Urban Bat Activity in Colorado Springs

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Introduction

- Urban bats commonly roost in old buildings or trees.
- Bats typically begin foraging around 30 mins after sunset when they are safer from visual predators
- Common El Paso County species:
  - Big Brown Bat, Little Brown Myotis
- Most bat calls are above human hearing range (0.002 to 20 kHz), but some larger bats produce an audible, lower frequency call.

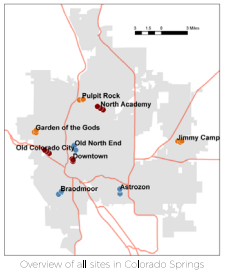
Methods

- We examined 3 landscape types with 3 study sites in each.
  - We placed 3 AudioMoth acoustic re corders at each site, recording 1 min every ½ hr for 3 days.
- We evaluated audio files from 7:30 PM to 6:30 AM.
- We walked a 1 mile transect at each site, ½ hour after sunset using the Echometer Touch Pro 2 to record.

Pulpit Rock transect and audiomoth sites

- Using Kaleidoscope Pro, we classified bat calls as low or high frequency.
- Using ArcGIS, we created 50 m buffers around our transects to compare land-cover to bat calls.

Results



Overview of all sites in Colorado Springs

- Study sites were selected within commercial zones, residential zones, and parks & open spaces, across Colorado Springs.
- AudioMoth acoustic recorders were able to detect details of different types of bat calls, including search, approach, and feeding buzz phases of foraging.
- Recorder sensitivity spans the human audible range and ultrasonic sounds, allowing us to "see" acoustic communities we are not normally able to detect. Here, early morning ultrasonic bat calls are seen while the morning bird chorus was underway.

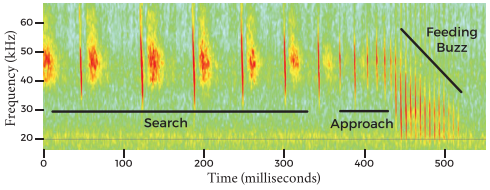
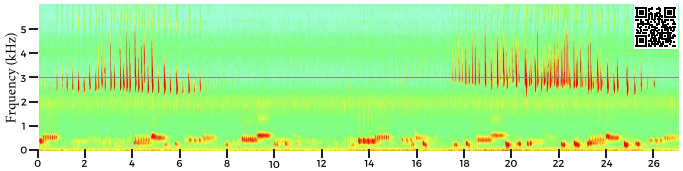
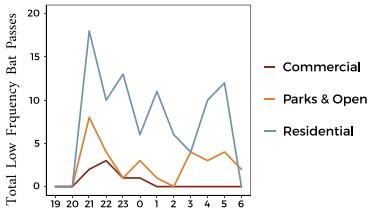


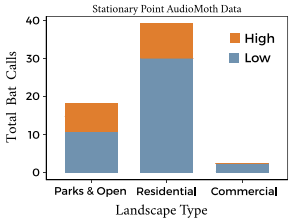
Diagram of a bat call while scavenging

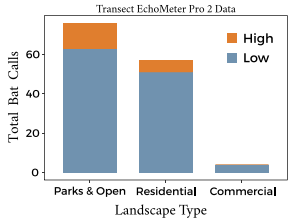


Comparison of a spotted towhee call and a bat call in Kaleidescope software

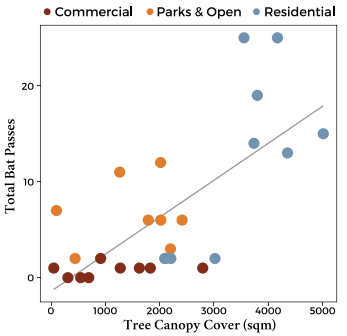


- Bat activity was highest just after sunset, corresponding to typical emergence time for foraging bats.
- Stationary recorders documented more bat calls in residential areas, while transect recorders documented more in Parks & Open Spaces.



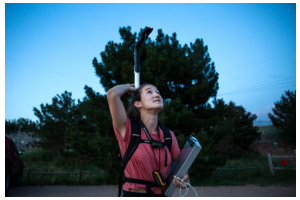


- Both approaches found significantly less bat calls in commercial zones.
- Total bat passes are positively correlated with tree canopy, which explained 47% of the variation in number of bat call passes ($p < 4.699e\text{-}05$).
- This correlation also shows a distinct pattern with respect to landscape type, with residential zones having higher canopy cover and, thus, more total bat call passes.



Conclusions

- Bat calls were frequent in parks & open spaces, but the presence of old houses and mature trees also resulted in more bat calls in residential zones.
- Resource managers and urban planners can use these data to inform decision-making.
- Canopy cover influences urban bat activity.



Echometer for transects. Photo/ Katie Klann, The Gazette

Future Research

Future research could involve locating urban bat roosts for study with ecoacoustics and other methods (e.g., emergence counts) to better understand bat populations in Colorado Springs. This knowledge could prove useful when the lethal bat disease White Nose Syndrome reaches Colorado. Manipulating buffers around sampling points to maximize the regression p-value might be a useful approach for further investigating canopy cover. Preliminary data suggest that examining bat activity (number of bat call passes) across residential areas varying in socioeconomic status could be a fruitful area for future investigations. Future studies could also utilize AudioMoth acoustic recorders to study bats & landscapes further afield – across the Rockies or even abroad.

Literature Referenced

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Acknowledgments

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