Albury Wodonga Threatened Species Monitoring Program 2024 Annual Report

Albury Conservation Company

DM ecological

Document Control

Document Information

File Ref: **250408_TSMP_AnnualRep_Rev2**

Version: 1

Distribution: Client – General Use (Uncontrolled when printed)

Annual Report – Threatened Species Monitoring Program			
Rev	**Description**	**Author**	**Date**
1	For review	Dylan McWhinney	04/04/2025
2	Final	Dylan McWhinney	08/04/2025

The report has been prepared by Dylan McWhinney (DM Ecological) who is an experienced ecologist and project environmental manager. He has over 14 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:

- assures the minimum standards of competency for consultants performing regulatory functions,
- develops guidelines and codes of practice, and
- improves confidence in the quality, reliability and accountability of environmental reports and documentation provided to government agencies by environmental practitioners.

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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 2024, the program monitored wildlife at over 124 sites using motion-sensing cameras as the primary survey tool. Two monitoring periods occurred in the Thurgoona - Wirlinga study area in 2024, autumn and spring. The survey effort in each period was 65 sites monitored. Results showed:

- 35 Squirrel Glider detections in the autumn monitoring period (detection rate of 54%)
- 29 Squirrel Glider detections in the spring monitoring period (detection rate of 44%)

All habitat types are showing a higher detection rate in spring 2024 than they were in spring 2019. During this time, roadside habitat sites have consistently produced higher detection rates in autumn as opposed to spring, until 2024 where the detection rate at roadside habitats remained constant from autumn to spring. Overall, results may highlight the importance of roadside vegetation in linking patches of vegetation in what is an increasingly fragmented landscape in terms of arboreal habitat. Remnant sites had shown the least amount of variance in detection rates over the life of the program but in 2024, detection rates at remnant sites decreased from 53% to 28 %

Two monitoring periods occurred in the Wodonga study area in 2024, autumn and spring. 59 sites were monitored in each of the survey periods. Results showed:

- 29 glider detections in the Autumn monitoring period (detection rate of 49%)
- 21 glider detections in the Spring monitoring period (detection rate of 36%)

Detection rates at remnant and revegetation habitat types remained constant from autumn to spring 2024, whilst there were marked reductions in detection rates at riparian and roadside sites. Glider detections in the proposed development land use zone have been relatively stable over ten monitoring periods so far however, glider detections within the urban and rural land use zones have shown more variance.

Recommended actions include:

1. Prepare a subset of baseline condition maps in each Council areas and review with Council staff along with the parameters and methodology to finalise a model of data collection that will provide value for their land management programs, with a threatened species focus.
2. 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.
3. Prioritise the delivery of the three-year funded *'Applying science to on-ground action for conservation of Albury Wodonga's threatened wildlife'* project. Commence monitoring of sites with habitat interventions to facilitate BACI experiment.
4. 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).
5. Data collected by the TSMP should be used to prescribe delivery of on-ground works relating to revegetation (connectivity and food sources), habitat enrichment (nest boxes and augmented hollows), weed control, removal of barbed wire etc. at specific sites

The Albury Wodonga Threatened Species Monitoring Program has been made possible with funding from Albury City Council, Ian Potter Foundation, Ross Trust, Wettenhall 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-tail 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 14 monitoring periods (biannually 2018-2024). In Wodonga, 60 sites have been monitored at least once across the 10 monitoring periods (biannually 2020-24). No threatened species other than the Squirrel Glider have been detected using the motion sensing cameras so far.

1.2 Location of the study area

The study area includes major growth corridors within the Albury City Council LGA and the Wodonga Council LGA. It is focused on 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).

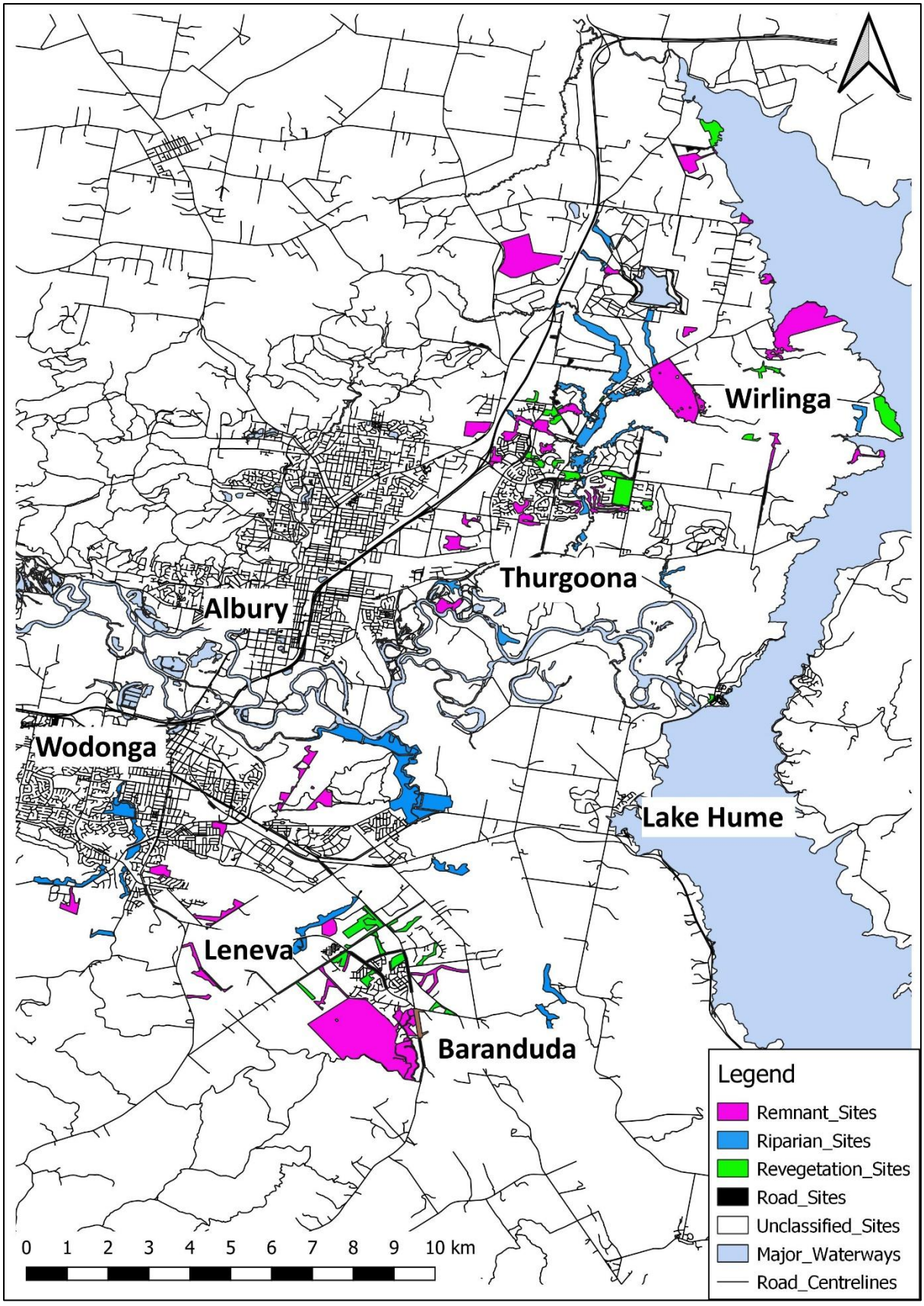

Figure 1: Entire study area including Thurgoona - Wirlinga and Wodonga study areas

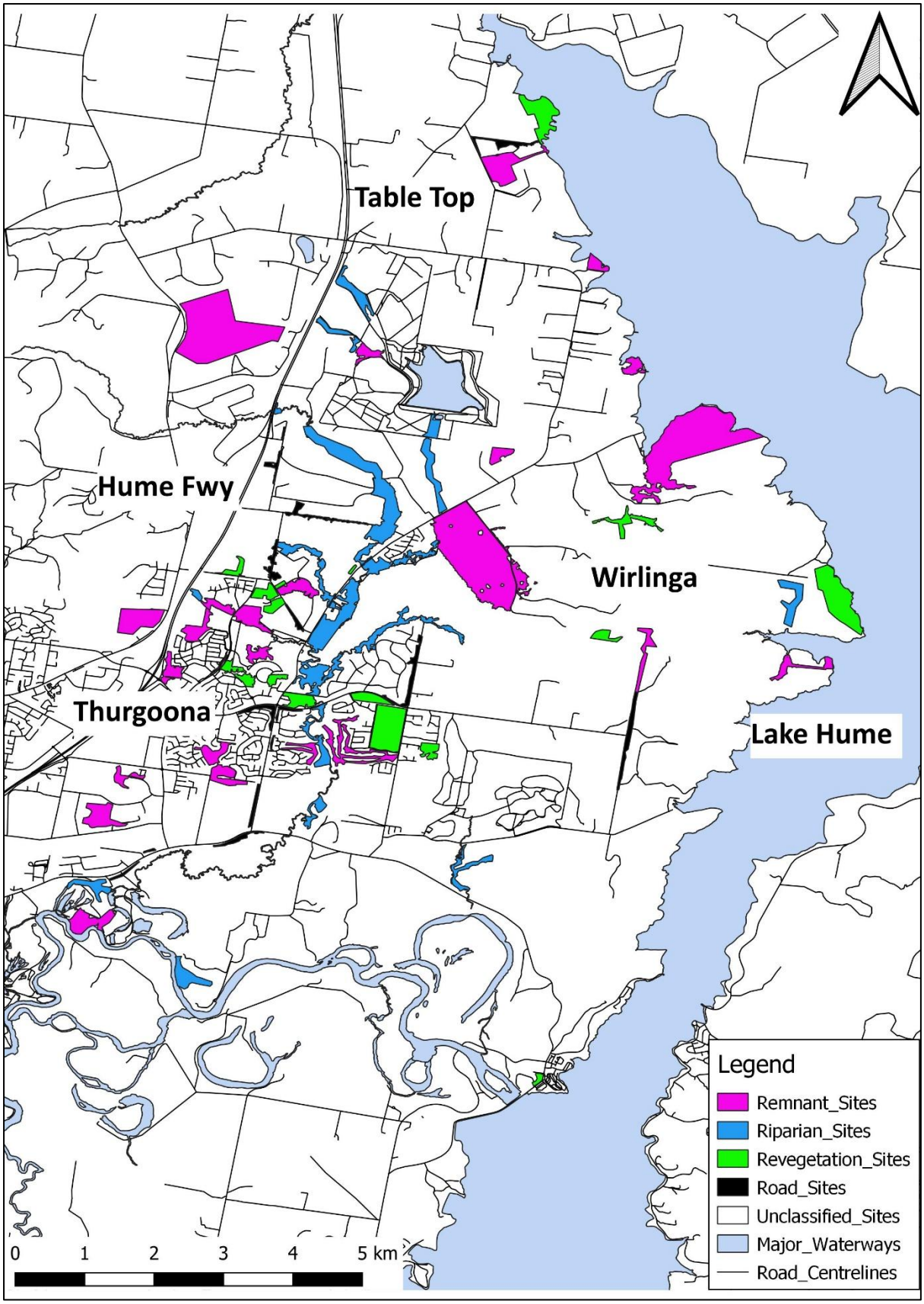

Figure 2: Thurgoona - Wirlinga study area

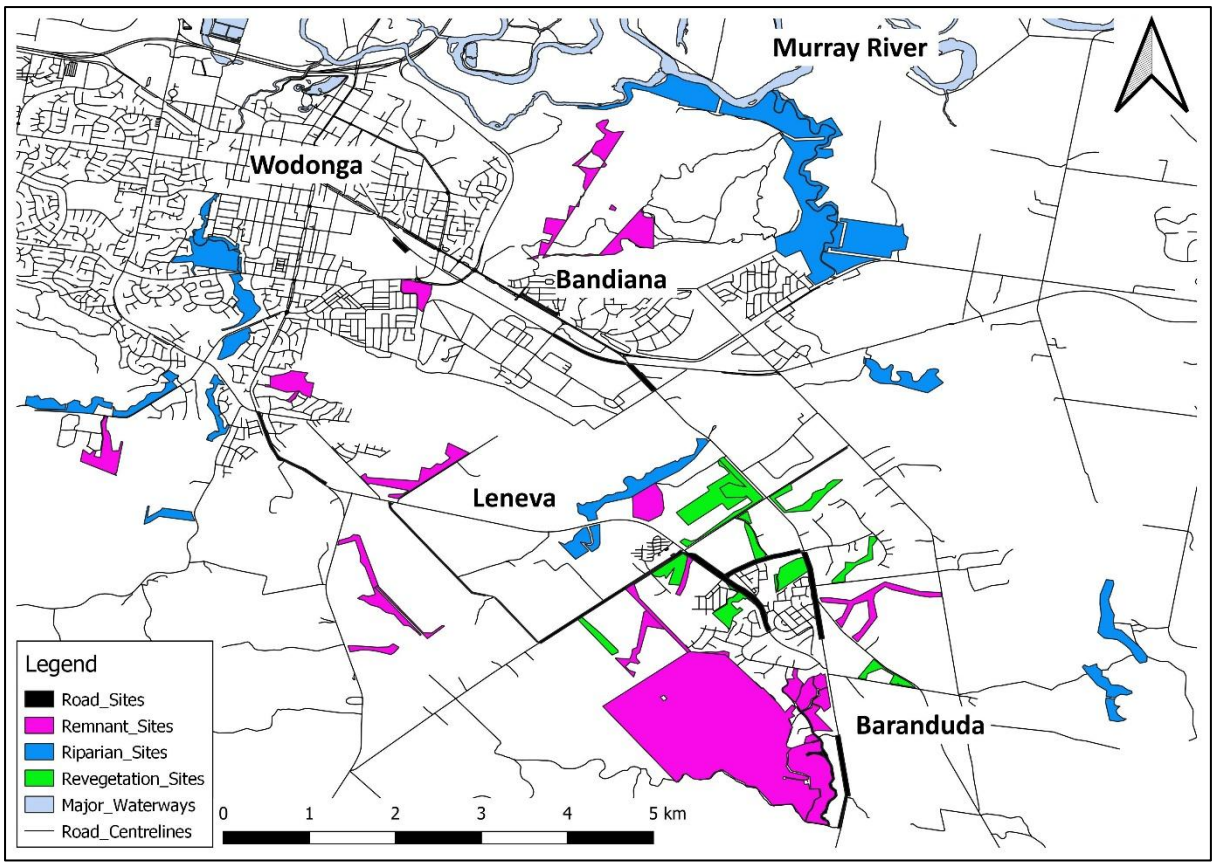

Figure 3: Wodonga study area

2. Methodology

2.1 Study design

The TSMP involves 85 potential survey sites in Thurgoona – Wirlinga and 60 potential survey sites in Wodonga. Native vegetation patches greater than 5 ha were 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 5 ha 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 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. These records are publicly accessible on the Albury Wodonga Nature Map, and data is regularly harvested and uploaded to the Atlas of Living Australia where the records are likely to be more widely considered.

During camera installation and retrieval, ecologists also record opportunistic bird observations with the purpose of documenting other threatened species. The bird observations 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 installation

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 2024 monitoring periods.

Table 1: 2024 TSMP Survey efforts (no. of sites monitored)

Monitoring Period	No. of sites monitored NSW	No of sites monitored VIC
Autumn 2024	65	59
Spring 2024	65	59

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 provided a limiting factor to accessing some sites in 2023. 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 2024, and their associated information are shown in Table 2

Table 2: 2024 survey limitations

Study Area	Site ID	Monitoring Period	Land Use Type	Habitat Type	Limitation
NSW	14	Autumn Spring	Urban	Revegetation	Site was cleared for development prior to Autumn 2019 period.
NSW	53	Autumn Spring	Proposed Development	Revegetation	Landholder not contactable for access
NSW	59	Autumn Spring	Rural	Riparian	Landholder did not permit access
NSW	62	Autumn Spring	Rural	Riparian	Landholder not contactable for access
NSW	64	Spring	Rural	Remnant	New land manager (Albury Aboriginal Lands Council) access had not been negotiated.
NSW	66	Autumn Spring	Proposed Development	Roadside	Landholder not contactable for access
NSW	71	Autumn	Rural	Revegetation	Landholder not contactable for access
NSW	72	Autumn Spring	Rural	Riparian	Property has been subdivided into rural living blocks. No contact details for new owners yet.
NSW	73	Autumn Spring	Rural	Riparian	
NSW	74	Autumn Spring	Rural	Revegetation	
VIC	157	Autumn Spring	Rural	Riparian	Access not granted by land manager.

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
P. norfolcensis	170-240mm	220-300mm	190-300g	Clear White	Muzzle longer, pointed. Tail never white tipped.
P. notatus	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: 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 2024, Autumn and Spring. The survey effort in each period was 65 sites monitored. They resulted in 35 Squirrel Glider (hereafter referred to as glider) detections in the Autumn monitoring period (detection rate of 54%) and 29 glider detections in the Spring monitoring period (detection rate of 44%). There was an increase in overall glider detection rate from the previous monitoring period (Spring 2023), where the detection rate was 49% before decreasing to 44% in the Spring 2024 period. The 2024 monitoring periods have resulted in 14 successive monitoring periods with glider detection rates greater than 30%, within a range of 30-55%. This is the fourth consecutive year where detection rates have been higher in Autumn than in Spring. 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 2024

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%**	↓
Autumn 2023	60	33	**55%**	↑
Spring 2023	63	31	**49%**	↓
Autumn 2024	65	35	**54%**	↑
Spring 2024	65	29	**44%**	↓

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 upward trend in glider detection rates at riparian sites (17% in Winter 2018 to 56% in Spring 2024). All habitat types are showing a higher detection rate in Spring 2024 than they were in Spring 2019, perhaps correlating with wetter than

average years and resource availability. During this time, roadside habitat sites have consistently produced higher detection rates in Autumn as opposed to Spring, with both seasonal rates increasing annually (Figure 8), until 2024 where the detection rate at roadside habitats remained constant from autumn to spring. Overall, results may highlight the importance of roadside vegetation in linking patches of vegetation in what is an increasingly fragmented landscape in terms of arboreal habitat.

Remnant sites had shown the least amount of variance in detection rates over the life of the program but in 2024, detection rates at remnant sites decreased from 53% to 28 % (Table 5, Figure 8). Riparian site detection rates remained constant from autumn to spring in 2024, whilst revegetation site detection rates had decreased from 66% in autumn 2023 to 50% in spring 2024 (Table 5). The glider detection rates per habitat type for each monitoring period are shown in Figure 8.

Table 5: Detection rates per habitat type in Autumn and Spring 2024

Habitat	Autumn 2024		Spring 2024		Trend
	Sites Monitored	Detection Rate	Sites Monitored	Detection Rate	
Remnant	19	52.63%	18	27.78%	↓
Revegetation	13	61.54%	14	50.00%	↓
Riparian	16	56.25%	16	56.25%	→
Roadside	17	47.06%	17	47.06%	→
All	65	53.85%	65	44.62%	↓

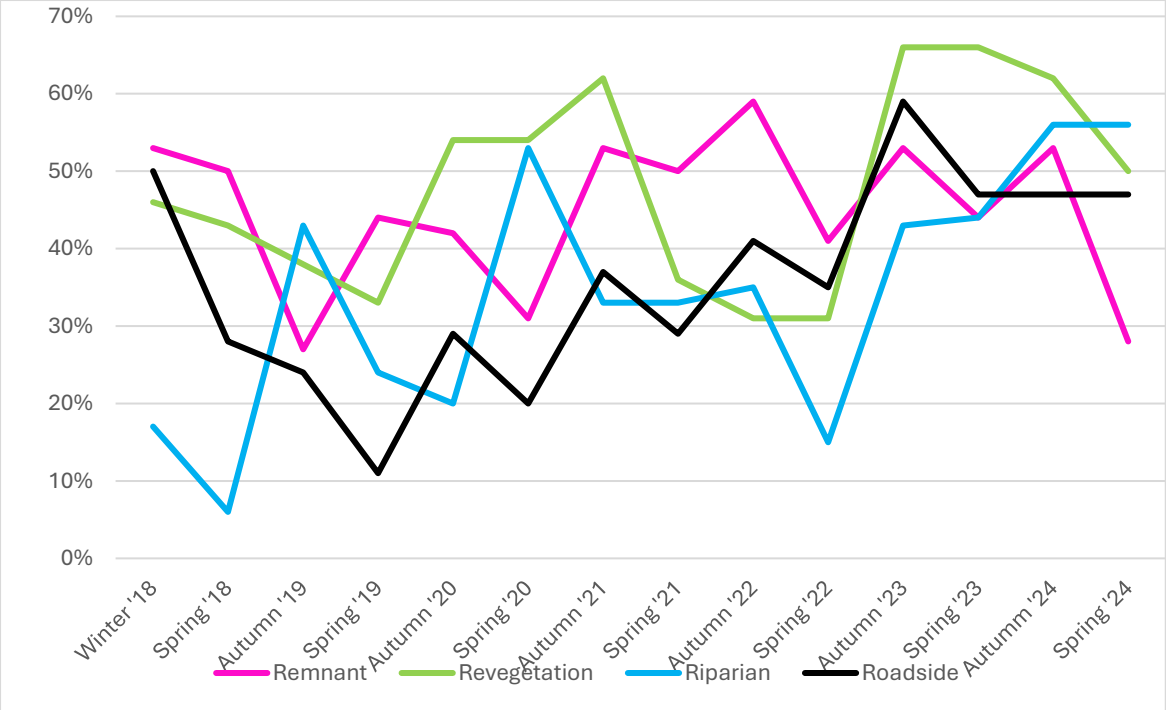

Figure 8: Squirrel Glider detection rates according to each habitat type in each monitoring period in Thurgoona - Wirlinga

Within a study period (calendar year) it is difficult to discern any real habitat preference or change thereof by gliders, with detection rates often 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 (2024 calendar year).

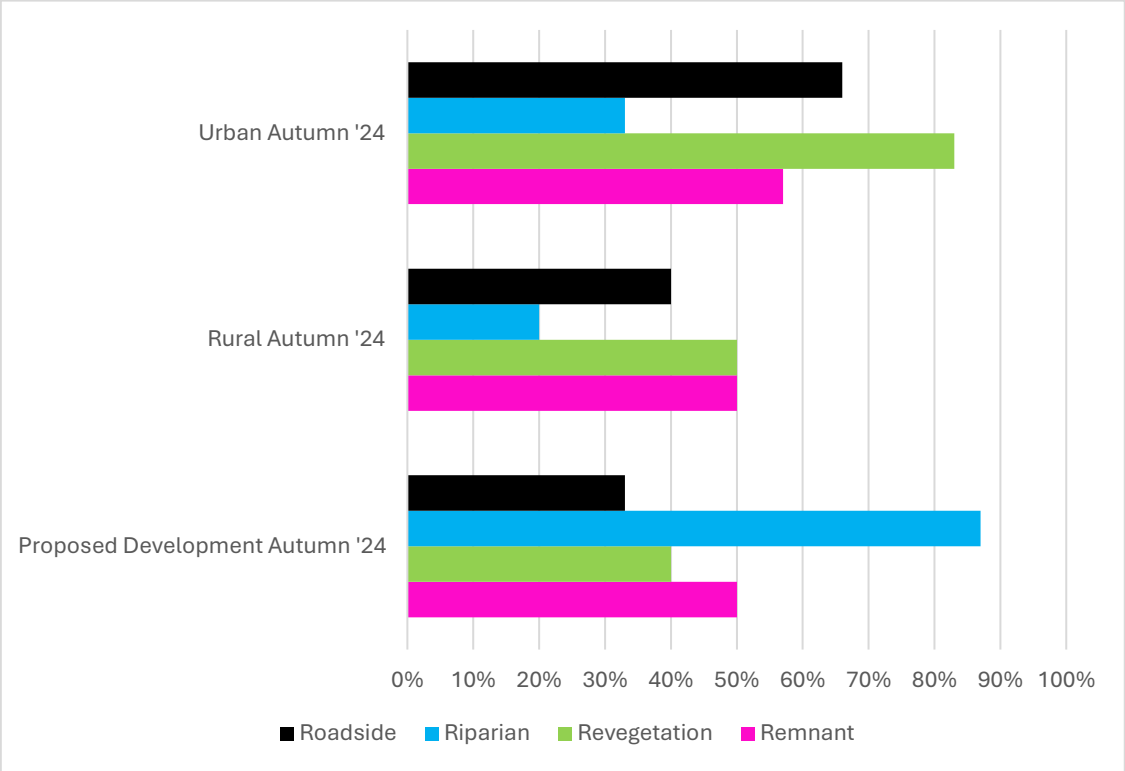

Figure 9: Squirrel Glider detection rates of each habitat type according to land use zone for the Autumn 2024 monitoring period in Thurgoona - Wirlinga

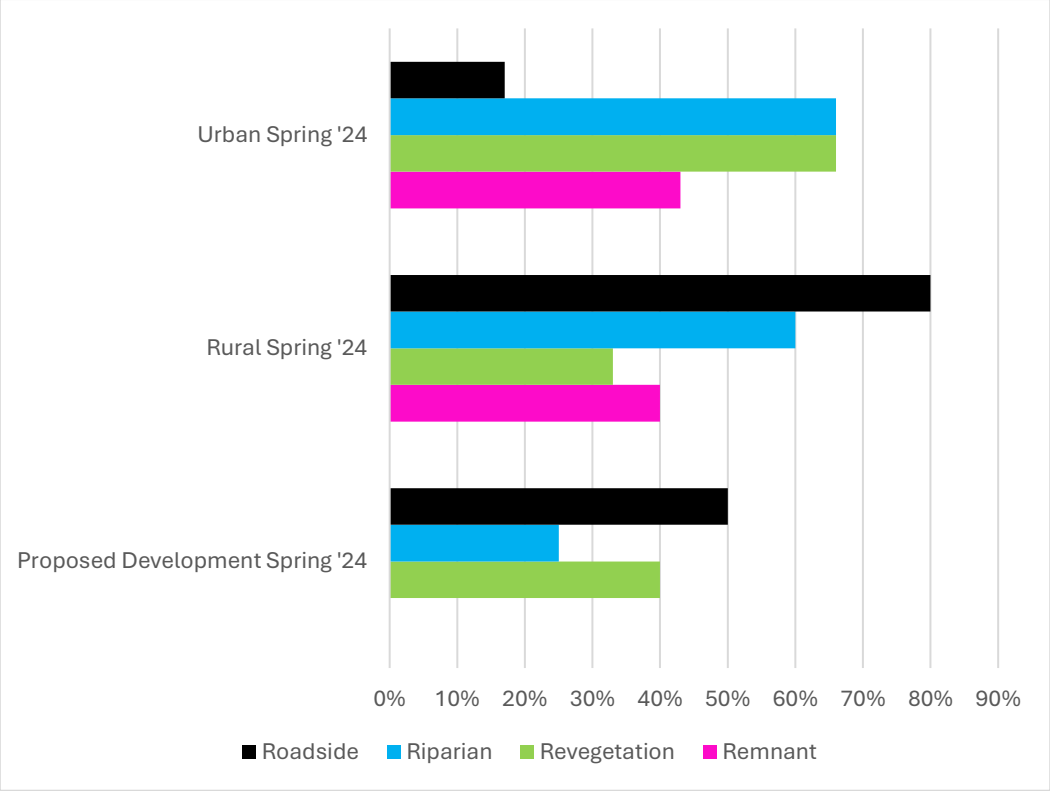

Figure 10: Squirrel Glider detection rates in each habitat type and land use zone during the Spring 2024 monitoring period in Thurgoona - Wirlinga.

Figures 9 and 10 highlight some notable variances between survey periods including:

- Roadside habitat types in the rural land use zone saw a doubling in detection rates from 40% in autumn to 80% in spring.
- Remnant habitat types in the proposed development land use zone saw a reduction in detection rates from 50% in autumn to 0% (no detections) in spring. At the same time, detection rates at riparian habitats in the proposed development land use zone decreased from 85% to 25%.
- Roadside detections in the urban land use zone decreased from 65% to 15% from autumn to spring whilst riparian detections increased from 33% to 66% from autumn to spring.

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.

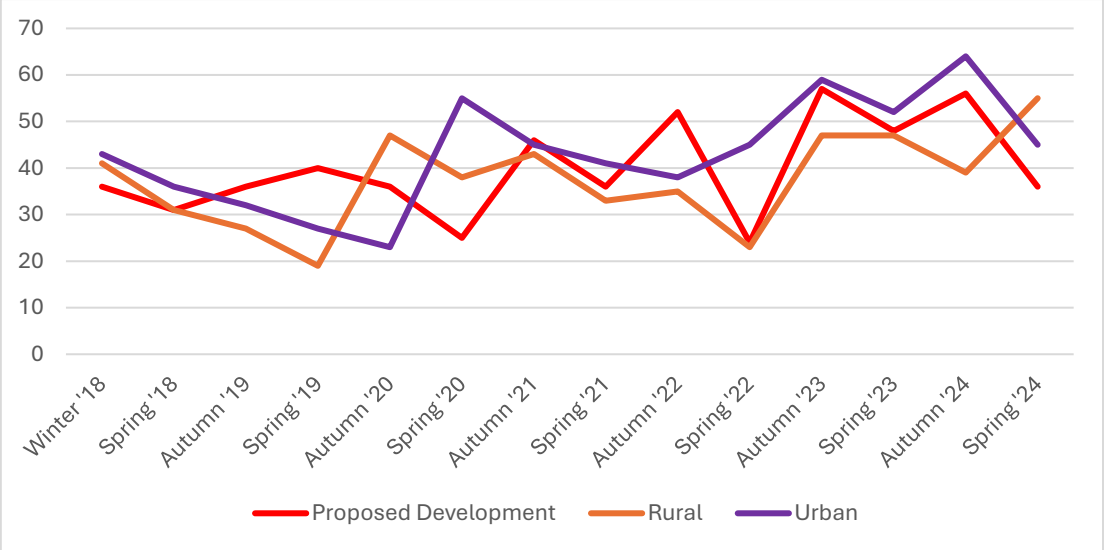

Figure 11: Squirrel Glider detection rates in Thurgoona-Wirlinga within each land use zone across life of program.

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 seven years (14 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. Until spring 2024 where there no detections at remnant sites in the proposed development land use zone, gliders had been detected in remnants across all three land use zones during all survey periods, highlighting the importance of this habitat type for the species.

3.1.3 Trends in nightly detection rates

Records (images and GPS location) from each of the sites detecting Squirrel Gliders in 2024 have been uploaded to the citizen science platform, https://albury-wodonga.naturemapr.org/.

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 (fourteen mounting periods across seven years) One site (Site 23) has detected gliders in 13 of 14 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 characteristic

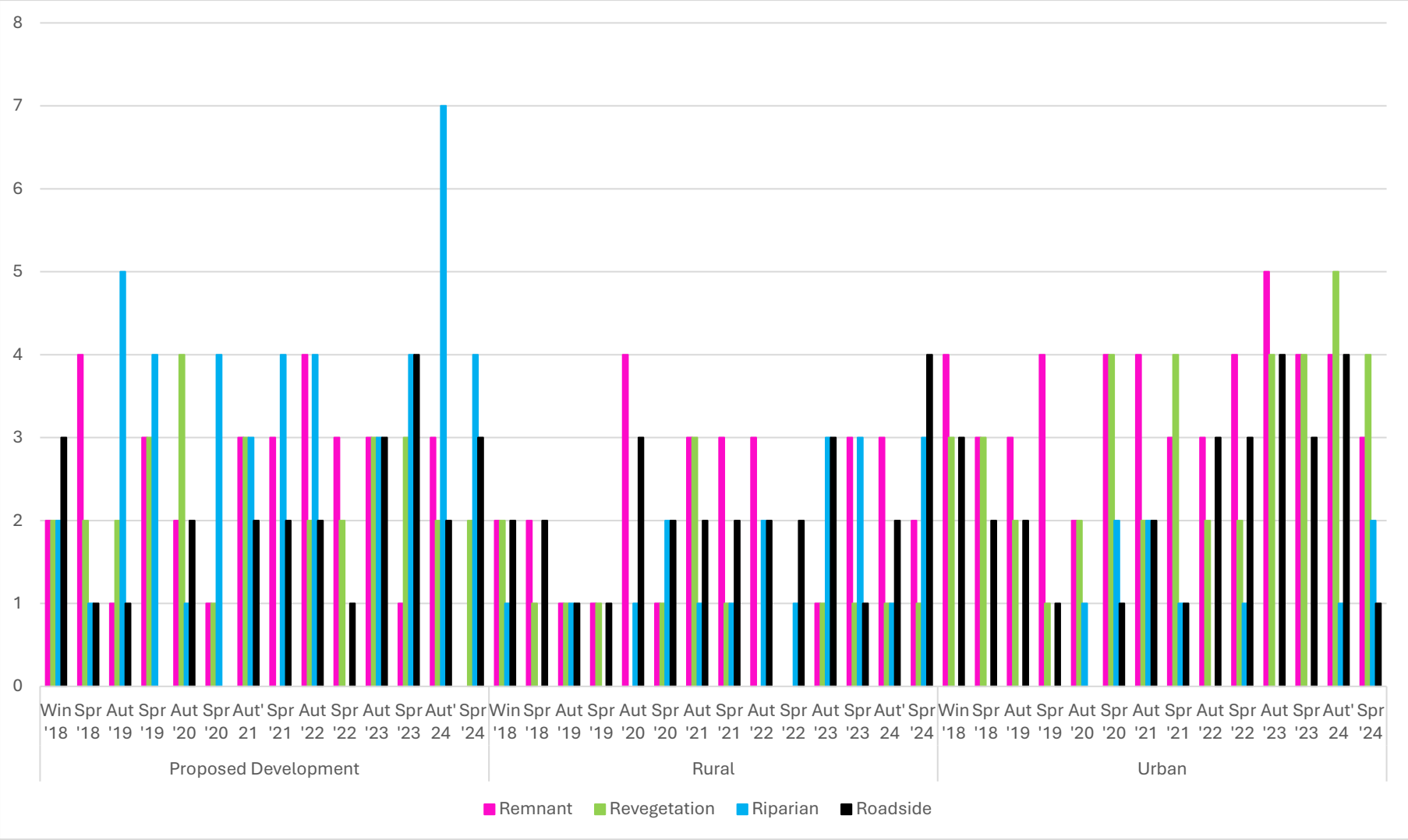

Figure 12: Total number of Squirrel Gliders detected across each monitoring period according to habitat type and land use zone in Thurgoona – Wirlinga

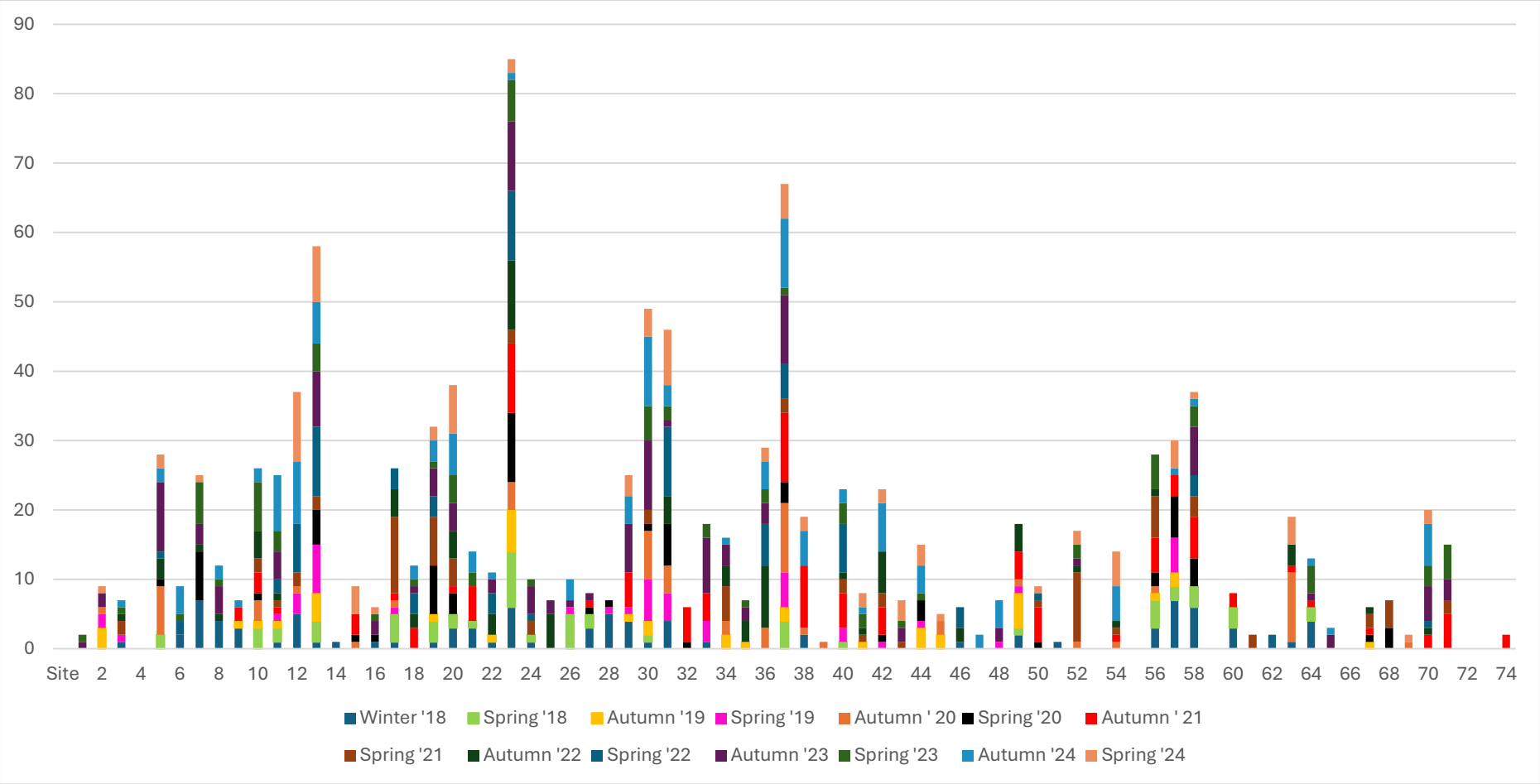

Figure 13: Total number of Squirrel Glider detection nights in each monitoring period (n=10-14nights) per site between 2018 and 2024 in Thurgoona Wirlinga.

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 2024, Autumn and Spring. The survey effort in each period was sites 59 monitored. They resulted in glider detection rates of 49% in Autumn 2024 and 36% in Spring 2024. 2024 monitoring showed an increase in detection rates initially (49% up from 32% the previous year), again recording a lower detection rate of 36% in Spring 2023. 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 2023 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%)**	↑
Autumn 2023	59	25 (27)	**42% (45%)**	↓
Spring 2023	59	17 (19)	**29% (32%)**	↓
Autumn 2024	59	26 (29)	**44% (49%)**	↑
Spring 2024	59	16 (21)	**27% (36%)**	↓

3.2.2 Trends in detection rates among habitat and land use types

In autumn, gliders were detected in 53% of remnant sites (n = 9), 40% of revegetation sites (n = 4), 44% of riparian sites (n = 7) and 57% of roadsides monitored (n = 9). Detection rates at remnant and revegetation habitat types remained constant from autumn to spring 2024, whilst there were marked reductions in detection rates at riparian and roadside sites from autumn to spring 2024 (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 2024

Habitat	Autumn		Spring		Trend
	Sites Monitored	Detection Rate	Sites Monitored	Detection Rate	
Remnant	17	52.94%	17	52.94%	→
Revegetation	10	40.00%	10	40.00%	→
Riparian	16	43.75%	16	18.75%	↓
Roadside	16	56.25%	16	31.25%	↓
All	59	49.15%	59	35.59%	↓

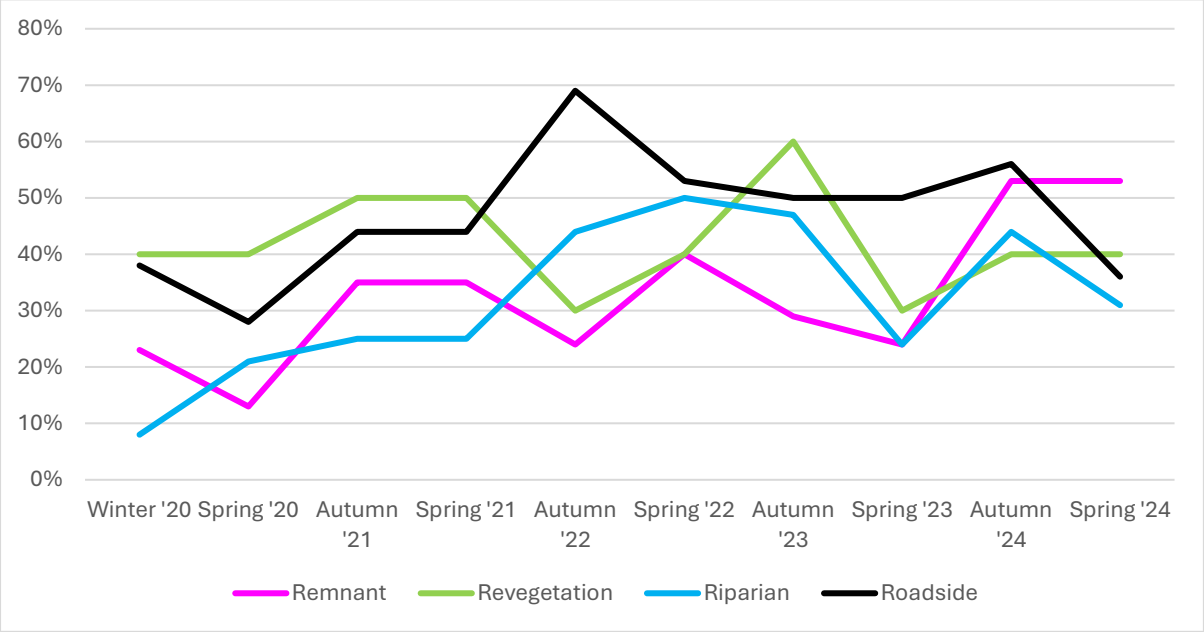

Figure 14: Squirrel Glider detection rates according to each habitat type across life of program in Wodonga

Figure 14 shows that three habitat types (remnant, revegetation, and riparian) finished with higher detection rates in spring 2024 than they did in spring 2023, and higher detection rates than the initial winter 2020 monitoring period, which indicates some stability over this time. Roadside habitat types finished with a lower detection rate in spring 2024 (36%) than spring 2023 (50%) but is like the initial detection rate of winter 2020 (38%).

Figures 15 and 16 demonstrate the difference in detection rates at each habitat type and land use zone within the study period (2024 calendar year).

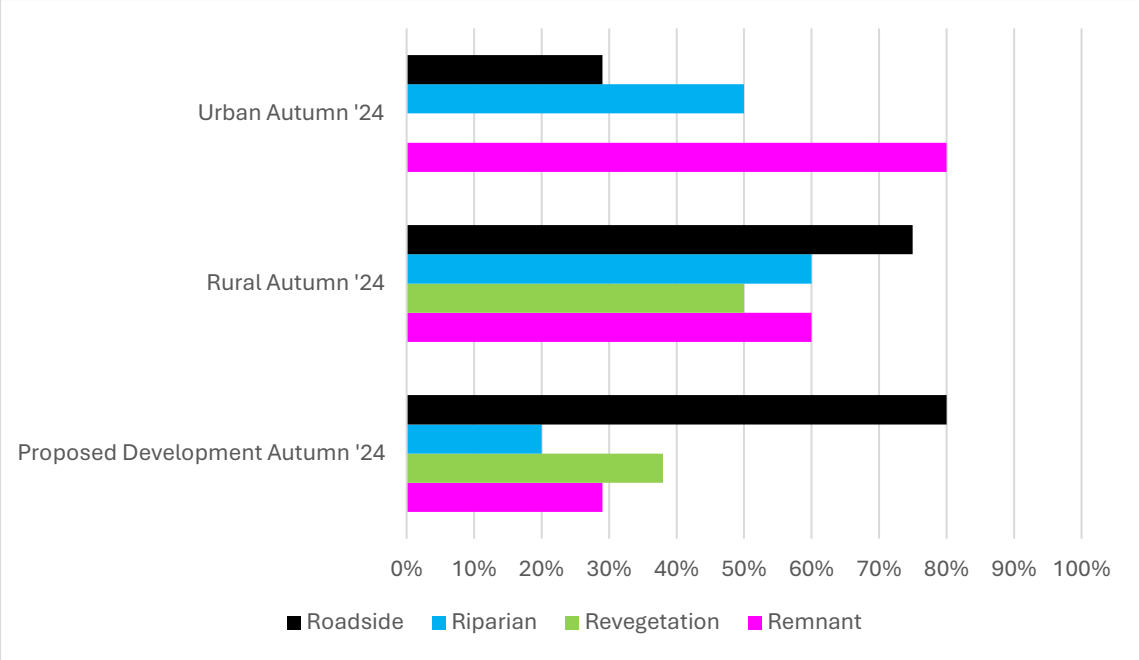

Figure 15: Squirrel Glider detection rates of each habitat type according to land use zone for the Autumn 2024 monitoring period in Wodonga.

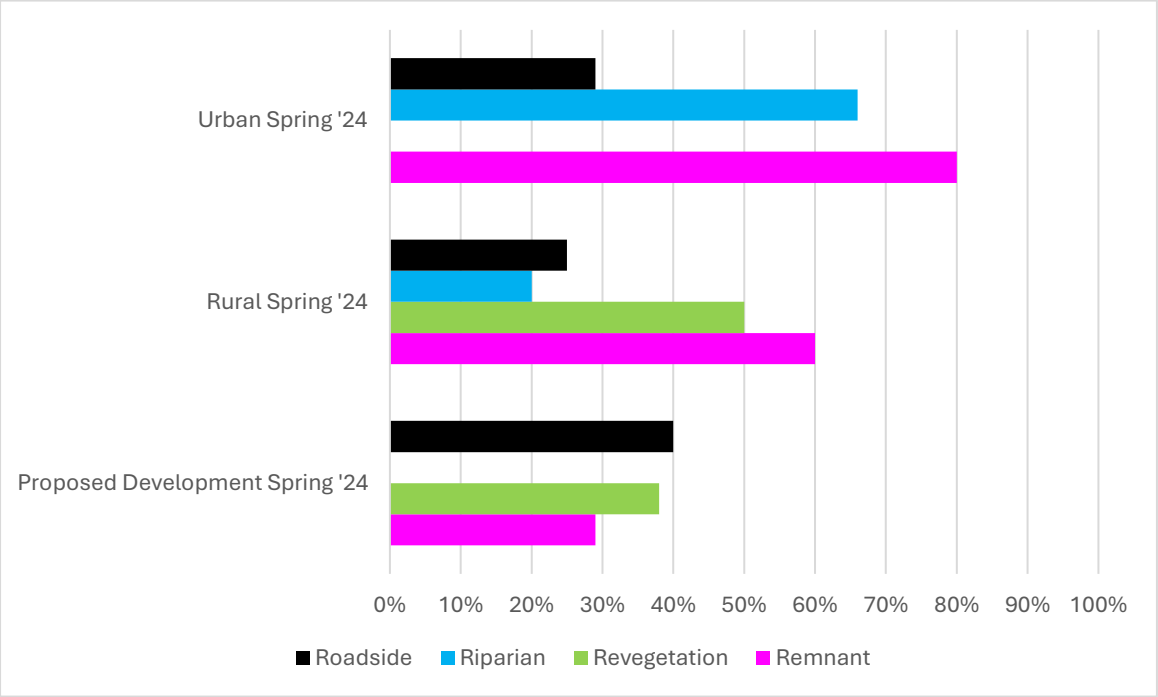

Figure 16: Squirrel Glider detection rates of each habitat type according to land use zone for the Spring 2022 monitoring period in Wodonga.

Figures 15 and 16 highlight some variances in habitat and land use type between monitoring periods including:

- The rural land use zone showing a marked reduction in detection rates within roadside and riparian habitat types from autumn to spring, reducing from 75% to 25 % and 60% to 20% respectively.

- Similarly, roadside sites in the proposed development land use zone halved from autumn (80%) to spring (40%).
- There were no detections in riparian habitat types within the proposed development land use zone in spring 2024, down from 20% in autumn 2024; and
- There was no change in the detection rate of revegetation habitat types between land use zones or 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 land use zone have been relatively stable over ten monitoring periods so far however, glider detections within the urban and rural land use zones have shown more variance.

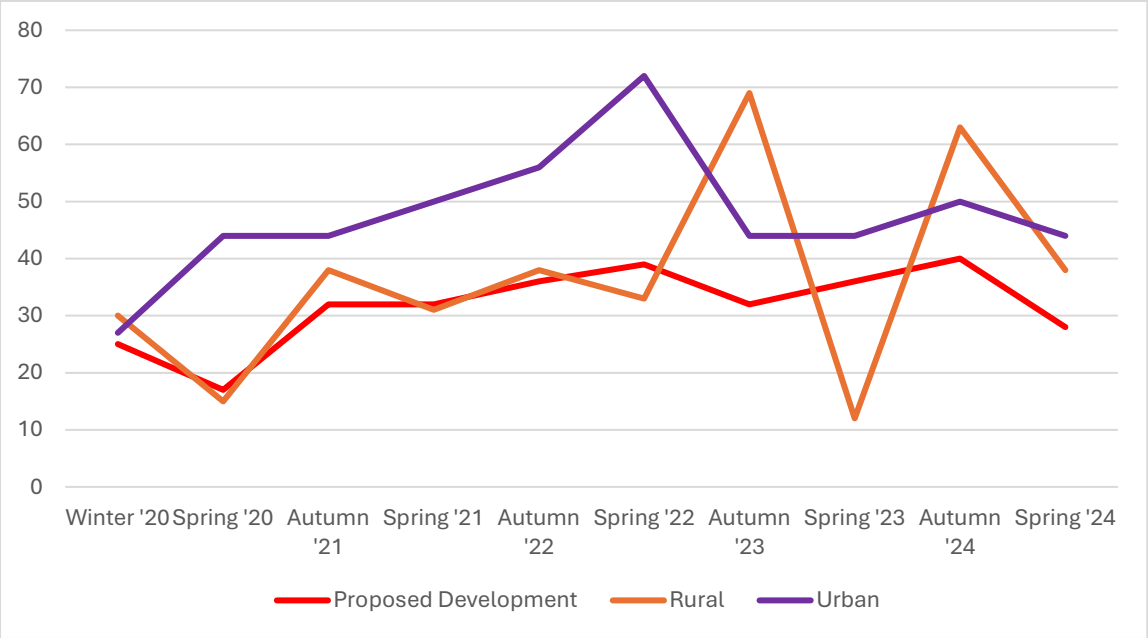

Figure 17:Squirrel Glider detection rates in Wodonga within each land use zone across life of program.

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 18). 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.

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. Revegetation habitat types appear more important in the proposed development land use zone than rural (there are no revegetation sites I the urban land use zone).

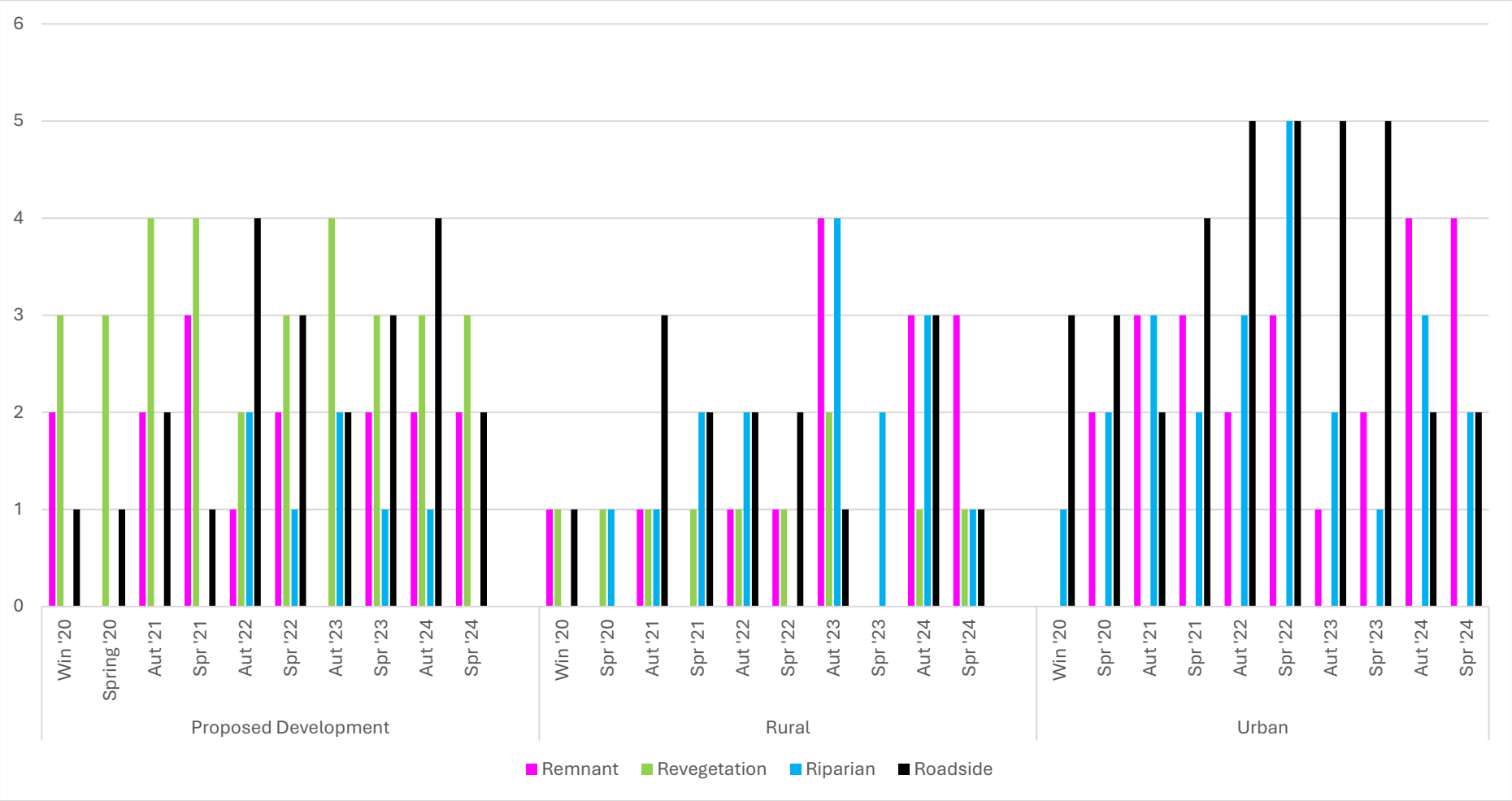

Figure 18: Number of glider detections in each land use zone and habitat type over time from Winter 2020 to Spring 2024.

3.2.3 Trends in nightly detection rates

Positive identifications were recorded at 26 of the 59 sites monitored in Autumn 2024 and 16 of 59 sites monitored during Spring 2024. Records (images and GPS location) from each of the sites detecting Squirrel Gliders in 2024 have been uploaded to Albury Wodonga Nature Map.

The number of detection nights per site from across each monitoring period is displayed in Figure 19. Gliders were detected on a maximum of 12 monitoring nights at some sites and as few as one night at others. One of the 59 total sites monitored (Site 103) has detected gliders across all ten 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

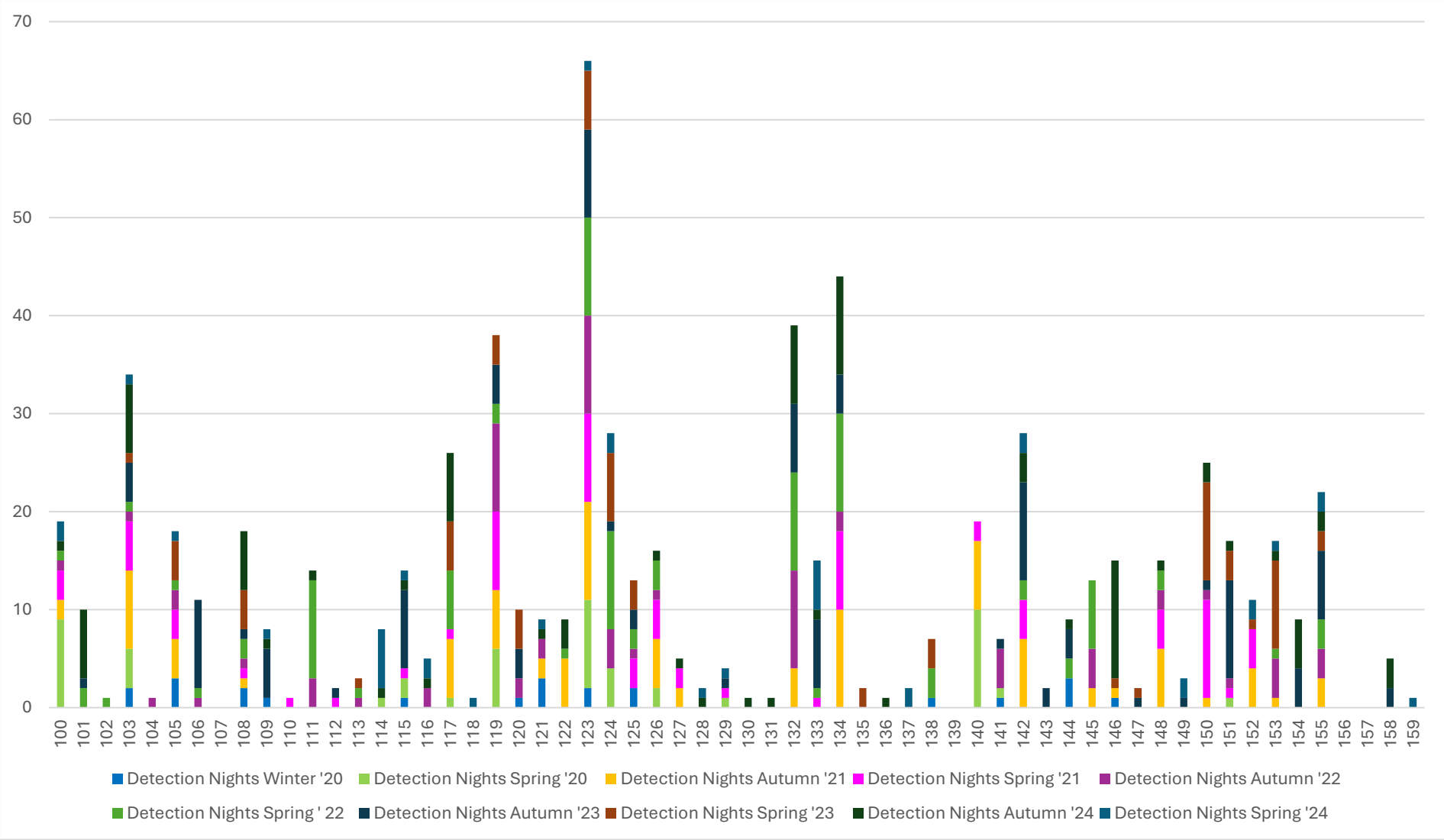

Figure 19: Figure 19: Total number of Squirrel Glider detection nights in each monitoring period (n = 10-14 nights) per site in Wodonga

3.2 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.

- Black Rat (*Rattus rattus*).
- Common Brushtail Possum (*Trichosurus vulpecula).*
- Common Ringtail Possum (*Pseudocheirus peregrinus).*
- Krefft's Glider (*Petaurus notatus).*
- Koala (*Phascolarctos cinereus).*
- Red Wattlebird (*Anthochaera carunculate*).
- Tawny Frogmouth (*Podargus strigoides).*
- Yellow-footed Antechinus (*Antechinus flavipes); and*
- White-winged Chough (*Corcorax melanorhamphos*).

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.

3.3 Bird observations

Bird species observations were recorded at TSMP sites as described in Section 2.2. These observations recorded predominantly common species across the study area. No threatened species as listed under Commonwealth (*Environment Protection and Biodiversity Conservation Act* 1999), New South Wales (Biodiversity Conservation Act 2016), or Victorian (Flora and Fauna Guarantee Act 1988) legislation were recorded in 2024. Over the life of the program, threatened bird species recorded have included:

- Black Falcon (*Falco subniger*).
- Brown Treecreeper (*Climacteris picumnus*).
- Diamond Firetail (*Stagonopleura guttata).*
- Dusky Woodswallow (*Artamus cyanopterus*).
- Gang-gang Cockatoo (*Callocephalon fimbriatum*).
- Glossy Black Cockatoo (*Calyptorhynchus lathami lathami*); and
- White-bellied Sea-eagle (*Haliaeetus leucogaster).*

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 has significantly improved the knowledge on Squirrel Glider (*Petaurus norfolcensis*) distribution across the study area, particularly in the Wodonga LGA where records prior to the TSMP were rare and limited. The program 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-tail 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 55% (Autumn 2023). The 2023 monitoring periods produced the highest glider detection rates to date at 55% and 49% and the 2024 monitoring periods saw detection rates remain above 50% in autumn and above 40% 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.

The autumn 2024 monitoring period saw the highest glider detection rate (49%) of the program so far within Victoria, before dropping to 26% in spring. The detection rates decreased in riparian and roadside sites from autumn to spring, whilst remnant and revegetation sites remained unchanged between monitoring periods (Table 7). Detection rates in the rural land use zone increased from 12% in Spring 2023 to 63% in Autumn 2024 before decreasing to 38% in Spring 2024. Seasonal changes have been evident in the rural land use zone since 2022.

The data collected should be shared with Councils, Landcare groups, NRM groups and other relevant land managers to inform on-ground work priorities. The data collected year to year and over time can be used to strategically plan for nest box installation, revegetation for connectivity or food supply, removal of barbed wire etc.

In 2024, there were three instances of *Petaurus* sp. detections where it was not possible to differentiate between Squirrel Glider and Krefft's Glider. This limitation was detailed in previous annual reports. There

are now 17 sites where the possibility of species overlap has been identified. An additional survey project plan has been developed 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 will 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.

To assist Councils and land managers within the study area, we have started collecting basic monitoring site condition data with the view of monitoring a set of parameters over time, which when combined with the Squirrel Glider presence/ absence data can be used to prioritise funding and certain on ground works. Annual monitoring of these parameters could allow the success of works delivered against the desired change in condition. Parameters include:

- Abundance of large trees/ native canopy cover.
- Abundance of native shrub layer + ground layer.
- Abundance of natural hollows.
- Abundance of nest boxes or augmented hollows.
- Abundance of high threat weeds (woody, herbaceous or grassy).
- Connectivity to other natural areas.

Some examples of how this data could be utilised by land managers include:

- Site with no/ limited glider detections has no hollows or installed habitat = priority for nest box installs.
- Site with no/ limited glider detections has adequate hollow habitat = improve connectivity (revegetation, glide poles etc) to other natural areas.
- Site with gliders in Spring but limited in Autumn (e.g.) = revegetation of understory to provide seasonal food source.
- Site infested with woody weeds (willows, poplars etc.) = treat and replace with native species and support with nest boxes as required.

It is suggested that baseline condition maps are prepared for a subset of sites in each of the Victorian and New South Wales study areas, which can be reviewed by relevant Council staff along with the parameters and methodology to finalise a model of data collection that will provide value for their land management programs, with a threatened species focus.

4.1 Summary of recommendations

1. Prepare a subset of baseline condition maps in each Council areas and review with Council staff along with the parameters and methodology to finalise a model of data collection that will provide value for their land management programs, with a threatened species focus.
2. 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.
3. Prioritise the delivery of the three-year funded *'Applying science to on-ground action for conservation of Albury Wodonga's threatened wildlife'* project. Commence monitoring of sites with habitat interventions to facilitate BACI experiment.
4. 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).
5. Data collected by the TSMP should be used to prescribe delivery of on-ground works relating to revegetation (connectivity and food sources), habitat enrichment (nest boxes and augmented hollows), weed control, removal of barbed wire etc. at specific sites.

6. 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), Department of Crown Lands combined licence (RI596463) and Victorian Government Department of Energy, Environment and Climate Action Research Authorisation Permit (Permit No 10011051).

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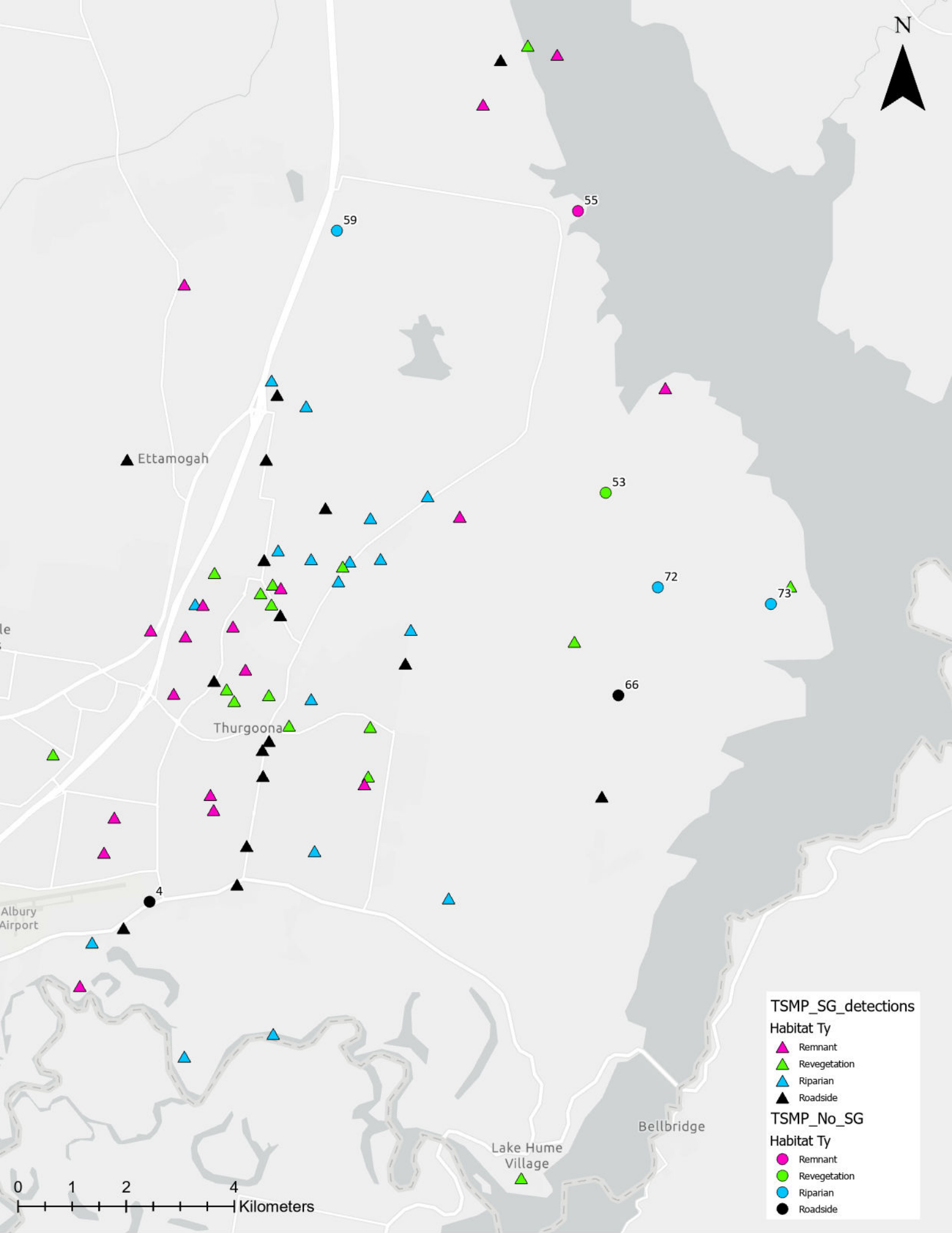
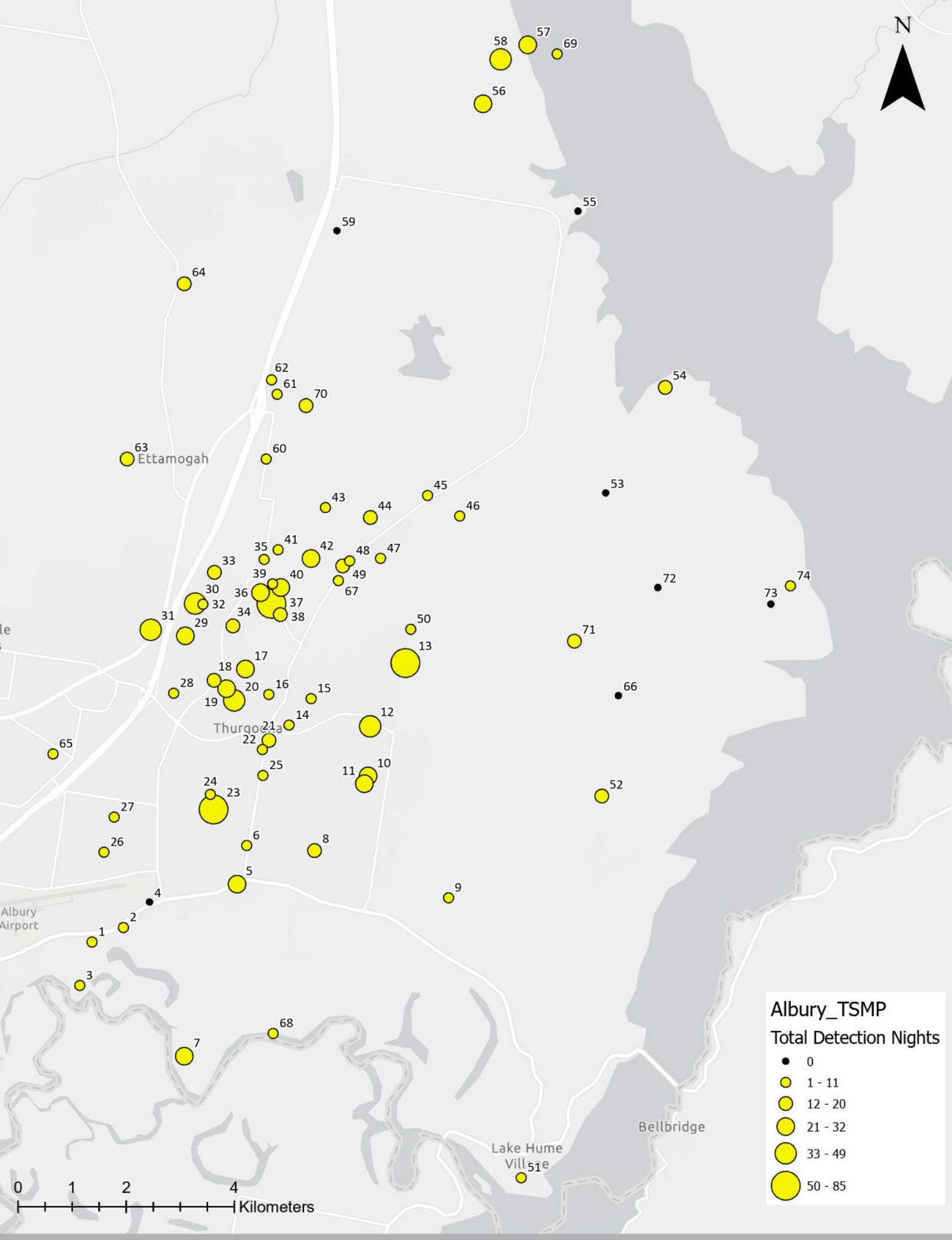
Appendix 1 – Results mapping

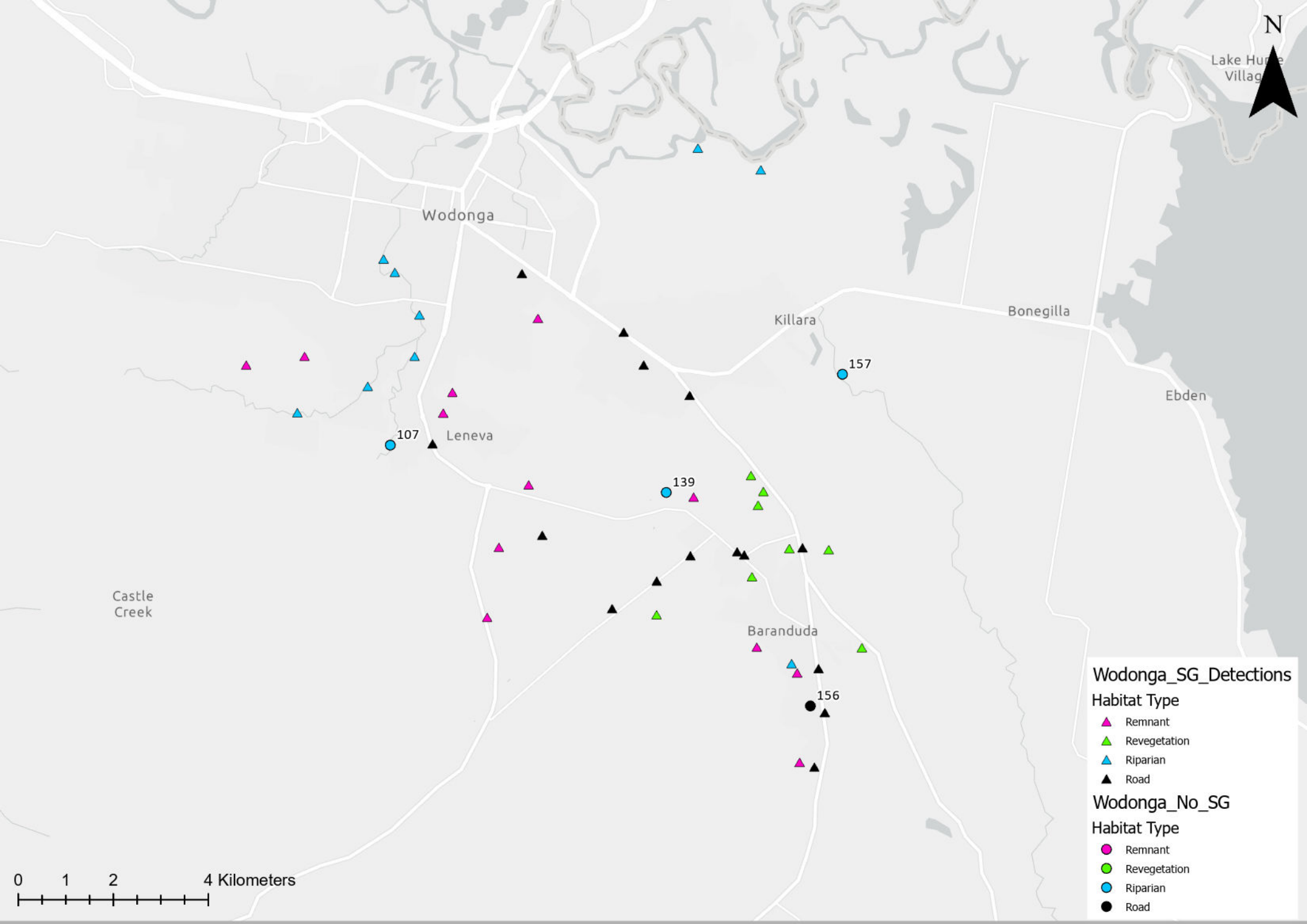


Vicmap, Esri, TomTom, Garmin, METI/NASA, USGS

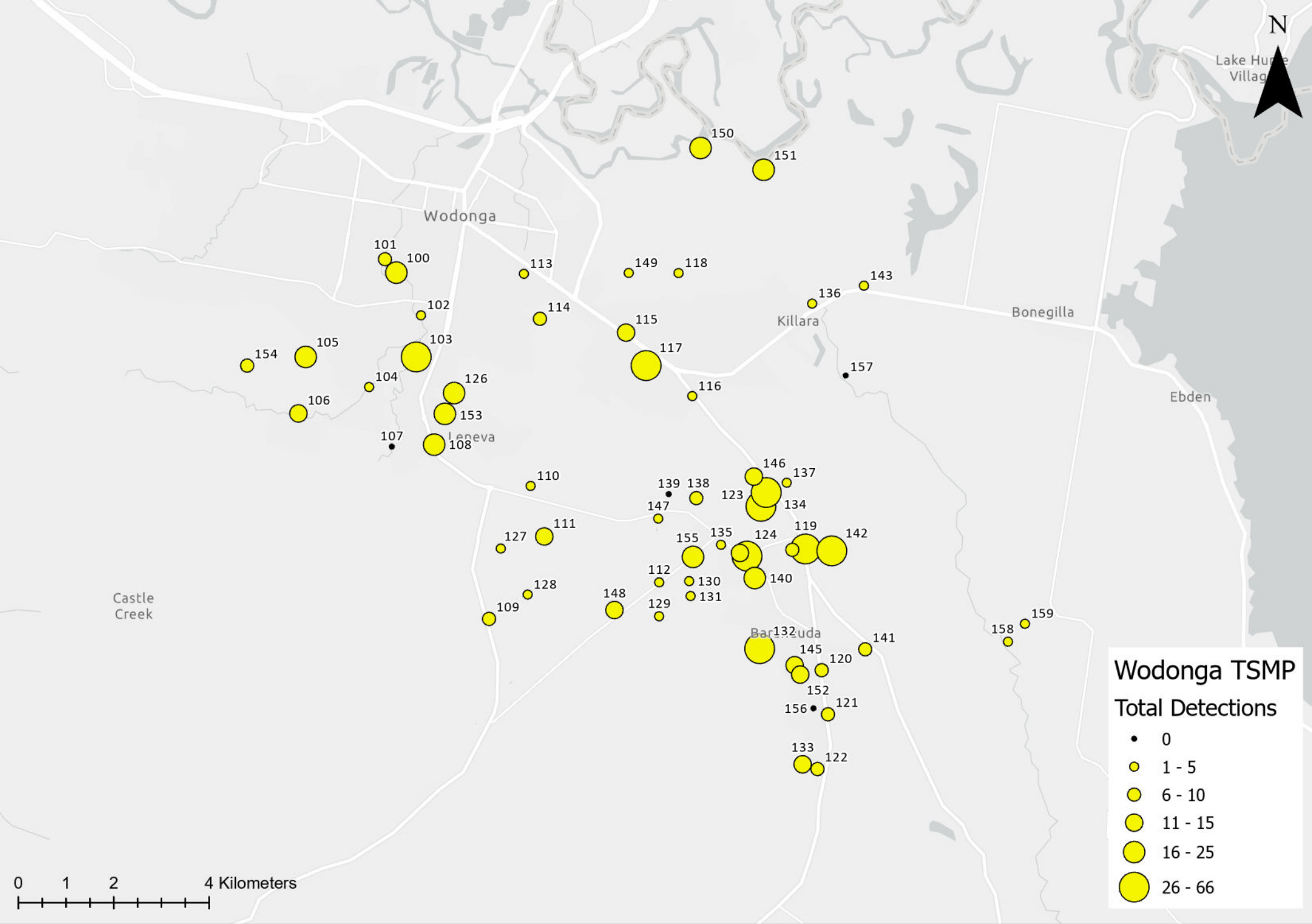
TSMP sites (NSW) with and without Squirrel Glider records over life of program



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



TSMP sites (VIC) with and without Squirrel Glider detections over life of program



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