

# Spatio-temporal Variability of Herpetofauna Road Mortality and Persistence of Carcasses in a Highly Fragmented Landscape

Joshua G. Rose<sup>1</sup>, Lauren W. Rego<sup>2</sup>, Chantel E. Markle<sup>1,2</sup>

<sup>1</sup>Department of Geography and Environmental Management,  
<sup>2</sup>School of Environment, Resources, and Sustainability  
 University of Waterloo, Waterloo, Ontario, Canada  
 jgrose@uwaterloo.ca

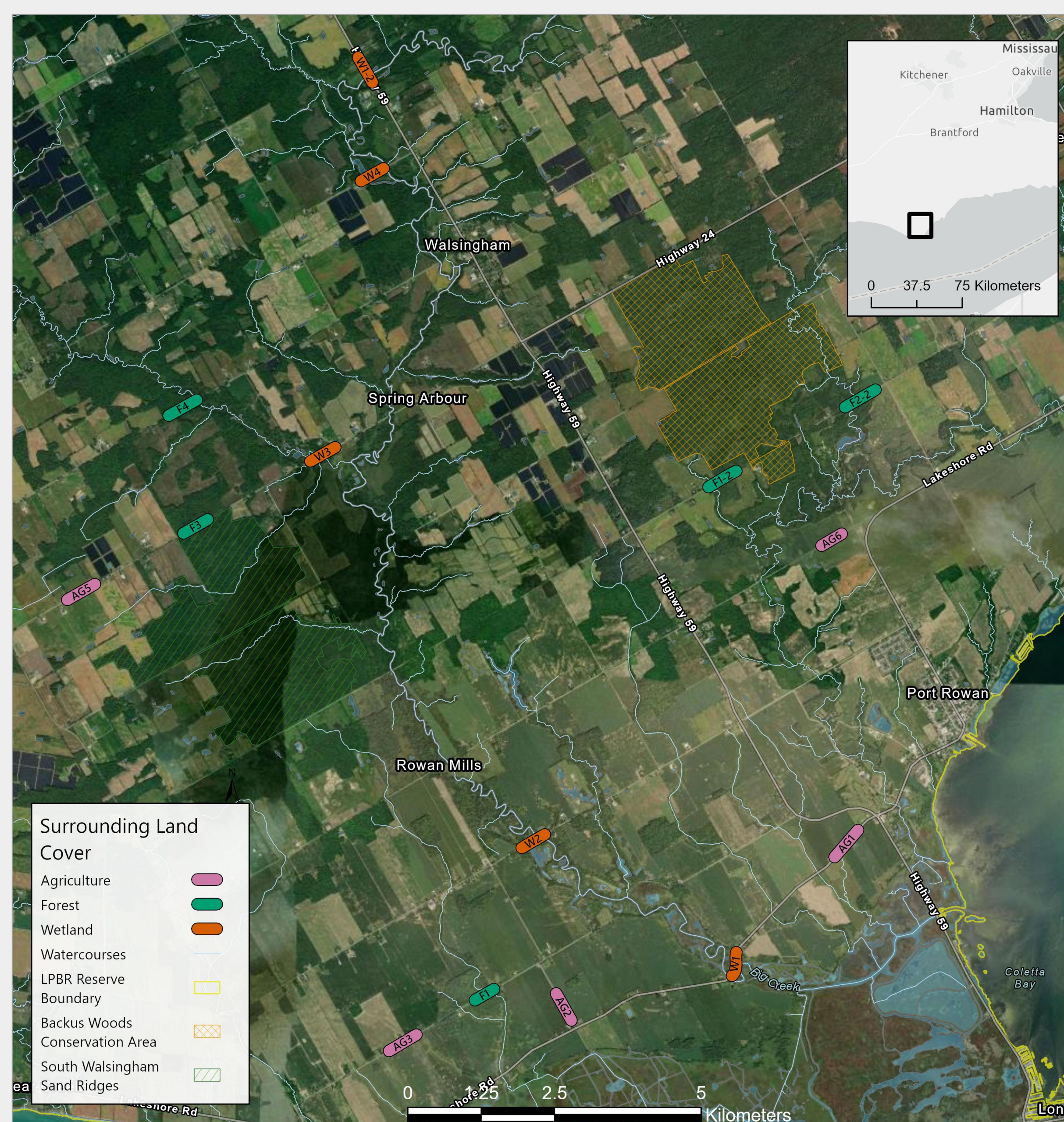
## Background

- **Species at Risk:** 21% of reptiles and 41% of amphibians globally are threatened with extinction.<sup>1</sup> **Wildlife-vehicle collisions (WVC)** are a leading cause of population declines.<sup>2</sup>
- **Disproportionately Susceptible:** Herpetofauna species are frequently observed on roadways due to ecological and behavioural characteristics (i.e., mating, nesting, overland movements between disconnected habitat).<sup>3</sup>
- **Biosphere:** The Long Point Biosphere Region (LPBR) boasts a rich wildlife diversity where road infrastructure presents high concentrations of road mortality in at-risk species.<sup>4</sup>

## Methods

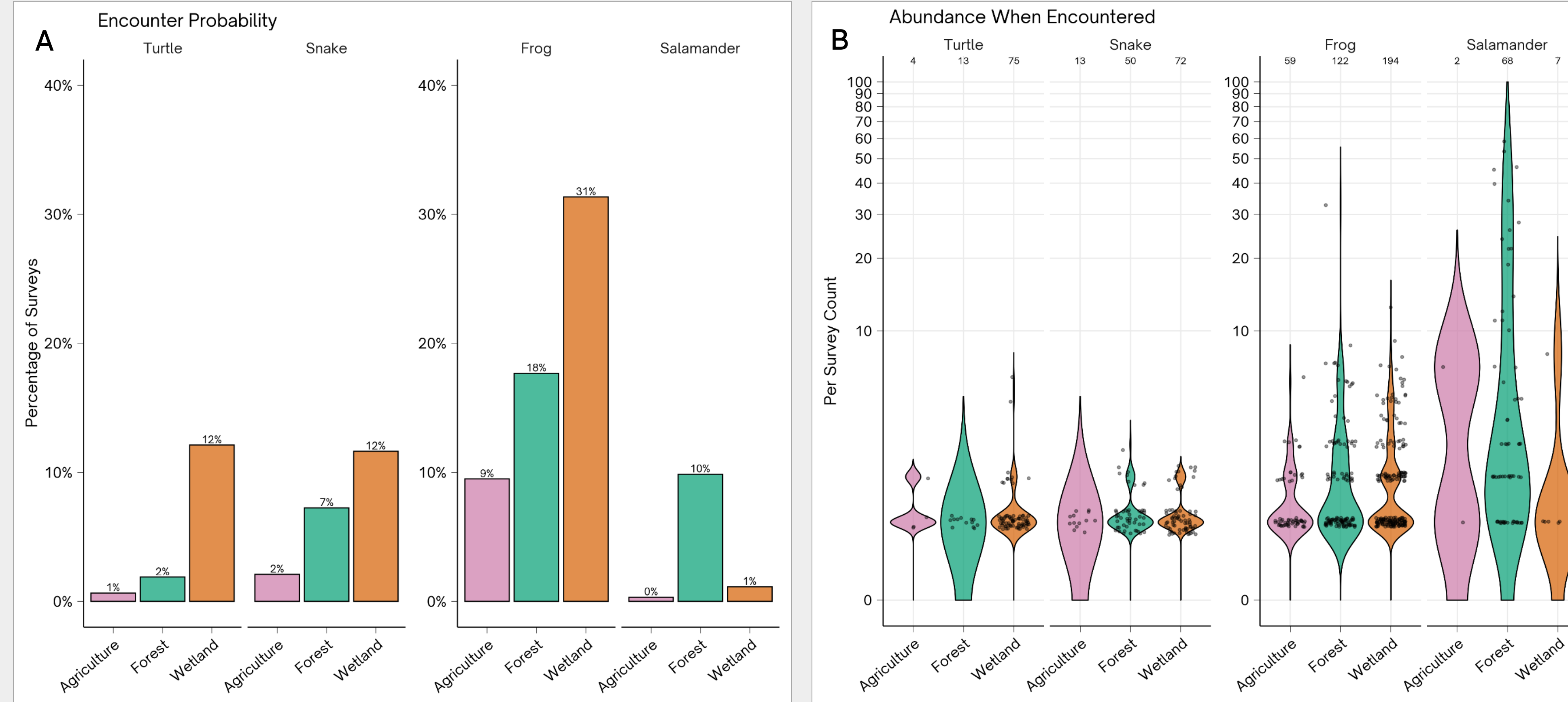
- **Systematic Surveys:** 1932 systematic walking surveys were completed during the active season across 15 equal-length road transects of three land cover types (**agriculture, forest, wetland**).
- **Randomized:** Surveys conducted between 06:00h and 20:00h in a randomized order. Number of vehicles observed during each survey were recorded to develop a daily average vehicle count per transect.
- **Carcass Persistence:** The location, species, initial carcass condition, and body size of **intact carcasses** were recorded. Carcasses were monitored **twice per day for the first three days**, then once per day until no longer detectable.

## Study Area



**Figure 1.** Road transects surveyed throughout the study, including five transects of three land cover types (15 total), each 300 metres length.

## Preliminary Results & Discussion

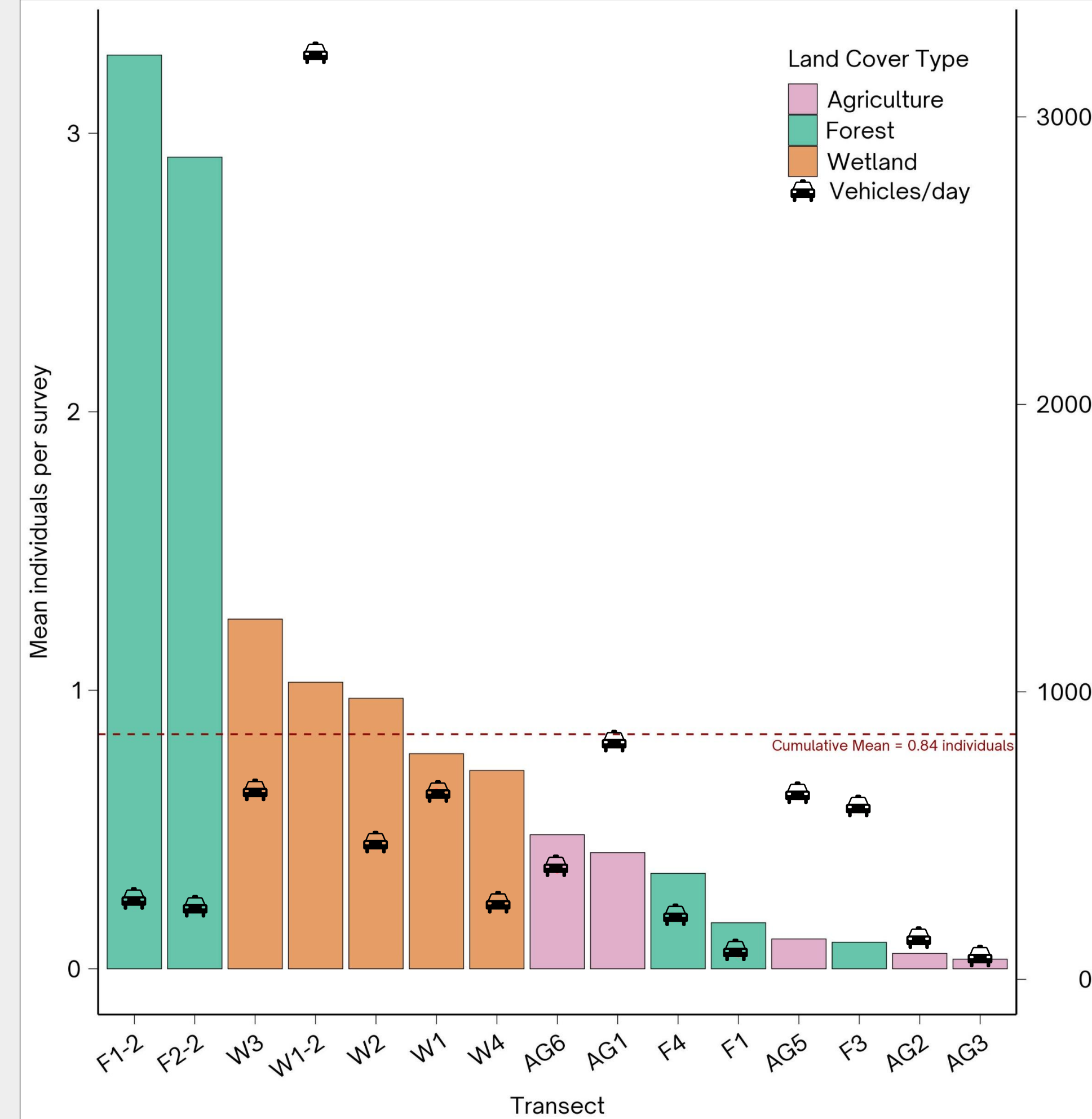
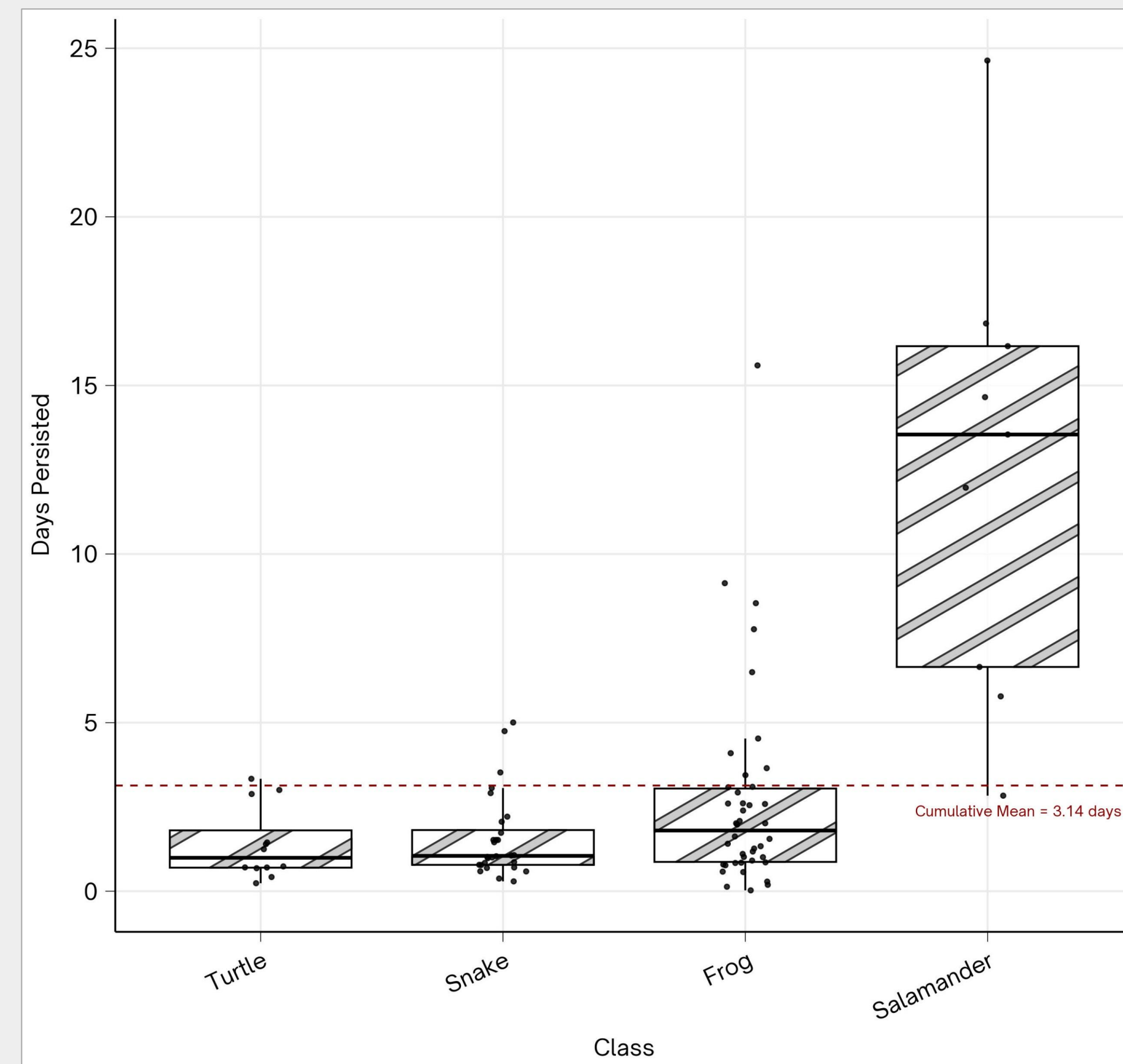


**Figure 2.** (A) Encounter probability based on mortality counts at land cover types, and (B) count frequency when detection occurred plotted on a log<sub>10</sub> scale. The numbers above the plot indicate surveys where n > 0.

**Table 1.** Survey totals including distance, observations, and percentage of each fate (dead/alive).

Year	# of Surveys	Distance (km)	Roadkill Density (Carcasses/km)		Number Dead on Road (%)		Number Live on Road (%)		Total Number on Road	
			Reptiles	Amphibians	Reptiles	Amphibians	Reptiles	Amphibians	Reptiles	Amphibians
2024	856	256.8	0.34	2.39	87 (74.4)	614 (85.8)	30 (25.6)	102 (14.2)	117	716
2025	1076	322.8	0.37	1.95	119 (77.8)	629 (92.8)	34 (22.2)	49 (7.2)	153	678
<b>Total</b>	<b>1932</b>	<b>579.6</b>	<b>0.36</b>	<b>2.14</b>	<b>206 (76.3)</b>	<b>1243 (89.2)</b>	<b>64 (23.7)</b>	<b>151 (10.8)</b>	<b>270</b>	<b>1394</b>
			<b>2.5</b>		<b>1449</b>		<b>215</b>		<b>1664</b>	

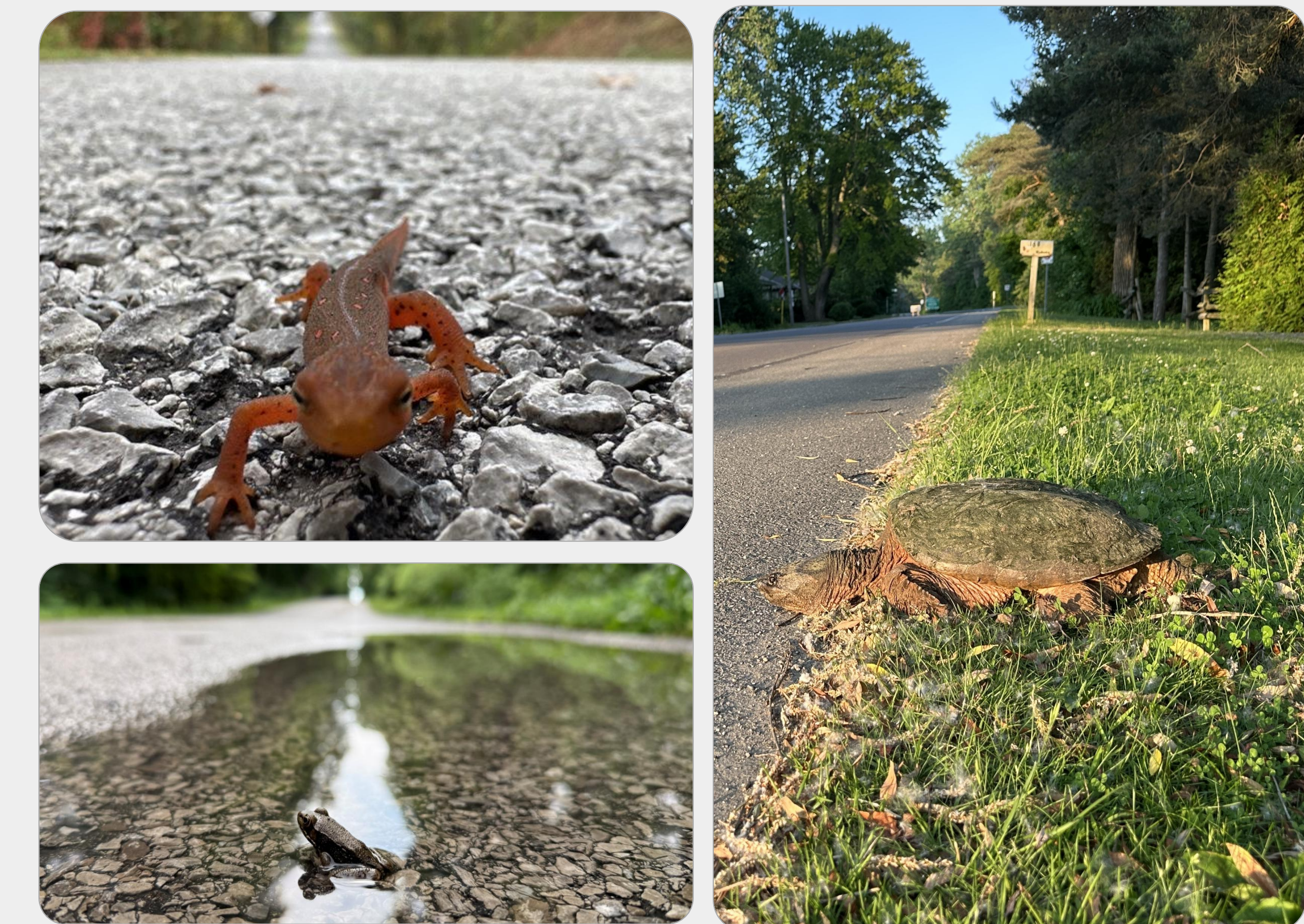
(Right) **Figure 3.** The mean number of all individuals recorded per survey (n = 1664), plotted along each transect with the calculated average daily traffic (AADT). There is **no immediate correlation** between AADT and number of observed individuals.



(Left) **Figure 4.** Distribution of persistence for observed carcasses (n = 91). Salamanders persisted the longest due to microtopography and lower predation pressure.

## Key Takeaways

- 46% of identifiable road-killed reptiles observed within our study are currently **protected under the federal Species at Risk Act**. This includes 8% of observed snake species (12/153) and 100% of observed turtle species (110/110).
- **Frequent surveys are required to accurately quantify WVC for reptiles.** Turtle and snake taxa demonstrated the shortest carcass persistence, with a mean of 1.40 and 1.57 days, respectively.
- **The largest observed hotspot was located adjacent to Backus Woods Conservation Area.** Differences in WVC counts across transects are driven by a combination of surrounding land cover and nearby environmental features.



**Figure 5.** Evidence showing herpetofauna species of differing classes **utilizing roadways** for nesting habitat (right; snapping turtle [adult female]), overland migratory movements (top; red-spotted newt [eft]), and as habitat patches (bottom; green frog [subadult]). Turtles frequently selected road shoulders as nesting sites between late May and early July due to maintained vegetation and soft substrate. Red-spotted newt efts exhibited a mass mortality event on September 25 in both years during migration to overwintering habitat.

## Next Steps

- Characterize the quantity of land cover within 25, 50, 100, 250m to determine the impact of land cover proportions at each transect.
- Understand the role of body size and environmental variables on persistence of carcasses to estimate error in WVC estimates.
- Develop connectivity maps using least-cost analysis to quantify the role of herpetofauna habitat connectivity on WVC.

**Acknowledgements** Thank you to everyone in the WEC Lab (especially Lauren R.) that made this project possible, from the endless road surveys to the tedious species identification. Thank you to Lauren N., Kari G., and Brian C. at the LPBR for their support this summer. This project would not have been possible without my supervisor, Dr. Chantel Markle, and her guidance. Project funding was provided by NSERC DG and CRC.

