Quantifying the Road Effect Zone for Insectivorous bats

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Why would roads be bad for bats?

- **Habitat loss**  (Bennett and Zurcher 2013; Hale et al. 2015)
- **Flight height**  (Medinas et al., 2013)
- **Avoidance of noise, light and vehicle presence**  (Fensome and Mathews 2016; Fure 2012; Stone et al. 2015; Threlfall et al. 2013, Zurcher et al. 2010)
- **Reduction in foraging ability**  (Schaub et al. 2008; Siemers and Schaub 2011)
Road effect zone

Roadkill and barrier effects are NOT the only impacts of roads

Area surrounding a road into which the ecological impacts of roads extends

- Animals will avoid this area
- Indirect loss of habitat
Does the activity of bats change with proximity to the highway?
Road Effect Zone for Bats - Methods

N = 18; Calder Freeway (n=5), Goulburn Valley Freeway (n=6), and Hume Freeway (n=7)
Road Effect Zone for Bats - Analysis

Total: 43,355 calls to species

Nightly Call Activity

\[ R_i \sim \text{Poisson} (\lambda_i) \]

\[ \log(\lambda_i) = \beta_0 + \beta_1 D_i + \beta_2 L_i + \beta_3 C_i + \beta_4 T_i + \varepsilon_{x(i)} \]

Distance From Highway

Number of Large Trees

Canopy Cover

Temperature

Transect
Road Effect Zone for Bats - Analysis

Nightly Call Activity

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Distance From Highway

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Number of Large Trees

Canopy Cover

Transect
What could be causing the road effect zone?

Prey Availability
Road Effect Zone for Insects - Methods

• Collected insect samples at the same transects, but on different nights
• Sorted to order, dried and weighed (Biomass)
  • 10 orders - main prey are moths, beetles, flies.
Main Conclusions

• Bats not as active in the 200 m closest to the highway
  • Should be compensated for in planning

• Road effect zone not because of lack of prey
  • Future Directions: Noise and Vehicle Presence
Thank you

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