Factors Influencing Mammalian Activity in an Urban Campus Environment

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Introduction

- Expanding human influence – 50% of world population now in cities
- Urban ecology more important than ever, but makes up <2% of current literature
- Urban anthropogenic influences on animals
- Behavioral alteration
  - Mesopredator Release Hypothesis
  - White-tailed deer and coyote response to invasive buckthorn (Vernon et al, 2014)
- Impervious surfaces and forest fragmentation contain or limit species distribution
- Conservation and management concern

Methods

- 8 camera trap sites on Butler’s campus (1/1/2017 – 1/1/2018)
- Colorado Parks and Wildlife Access Database used to store and tag images
- ArcGIS used to define 1-ha site area (except where contiguous forest/green space <1-ha)
- Isolation index calculated by weighted average of perimeter adjacent to habitats of various value to animals
- Fractal dimension calculated as FD = 2*log(perimeter)/log(area)
- Distance to water measured as Euclidean distance
- Human surveys conducted as 1hr during “peak” hours
- Spearman’s non-parametric R to analyze correlation with detection
- Shrub density measured using line intercept method
- Program R used to analyze single-season occupancy for all species
- Covariates scaled to use models on logit scale

Results

- 14,008 detections were collected over 2,829 trap nights (out of possible 2,920)
- Shrub density was a top predictor in 3 of 6 species tested.
- Fox squirrel models not presented because extreme detection at every site
- Human surveys conducted as 1hr during “peak” hours
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Discussion

- Habitat isolation and edge
- Connected habitats enable migration (Burkey 1989)
- Shrub Density
  - Some sites up to 100% shrub cover – honesuckle
  - Enable prey species pervasion of sites
  - Evaluation of site ecosystem services?
  - Invasive species
- Distance to water
  - Not a significant factor in determining occupancy
- Shrub density for individual species
  - May be more important with more limited water resources
- Combining development and ecosystem restoration
  - Butler making large push toward development
  - Best things to consider for mammals is keeping forest contiguous
- Use passable habitats to connect forest fragments
- Shrub dense areas
- Rabbit and opossum niche similarity
  - Possible partition through edge interface and shrub density levels
- Temporal separation
- Future Directions
  - Fine scale analysis of specific species interactions in varying levels of shrub cover
  - Identify corridors used by large mammals
  - Emigration and immigration rates

References

- Cox, Ben W., Graff, Robert A., and Graff, John B. Effects of supplemental cover on survival of screech owls and white-tailed deer in habitat islands. (2015) 176:791-796