of the threatened species monitoring program into the Wodonga Council local government area (LGA) provides an excellent opportunity to monitor and evaluate the distribution of threatened species at a landscape scale and aligns with the Regional Natural Environment Strategy collaboration between the two councils. The program significantly improves the knowledge on Squirrel Glider (*Petaurus norfolcensis*) distribution across the study area and provides robust data that can be used by various government and other

stakeholders. Importantly, the program now provides the opportunity to detect other threatened species such as the Brush-tailed Phascogale (*Phascogle tapoatafa*) and Spotted-tailed Quoll (*Dasyurus maculatus*). Both species have historical records in the Wodonga LGA with most recent records within the study area occurring in 2015 for each species (Atlas of Living Australia, 2021).

As identified in Sections 3.1.2 and 3.2.2 of this report, the data derived from the program provides improved insight into Squirrel Glider (and potentially other species) habitat use over time. That is, the more monitoring sites which are incorporated into the program and the more monitoring periods that are undertaken, the more likely we are to draw some significant findings into how glider populations are responding to the ever-changing landscapes in the study areas. Both study areas (Thurgoona – Wirlinga and Wodonga) are experiencing rapid urban growth which is, and has the potential to, reduce and fragment existing habitat. By monitoring glider presence and absence across multiple habitat types and land use zones over time, we can identify critical habitats, linkages, and management interventions to ensure the populations remain viable in the face of urbanisation.

Key to the success of the program in providing data that can inform wildlife and habitat management is ensuring that the program continues in a consistent manner (i.e. biannual Autumn and Spring surveys in both study areas) and expands to include additional sites.

Ideally, the data provided by the monitoring program will be considered in the development application phase, particularly where population strongholds or keystone habitat (see Figures 12 and 17) have been identified. These sites should be a priority for retention and enhancement through revegetation and linkage works where required.

Critical to maintaining the population viability of Squirrel Gliders across the study areas is the application of the records informing development applications and management interventions to minimise impact on the species and their key habitat patches. The records of Squirrel Gliders, as well as non-target arboreal species identified and recorded throughout the program have the potential to identify movement barriers and priority linkages within the landscape. Squirrel Gliders, Common Brushtail Possums, Common Ringtail Possums, Yellow-footed Antechinus and Feathertail Gliders have all been recorded through this program and these, along with historical records can give a good indication of distribution and abundance throughout the study area.

The Squirrel Glider population appears to be relatively stable in the Thurgoona - Wirlinga study area with the detection rates since the beginning of the program ranging from 30% (Spring 2019) to 45% (Autumn 2021). The 2022 monitoring periods produced glider detection rates near either end of that range with 42% in Autumn and 32% in Spring. The fluctuations in overall detection rates are expected given the Squirrel Gliders mobility and propensity to change den sites often within their home range, combined with the monitoring sites being static (i.e., the same tree is monitored each monitoring period) meaning there is a strong probability of recording a false absence within a monitoring site, habitat type or even land use zone). Modelled distributions and occupancy should always be considered along with follow up targeted surveys before an absence is considered. From a planning perspective, the precautionary principle should apply to account for false absences.

Detection rates in the Wodonga study area improved on the initial surveys in Winter (27%) and Spring (25%) 2020, increasing to 43% in the Spring 2022 surveys. The detection rates of each habitat type increased except for roadside sites where it decreased slightly (Table 7). Only when land use zones were considered with habitat types were any variances observed. Roadside and riparian habitat types appear to account for more glider detections in the rural and urban land use zones than they do in the proposed development zone.

In 2022, there were several instances of *Petaurus sp.* detections where it was not possible to differentiate between Squirrel Glider and Krefft's Glider. This limitation was detailed previous annual reports. There are now ten sites where the possibility of species overlap has been identified. An additional survey project plan has been developed (Appendix B) which would see spotlight surveys undertaken at these sites to enable accurate recording of arboreal species presence. This project will require funding but will lead to a more accurate representation of species distribution for both glider species in the study area. It also aims to develop an identification protocol for use with motion-sensing cameras that could be of benefit to other projects where this

species overlaps occurs. In the interim, detection images captured during the TSMP should be uploaded to the [Wildlife Insights](#) artificial intelligence program to assist in the platforms ability to detect and recognise glider species from images captured via motion sensing cameras.

The continuation of the TSMP and implementation of associated projects should enable research opportunities that will further develop the understanding of threatened species management in areas of peri-urban development.

Funding of a three-year project across the TSMP study areas (Thurgoona – Wirlinga and Wodonga) will enable Albury City Council and Wodonga Council to design and implement on-ground works programs that provide the most appropriate level of investment and scope of works across their municipalities, to benefit threatened species based on the data collected in the TSMP. As well as being used from a statutory and planning point of view (strategic investment and development approvals) as has been done in 2021, the councils will be able to use the data to deliver works such as revegetation, weed control, fencing, habitat augmentation and enrichment etc. backed by the scientific input from Albury Conservation Company. The project should be developed and implemented as a high priority for Albury Conservation Company as it has the potential to build on the work outlined in Michael et.al (2021) and provide some results in context to the blueprint for monitoring threatened species in peri-urban areas.

Another project which was funded in the Wodonga study area and delivered in 2022 saw the installation of 50 traditional nest boxes (constructed by Wodonga Men's Shed), [50 Habitech polypropylene modular nest boxes](#) and 50 augmented (i.e. chainsaw carved) hollows at selected TSMP sites in the study area. Follow up monitoring of the 150 habitat interventions will allow the identification of any species preference for, or success/failure of each type of intervention to enable best outcomes for future management. Follow up monitoring of the habitat interventions may allow the monitoring for changes in detection rates post increase in habitat availability for arboreal hollow dependant species through the establishment of a before-after control-impact (BACI) experiment. The collection of two years of before data provides a strong baseline for contrasting and comparing management interventions (e.g. cavity augmentation and understory restoration) at sites with and without gliders to control sites where no interventions take place and also support or don't support gliders. There is a great opportunity for the funding of this monitoring to contribute meaningful information to habitat installation projects for arboreal mammals which could be utilised industry wide. If additional funding for this monitoring cannot be found, Albury Conservation Company and its stakeholders should consider commencing this monitoring as part of the Ian Potter Foundation funded project, *'Applying science to on-ground action for conservation of Albury Wodonga's threatened wildlife'*.

Albury Conservation Company are partly funding a PhD in the local area that will research the drivers of Squirrel Glider occupancy across the study area, asking questions about housing density, light pollution and population viability. Data from the TSMP could contribute to the PhD and the PhD maybe able to provide strategic direction to the future of the TSMP. It is important that collaboration occurs between these two projects and other stakeholders in conservation within the study area to ensure knowledge outcomes are maximised during the PhD and the TSMP delivers maximum value to associated stakeholders.

Some of the cameras used to deliver the monitoring program have been deployed for ten monitoring periods and are now unusable and beyond routine maintenance. Issues commonly encountered include:

- Clips and fasteners becoming brittle and breaking off, resulting in inability of camera to properly contain batteries SD card or protect internal mechanisms form water ingress; and.
- Infestation of ant colonies (including eggs, larva) inside the camera including within the lenses, often blurring photos or triggering photos inadvertently.

Combined, there are now 19 cameras that require replacement due to theft or operational functionality. The cost to replace these cameras is approximately \$3,600.00. Without these cameras, there is on average four extra days required in the field per monitoring period to complete the required amount of sites with less cameras. It would be more efficient time and money wise to replace the cameras than to persist with fewer

cameras for any further monitoring periods. There could be an opportunity for project investors to contribute to capital costs associated with delivering the project.

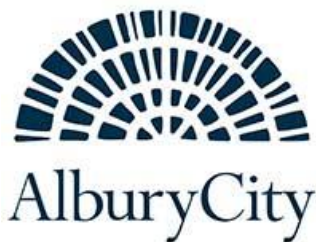
4.1 Summary of recommendations

8. Continue implementing the TSMP in both Thurgoona – Wirlinga and Wodonga to improve knowledge of threatened species and identify critical habitats, linkages, and management interventions to ensure the populations remain viable in the face of urbanisation.
9. Detection images captured during the TSMP should be uploaded to the Wildlife Insights artificial intelligence program to assist in the platform's ability to detect and recognise glider species from images captured via motion sensing cameras.
10. Prioritise the delivery of the three-year funded '*Applying science to on-ground action for conservation of Albury Wodonga's threatened wildlife*' project. In particular, commence monitoring of sites with habitat interventions to facilitate BACI experiment.
11. Ensure the timely and effective delivery of the '*Applying science to inform on-ground actions for conserving Wodonga's threatened wildlife*'.
12. This program and its associated projects should be supported by Councils and other key stakeholders. It aligns with the Regional Natural Environment Strategy (RNES) and meets many of the actions in the RNES Action Plan (2020-24).
13. The TSMP should collaborate with PhD candidate funded by Albury Conservation Company to ensure beneficial relationship and outcomes for both parties;
14. The replacement of twenty cameras should be prioritised by Albury Conservation and its investors to ensure the project can be delivered efficiently.

5. Acknowledgments

Albury Conservation Company would like to gratefully acknowledge funding received from:

- Albury City Council to support implementation of the program for three years until 2023/24.
- The Ross Trust and Wodonga Council for facilitating the expansion of the program into the Wodonga region.
- The Ian Potter Foundation for the significant investment in the three-year funded '*Applying science to on-ground action for conservation of Albury Wodonga's threatened wildlife*' project.
- The Victorian Government Department of Environment, Land, Water and Planning (DELWP) for the funding of the '*Applying science to inform on-ground actions for conserving Wodonga's threatened wildlife*' project.
- Wettenhall Environment Trust for providing two small grants to help purchase motion sensing cameras central to the monitoring program.
- Crowd funding via Edge Pledge which facilitated the initial purchase of motion sensing cameras required to implement the program and,
- Public donations made to Albury Conservation Company via <https://www.givenow.com.au/alburyconservationcompany>



DM Ecological would like to thank the following people and organisations for their ongoing involvement in implementing this program:

- Albury Conservation Company, particularly James Jenkins (Chairperson) Sophie Enders, (Executive Officer) and Dr. Damian Michael (Vice chairperson) for engaging DM Ecological to implement the program and their assistance in obtaining background information, permits and approvals, contacts and support throughout, including peer review of this report.
- Albury City Council for their assistance in land access and supply of GIS data.
- Wodonga Council for their access to council land including Wodonga Retained Environment Network (WREN) lands.
- Parklands Albury Wodonga for their assistance and advice in accessing sites.
- Users of [Albury Wodonga Nature Map](#) whose records have added considerably to local wildlife knowledge, including our target species.

This research has been approved by the Charles Sturt Animal Care and Ethics Committee (Protocol numbers A18021, A20031 and A23469) under NSW Office of Environment and Heritage scientific licence (SL102071), Department of Crown Lands combined licence (RI596463) and Victorian Government Department of Energy, Environment and Climate Action Research Authorisation Permit (Permit No 10010723).

6. References

[2017 Addendum to proposed Squirrel Glider monitoring plan for Thurgoona-Wirlinga, Dr. Damian Michael on behalf of Albury Conservation Company](#)

DM Ecological, 2018, Squirrel Glider Monitoring Program – Supplementary Bird and Vegetation Quality Survey Report, Albury Conservation Company

[DM Ecological, 2018, Squirrel Glider Monitoring Program Thurgoona - Wirlinga – Winter 2018 Monitoring Report, Albury Conservation Company](#)

[DM Ecological, 2018, Squirrel Glider Monitoring Program Thurgoona - Wirlinga – Spring 2018 Monitoring Report, Albury Conservation Company](#)

[DM Ecological, 2019, Squirrel Glider Monitoring Program Thurgoona - Wirlinga – Autumn 2019 Monitoring Report, Albury Conservation Company](#)

[DM Ecological, 2019, Squirrel Glider Monitoring Program Thurgoona - Wirlinga – Spring 2019 Monitoring Report, Albury Conservation Company](#)

[DM Ecological, 2020, Albury-Wodonga Threatened Species Monitoring Program Annual Report – 2020, Albury Conservation Company](#)

DM Ecological, 2021, Albury-Wodonga Threatened Species Monitoring Program Annual Report – 2021, Albury Conservation Company

[Francis et.al \(2015\) The influence of urban encroachment on squirrel gliders \(*Petaurus norfolcencis*\): effects of road density, light and noise pollution, Institute of Land, Water and Society, Charles Sturt University, PO Box 789, Albury, NSW 2640, Australia](#)

Menkhorst and Knight (2011), A field guide to the mammals of Australia third edition, Oxford University Press, 253 Normanby Road, South Melbourne, Victoria 3205, Australia

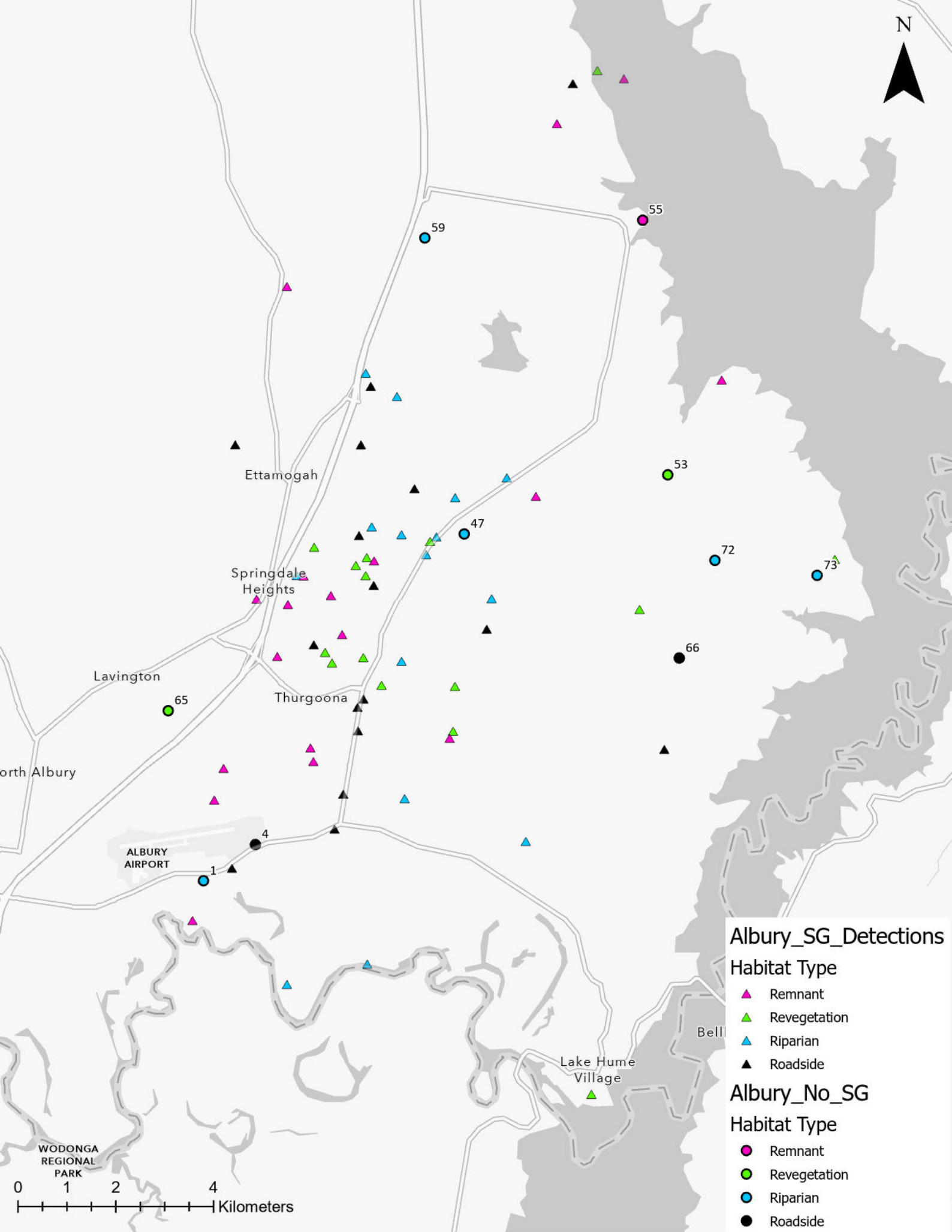
Michael et.al (2021) The conservation of arboreal marsupials in the Albury-Wodonga region of south-eastern Australia, Journal of Ecological Management and Restoration Volume 22, Issue 1 (pages 45-52), Wiley Online Library <https://onlinelibrary.wiley.com/doi/10.1111/emr.12445>

[Soanes, K and van der Ree, R \(2016\), Long-term monitoring plan of Squirrel Glider populations in Thurgoona-Wirlinga: Final Report, Australian Research Centre for Urban Ecology \(ARCUE\)](#)

[Stewart, C and van der Ree, R \(2009\) Population and Viability Analysis for Squirrel Gliders in Thurgoona NSW, Australian Research Centre for Urban Ecology, Royal Botanic Gardens, Melbourne VIC Aus](#)

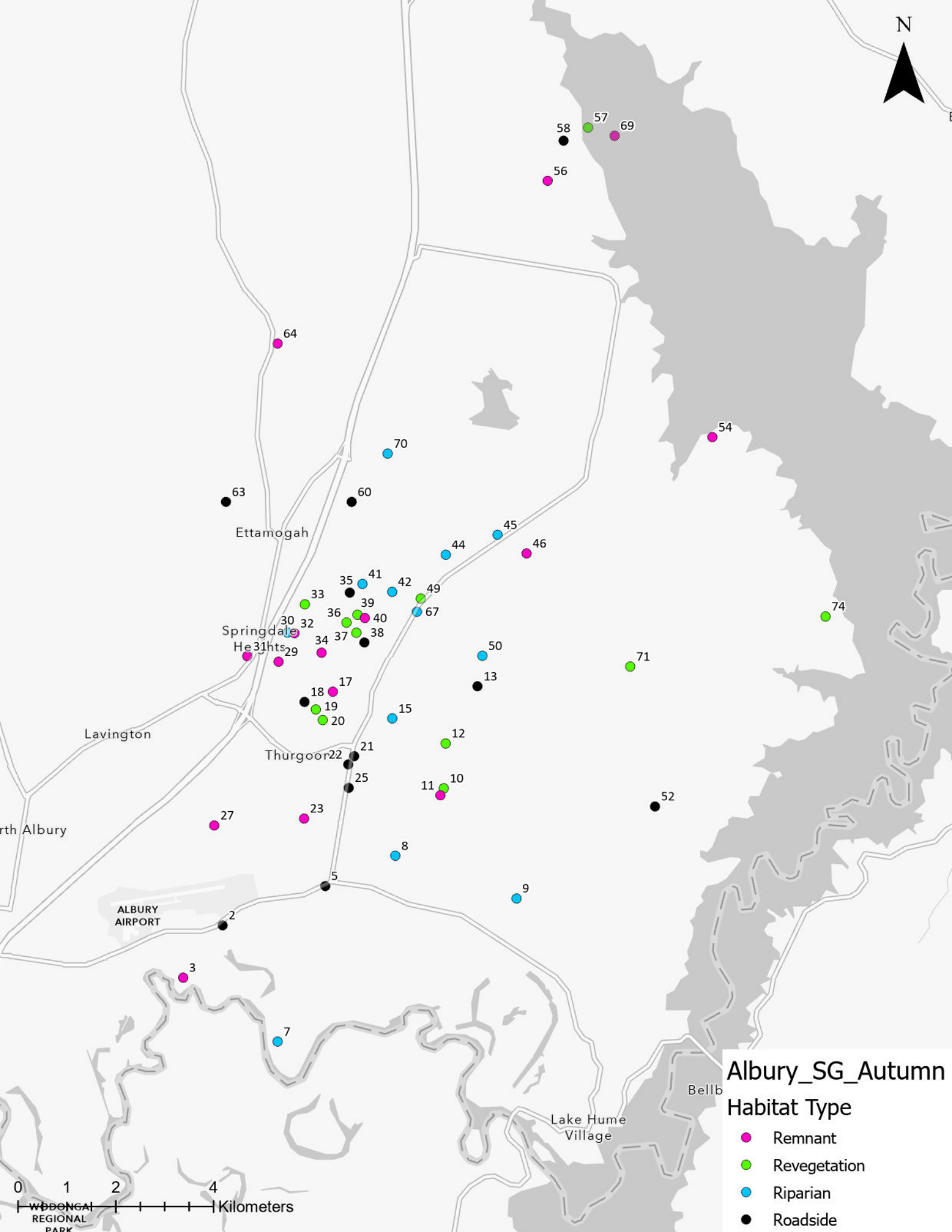
[Van der Ree, R \(2003\) The distribution and Status of the Squirrel Glider, *Petaurus norfolcencis*, in the Thurgoona area of Albury, Albury Wodonga Development Corporation](#)

Appendix A – Results mapping



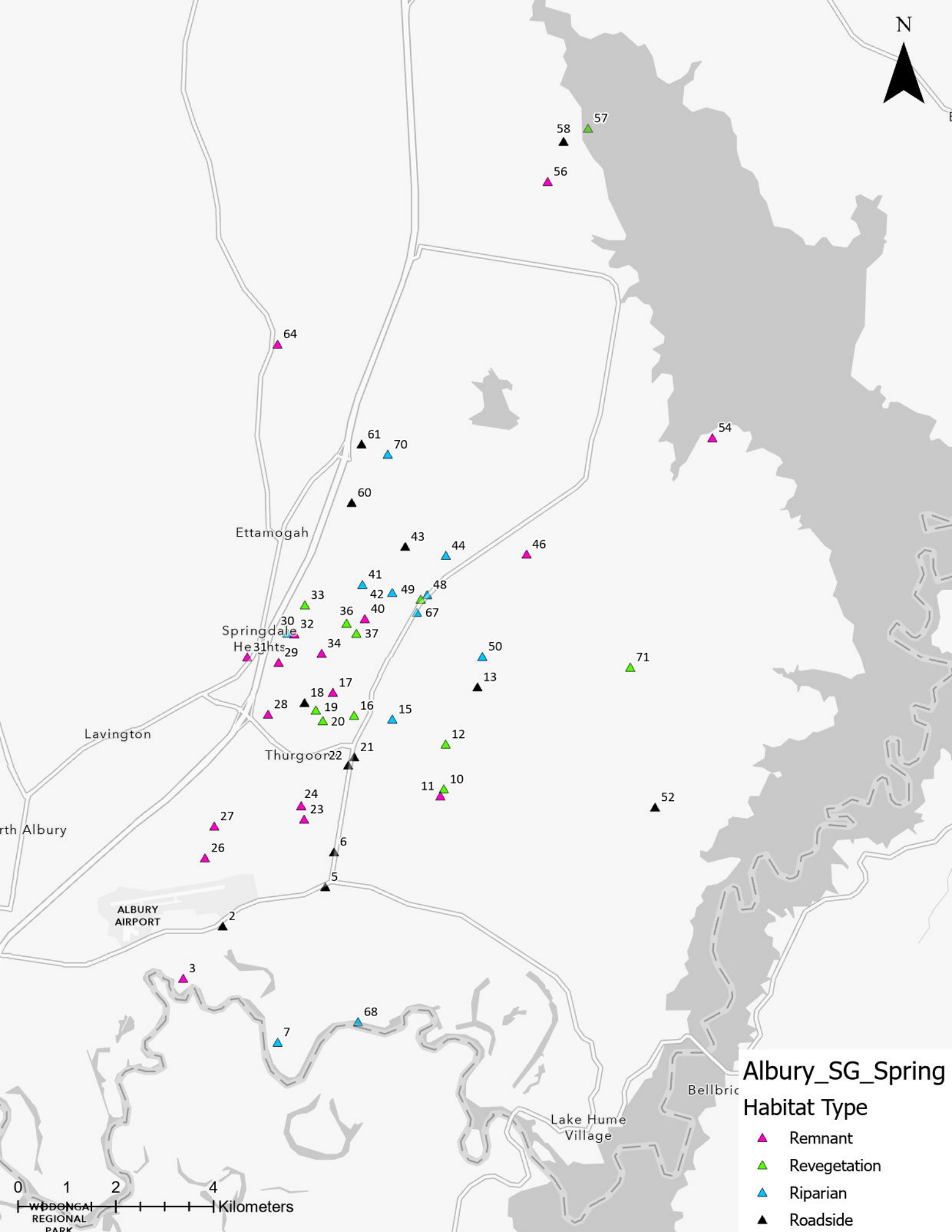
TSMP Sites (NSW) with and without Squirrel Glider Records over life of program.

Vicmap, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS



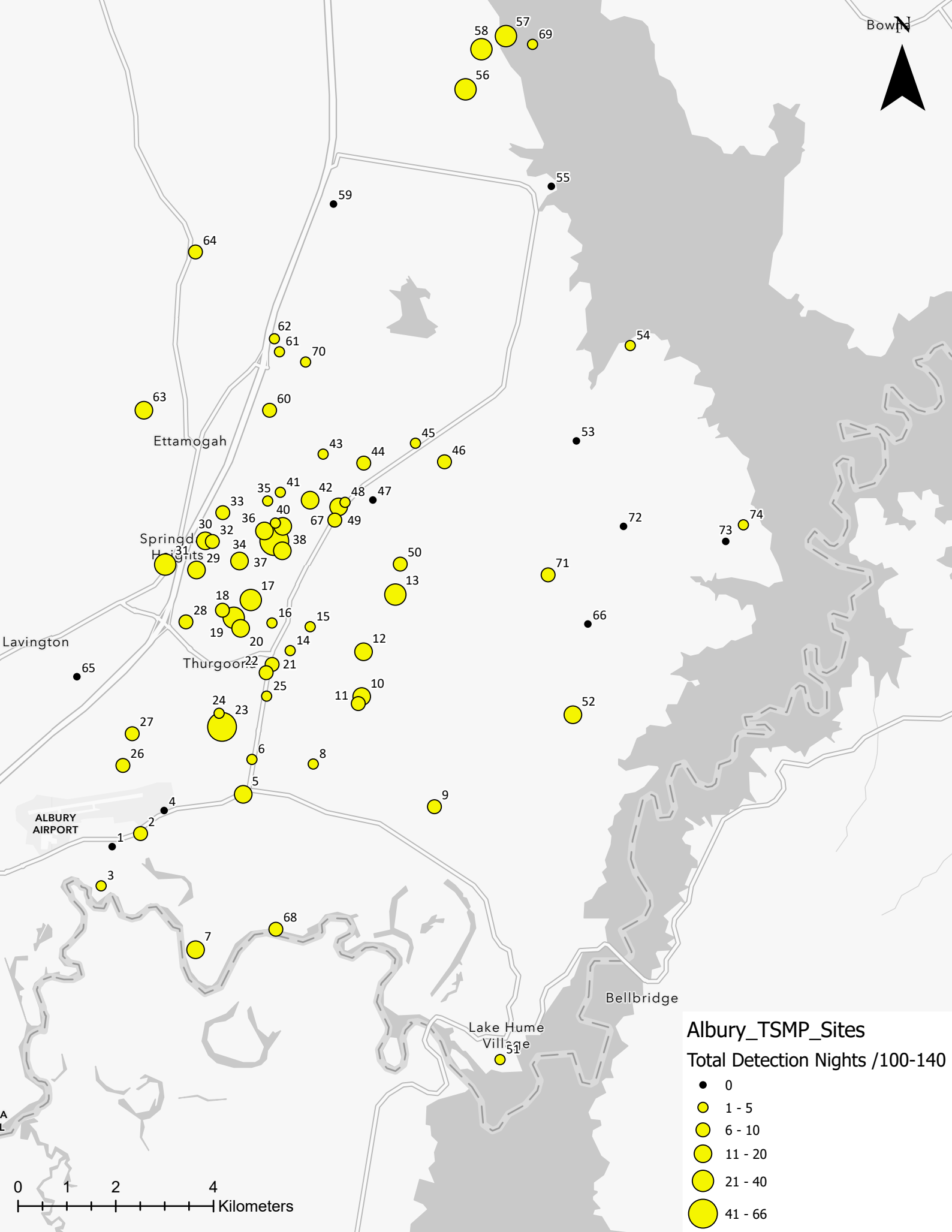
TSMP Sites (NSW) with Squirrel Glider Records during Autumn over life of program.

Vicmap, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS



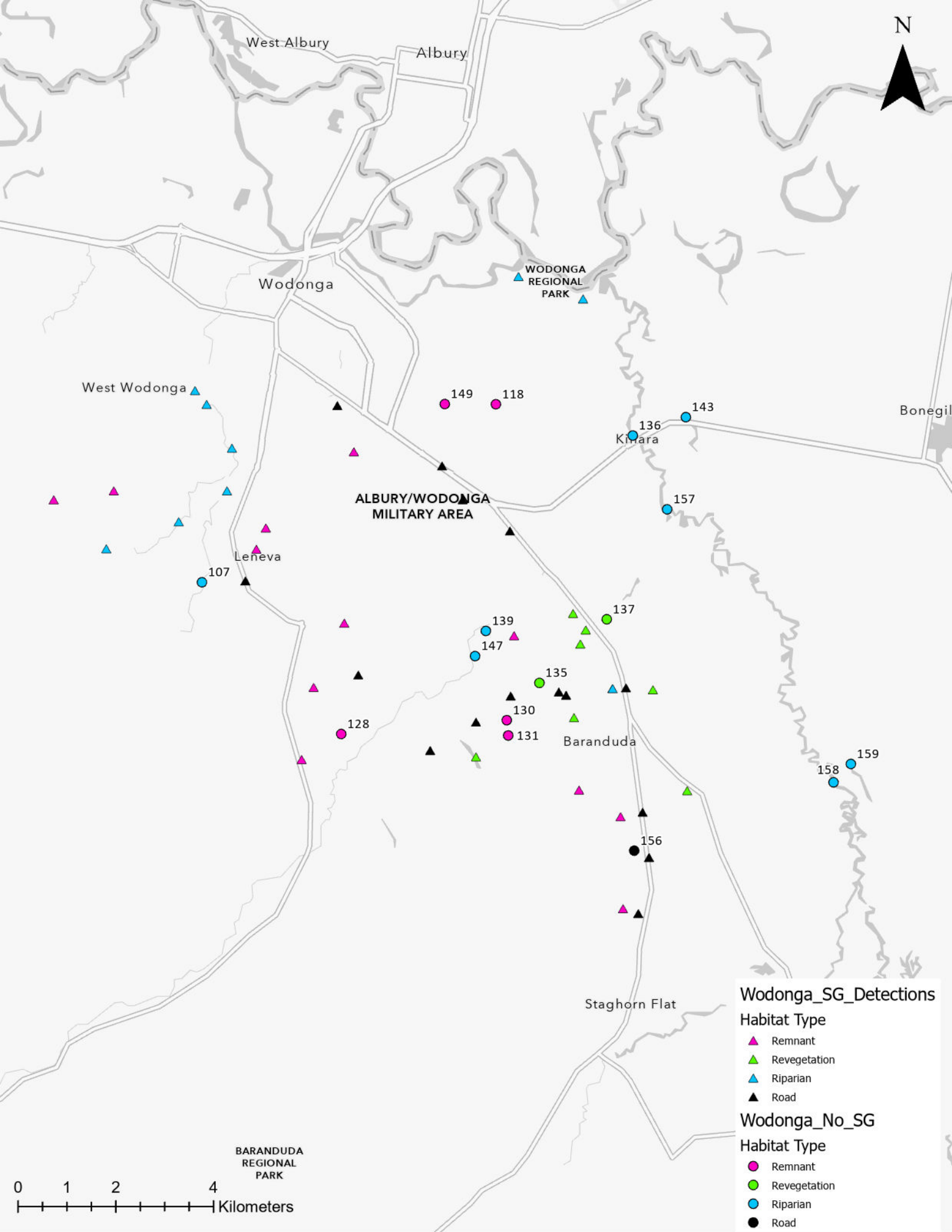
TSMP Sites (NSW) with Squirrel Glider Records during Spring over life of program.

Vicmap, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS



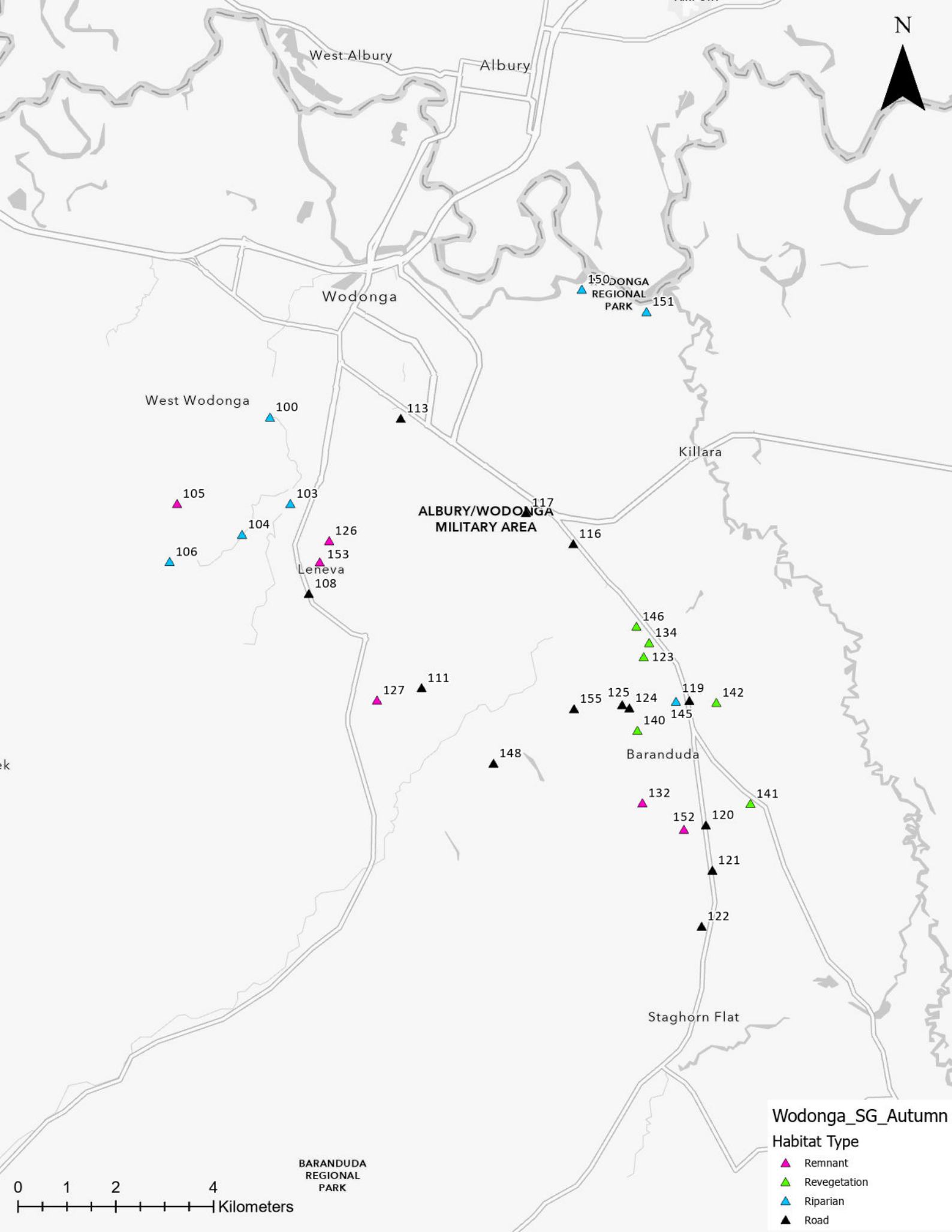
TSMP sites (NSW) total Squirrel Glider detectionnights over life of program

Vicmap, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS



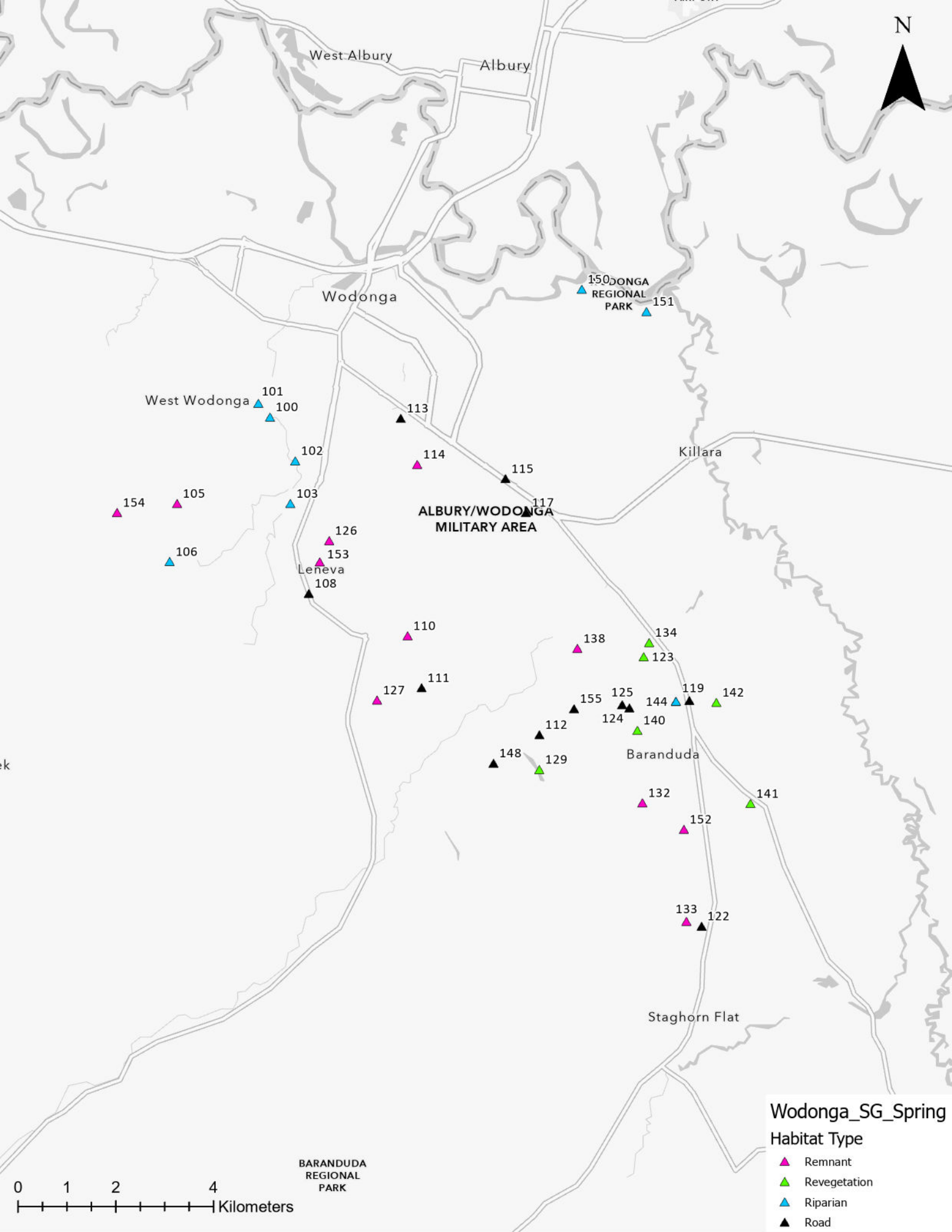
Vicmap, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS

TSM sites (VIC) with Squirrel Glider records during Spring over life of program



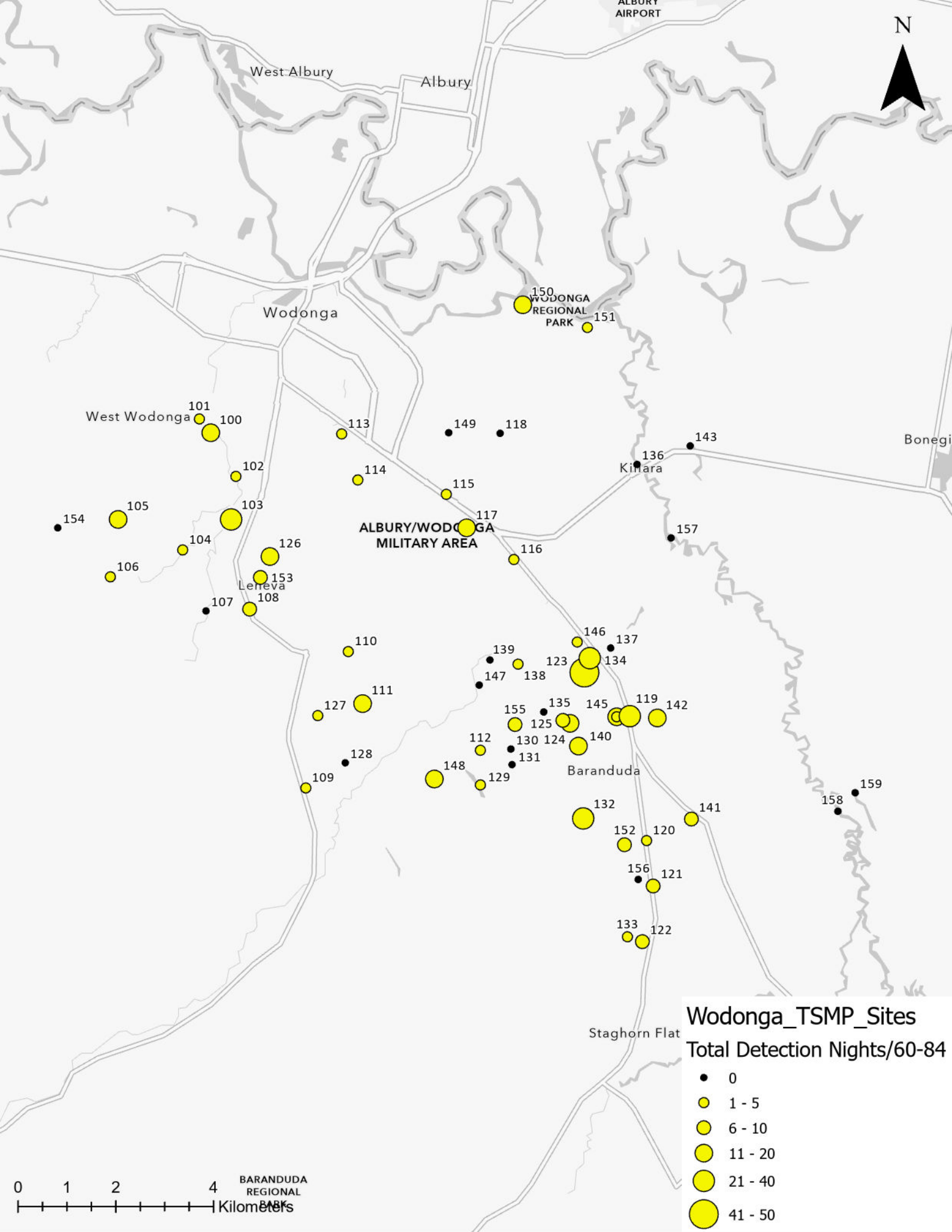
Vicmap, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS

TSM sites (VIC) with Squirrel Glider records during Autumn over life of program



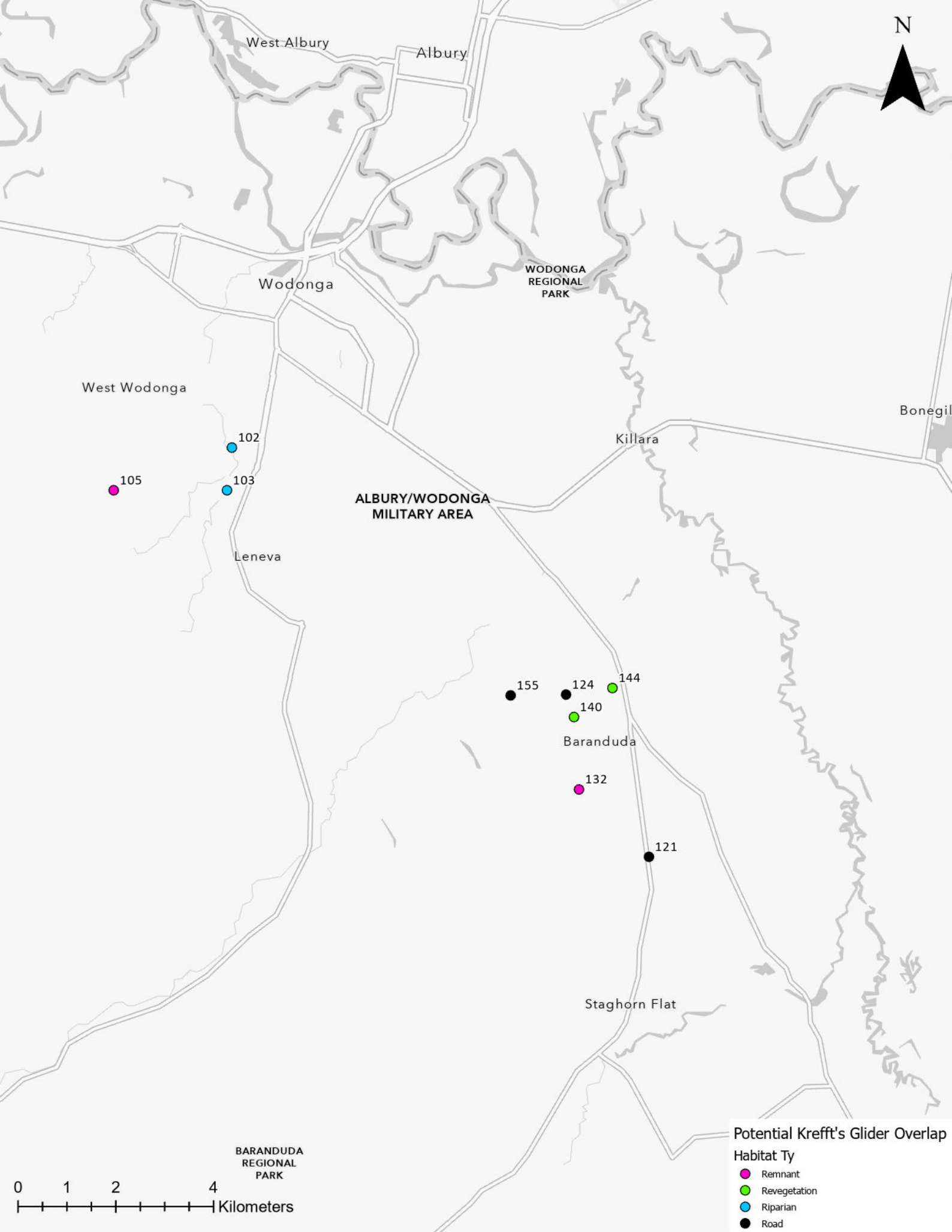
Vicmap, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS

TSMP sites (VIC) with Squirrel Glider records during Spring over life of program



Vicmap, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS

TSMP sites (VIC) total Squirrel Glider detectionnights over life of program



Vicmap, Esri, HERE, Garmin, Foursquare, METI/NASA, USGS

TSMF sites (VIC) with potential Krefft's Glider overlap

Appendix B - Glider Identification Protocol – Project Plan

Project Details

Project name: Glider Identification Protocol

This project seeks to develop an identification protocol for differentiation between Squirrel Glider and Krefft's Glider using motion sensing wildlife cameras. During implementation of the Threatened Species Monitoring Program (TSMP) for Albury Conservation Company (ACC) in the Wodonga local government area, nine sites have been identified for potential species overlap. The development of the protocol will be used to increase identification accuracy using monitoring via motion sensing wildlife cameras, making the survey technique more reliable within the TSMP and any other project where the species co-exist.

Business Case

The primary focus of this project will be to develop guidelines for identification between Squirrel Glider and Krefft's Glider, using motion sensing wildlife cameras. The current process relies on the observer to identify the species using the distinguishing features identifiable in the image captured, which are often limited. The proposal for this identification protocol was originally discussed at the *2020 Greater and Squirrel Glider Symposium* facilitated by Biolinks Alliance. In the [Squirrel Glider Survey Design and Monitoring Workshop](#) a common limitation of the motion sensing wildlife camera survey technique was species differentiation.

Squirrel gliders have been the focus of Albury Conservation Company's Threatened Species Monitoring Program, which ACC has been implementing since 2020 in Wodonga and 2018 in Albury. ACC currently monitors 60 sites across the Wodonga LGA's major urban growth area (Leneva/Baranduda), twice-a-year using motion-sensing cameras. Of these sites, nine have been identified where differentiation between the two species has not been possible on at least one occasion and require further work to confirm species presence.

Where a species cannot be accurately identified, it poses the risk of underestimating the presence or abundance of the conservation listed Squirrel Glider, which is listed as Vulnerable under the Flora and Fauna Guarantee (FFG) Act 1998. In rapidly expanding rural cities like Wodonga, this could mean that key habitat could be removed to facilitate development without consideration of the species.

Accurate species presence data collected and verified by this protocol could directly contribute to the Natural Places Objectives identified in the [Regional Natural Environment Strategy Action Plan 2020-2024](#) developed and adopted by Albury and Wodonga City Councils. These are:

1. Be strategic in the retention of native vegetation.
2. Protect and enhance habitat.
3. Maintain and improve vegetation condition.
4. Prioritise planning and management for threatened species, communities and their habitats.

There are a number of priority actions identified in the plan which could benefit from a developed species identification protocol, namely:

Continue to collaborate with technical experts to monitor and inform management for key threatened and locally significant species, including:

- *Squirrel Glider;*
- *Sloane's Froglet;*
- *Brush-tailed Phascogale; and,*
- *Woodland bird communities*

This species identification protocol could be utilised across Victoria and Australia where Squirrel Gliders and Krefft's Gliders distribution overlaps occur, making data collected by researches, agencies and community groups more reliable. This would result in better understanding of local and regional distributions of each of the species and potentially their specific habitat preferences.

Outputs to be delivered by this project include:

1. Spotlight surveys at nine sites in Wodonga LGA to determine subset of sites where species overlap does exist. Up to four x 30 min surveys at each location;
2. Trialing of motion sensing camera innovations and techniques at the subset of sites identified, to enable accurate species identification from images obtained. This includes purchase and use of [The Selfie Trap](#) and use of Artificial Intelligence Software [Wildlife Insights](#);
3. Development of a species identification protocol that can be applied to the TSMP and shared with relevant agencies, researchers and community organisations who may be involved in Squirrel Glider monitoring.

Summary of costs:

Budget Category	Description	Expenditure exc GST
Project management and co-ordination	Engagement of Albury Conservation Company's Executive Officer (4 days @ \$650/day) to manage the project.	\$2,600
Initial Spotlight surveys at nine sites.	Engagement of ecologists (x2) to conduct surveys (2hr) at each site (including travel and associated costs). hours at \$100/hr	\$5,000
Conduct motion sensing camera survey technique trials at subset of sites	Estimate up to 20hrs per site at 5 sites including data analysis and verification and use of Wildlife Insights. Ecologists 50 hours at \$100/hr	\$5,000
Materials	The Selfie Trap (\$465 each + P/H.) est. \$500.ea	\$1,000
Develop species identification protocol	Ecologist 20hrs @ \$100/hr	\$2,000
Printing/design	Promotional material to communicate the project's aims, activities and outcomes.	\$250
Total		\$15,850.00

3 Timing

Proposed start date:	01/09/2022	Proposed end date:	30/06/2023
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4 Project Management Arrangements

Role:	Responsibility:	Responsible Person:
Project Manager	Ensure the project is delivered on-time and within budget. Liaise with stakeholders, investors and ACC board on progress, risks and opportunities, forecasts etc.	Sophie Enders
Project Staff	Oversee the project design and implementation. Delivery of on-ground works and community engagement. Liaise with stakeholders to deliver works. Drafting of protocol.	Dylan McWhinney, Chris Allen
Project Support	Project governance, scientific oversight and support through social media.	Albury Conservation Company Board

5 Project Objectives, Outcomes and Outputs

<p>Objectives of the project:</p> <p>Develop an identification protocol to increase accuracy in identification between Krefft’s Gliders and Squirrel Gliders.</p>
<p>Project outcomes:</p> <ul style="list-style-type: none"> • Species identification protocol that can be used to distinguish between Krefft’s Gliders and Squirrel Gliders using motion sensing cameras.
<p>Project outputs:</p> <ol style="list-style-type: none"> 1. Spotlight surveys at nine sites in Wodonga LGA to determine subset of sites where species overlap does exist; 2. Trialing of motion sensing camera innovations and techniques at the subset of sites identified, to enable accurate species identification from images obtained; 3. Development of a species identification protocol that can be applied to the TSMP and shared with relevant agencies, researchers and community organisations who may be involved in Squirrel Glider monitoring.

6 Stakeholders

Name of stakeholder:	Proposed involvement in project:
DELWP	Investor?, Issuer of relevant licenses/ permits.
Wodonga Council	Key stakeholder responsible for the management of many parks and reserves where NRM works may be delivered based on data collected. Statutory planning authority that may use data collected to inform development approvals.
Albury Conservation Company	Project proponent and principal contractor responsible for delivery of the project and reporting to investor.
DM Ecological	Sub-contractor to Albury Conservation Company to deliver the project (conduct initial spotlight surveys, trial motion sensing camera techniques, develop protocol).
NatureMapr	Potential to conduct citizen science component on Albury Wodonga Nature Map. Promote findings on platform.
Parklands Albury Wodonga/ various Landcare/ Friends of groups.	Consult re delivery of project on lands they manage, existing nest box programs and potential for shared benefits.

7 Communication Management Plan / Reporting Summary

Report, document, event:	Prepared by:	Information provider:	Distribution group:	Distribution frequency:
Signed funding agreement	Investor/ ACC	ACC	TBC	TBC
Project Completion Report with financial acquittal	DM Ecological/ ACC	DM Ecological	TBC	30/06/2023
Updated VBA records/ Shapefiles of completed activities	DM Ecological/ ACC	DM Ecological	DELWP/ Council/ Community Groups as required	30/06/2023
Social Media update on project during works phase	ACC	DM Ecological	Social media network	TBA
Social Media update on project completion	ACC	DM Ecological	Social media network	TBA

	Yes	No
Will any documents need to be of publishing quality?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Will a media release or event be needed for the project?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

8 Risk Management Plan

What are the top risks? High scores and greater need to be actively managed as a priority. High scores need to have mitigation strategies in place that are monitored frequently. Moderate scores should have mitigation actions to reduce risk and low scores can be periodically reviewed. An intolerable risk indicates that further work needs to stop (safely), and review is required.

Consequence / Likelihood	1 - Insignificant	2 - Minor	3 - Moderate	4 - Major	5 - Extreme
1 – Rare	Low	Low	Low	Low	Significant
2 – Unlikely	Low	Low	Low	Moderate	Significant
3 – Possible	Low	Low	Moderate	Significant	High
4 – Likely	Low	Moderate	Significant	High	High
5 – Almost Certain	Moderate	Significant	High	High	Intolerable

No:	Description of risk:	Likelihood:	Impact:	Risk rating:	Mitigation strategy:
1	Project is not delivered by 30/06/2023	Unlikely	Moderate	Low	Albury Conservation Company (ACC) has the resources and capacity to complete this project before 30/6/2023. ACC will only engage contractors who can also commit to this timeframe.

No:	Description of risk:	Likelihood:	Impact:	Risk rating:	Mitigation strategy:
2	Project is not delivered within budget	Unlikely	Moderate	Low	The project has been costed in consultation with potential partners, therefore Albury Conservation Company has confidence in financial investment required to deliver the project as stated.
3	Project Manager/ staff changes affect the progress/ delivery of the project	Unlikely	Moderate	Low	ACC has just on boarded a new Executive Officer. DM Ecological has been contracted to ACC since 2018, and will deliver this project.
4	Insufficient support from the community	Unlikely	Minor	Low	Strong history of collaboration and engagement with community. Early engagement of council.
5	Delays caused by Covid-19 outbreaks.	Unlikely	Moderate	Low	Face-to-face events will conform to the Victorian Government's COVID regulations. Albury Conservation Company has the demonstrated capacity to deliver on-line engagement if required. Contractors will comply with CHO requirements including work permits, vaccinations etc.
6	Health and safety incident causes project delays	Unlikely	Major	Moderate	All work health and safety requirements (e.g. insurances, Job Safety Analysis) will be requested from all contracted parties engaged in the project.
7	Contractor/ consultant delays (in appointing or change in work priorities).	Unlikely	Moderate	Low	DM Ecological is an existing contractor. Other suitable contractors have already been consulted about the project. If successful, all parties will be notified and asked to enter contracts with ACC requiring delivery of the project by the completion date.

No:	Description of risk:	Likelihood:	Impact:	Risk rating:	Mitigation strategy:
8	Lead times associated with permits/ approvals delay the project	Possible	Moderate	Moderate	All relevant permits and approvals (e.g. access to council owned and managed land) have been secured by Albury Conservation Company for our threatened species monitoring program. Additional DELWP permits for spotlight surveys may be required.

9 Main Tasks, Responsibilities, Timelines and Budget

Include relevant costings for the project budget from project management perspective. Ensure that costs for internal project management are included. Estimates of other in-kind costs can be included if relevant/useful.

No.	Task / Budget item	Timeline	Responsibility	\$
1	Obtain funding to implement project	30/08/2022	ACC	650
2	Conduct spotlight surveys at nine sites	30/11/2022	DM Ecological	5,000
3	Conduct motion sensing camera trials at species overlap sites	30/05/2023	DM Ecological	6,000
4	Develop species identification protocol	30/06/2023	DM Ecological	2,000
5	Project management, stakeholder engagement etc.	30/06/2023	ACC	2,200
				\$15,850

10 Sources of Funding

Funding Source(s):	Amount:	Details/Timing/Conditions:
TBC	\$15,850.00	TBC
Total	\$15,850.00	TBC

	Yes	N
Has the project manager got sufficient financial delegation for the project?	<input type="checkbox"/>	<input type="checkbox"/>
If not, has appropriate approval for financial approval been obtained?	<input type="checkbox"/>	<input type="checkbox"/>

11 Monitoring, Evaluation and Integration

What are the key evaluation questions?

- What are the key identifiable features between Krefft’s Gliders and Squirrel Gliders?
- Where are the areas of species overlap located?
- Are the range of each species distinctly defined?
- What methods can be used in motion sensing camera trapping, to make identification easier?

What is the data or information needed to be collected?

- Spotlighting survey results to identify areas of existing species overlap.
- Ongoing presence/ absence records of target species/ hollow dependant fauna via seasonal monitoring.
- A series of images from the overlap sites derived from a range of motion sensing camera survey techniques to inform identification protocol.

Is there sufficient budget or resources to do this?

Albury Conservation Company has funding to continue Autumn and Spring monitoring at the 60 sites until 31/12/2022. The data already collected from the threatened species monitoring program (TSMP), data collected through delivering this project and data generated via TSMP in future will place ACC in a strong position to leverage future funding to continue monitoring. ACC is a current funding recipient of the Wettenhall Environment Trust, the RE Ross Trust and the Ian Potter Foundation until 2024 and there is potential for shared benefits/ ongoing funding.

Will the results of this project impact on other regional projects or activities?

Currently there is limited studies and protocols in differentiation between Krefft’s Gliders and Squirrel Gliders. During desktop analysis there was an emphasis on trained or experienced observers to be consulted to distinguish between the species. The project will outline the best methods to gain the required observations to easily distinguish between the species.

12 Approval

Prepared by:	Date:	Revision No:
Dylan McWhinney	25/09/2022	2

This Project Plan has been reviewed and is approved for implementation	Signature:	
	Position:	Date: