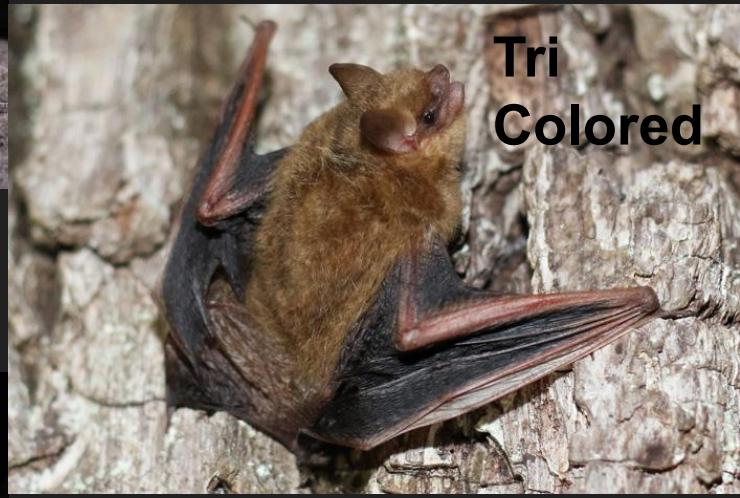
Bat abundance and species diversity in the vicinity of wetlands situated in residential versus park wetlands, Central Iowa, U.S.A.

Matthew Card, Ross Curry, RJ Green, Riley Henry

Introduction

- Is there a significant difference in bat diversity and abundance within urban wetlands and reconstructed tallgrass prairie/wetlands?
- What did we use to detect bats?
- Dixon 2012 study
  - Some bat species (Red) thrive with increased residential cover, others (Silver-haired) do not
  - Proximity to water is positively correlated with bat abundance
- Coleman and Barclay 2011 study
  - Urbanization positively affects abundance, but negatively impacts diversity

Bats of Iowa



Bats of Iowa Continued

Long-eared

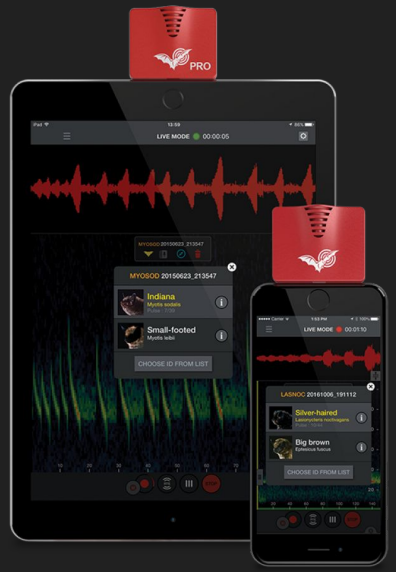
Evening

Indiana

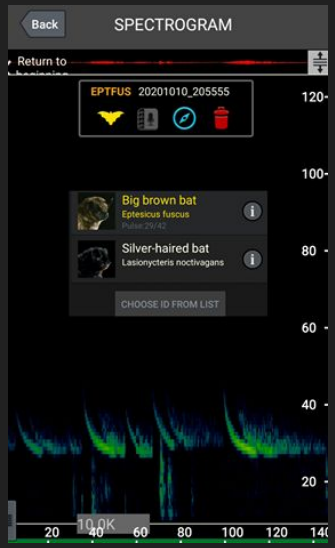
Silver-haired

Methods

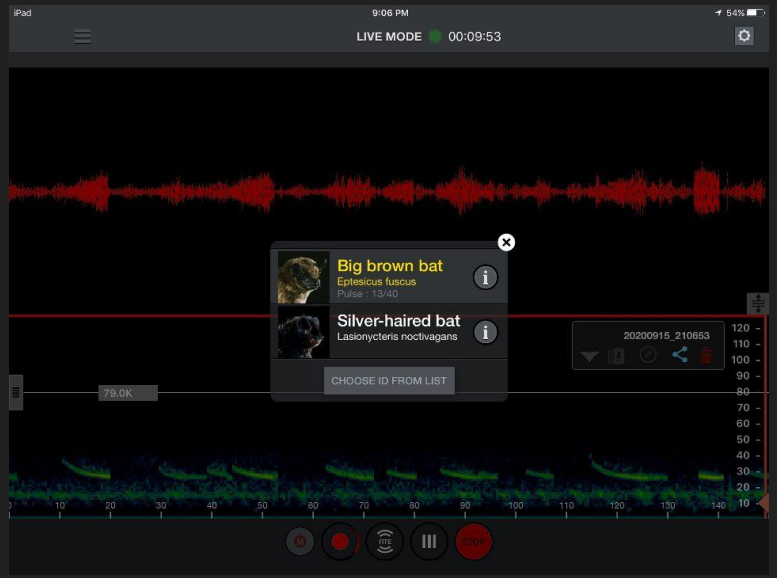
Echo Meter Touch 2 Pro



Detector Module



Android View



Ipad view

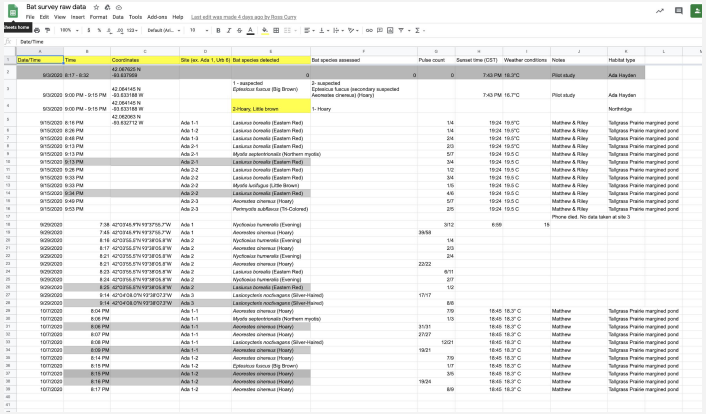
Pilot study

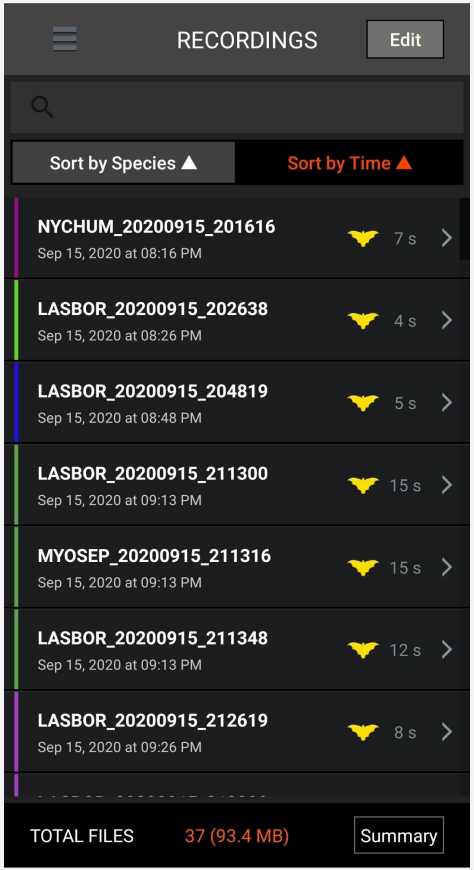
- Determine study feasibility
- Scout location (real vs. GPS)
- Problems we may encounter
- Determine recording length

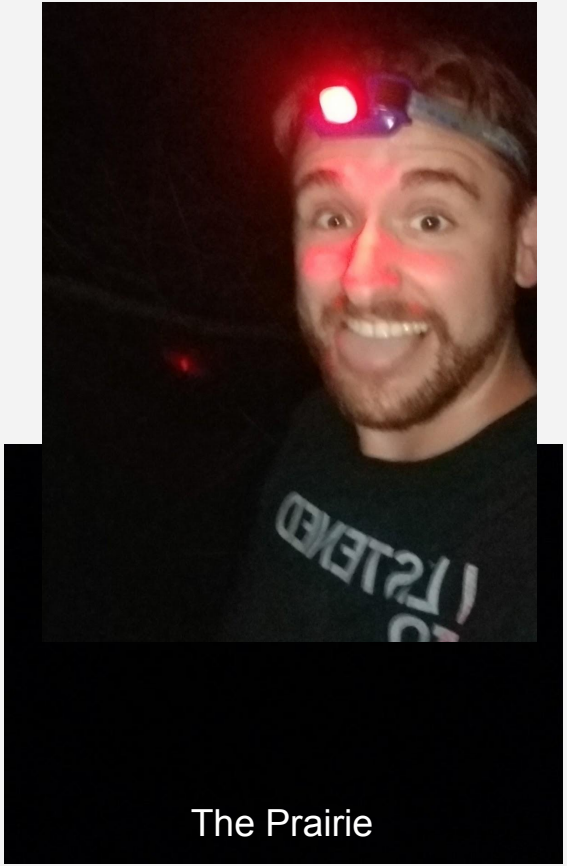
- 6 sites selected (3 samples each)
  - Urbanization
  - Proximity to water
  - 10 minutes per sample

Data Collection

- 4 nights (9/15 - 10/6)
- Between 7-10pm
  - No earlier than 30 mins after sunset







Results

Results

- Shannon's diversity Index
  - Ada Hayden: 1.65
  - Northridge Heights: 1.38

- Evenness
  - Ada Hayden: 0.79
  - Northridge Heights: .77

- Paired t-tests

$$H=-\Sigma(Pi)x\ln(Pi)$$

Results Explained: Shannon's Diversity Index

- As the number of species goes up, Shannon's value goes up
- As evenness goes up, value goes up
- What is evenness?
  - Separate calculation for each habitat type
- Ada: Evenness= 0.79
- Northridge: Evenness= 0.77
- Not very different... Number of species is mostly causing the difference
- Could try other measures to compare communities

Paired t-tests

- Comparing two data sets
  - Abundance, richness, hoary bat abundance
  - Counts per day used
- Is there zero difference between the means of these samples?
- P-values: is statistically significant if p= <0.05
  - **Abundance: p= 0.0481**
  - Richness: p= 0.1328
  - Hoary bat abundance: p=.1999

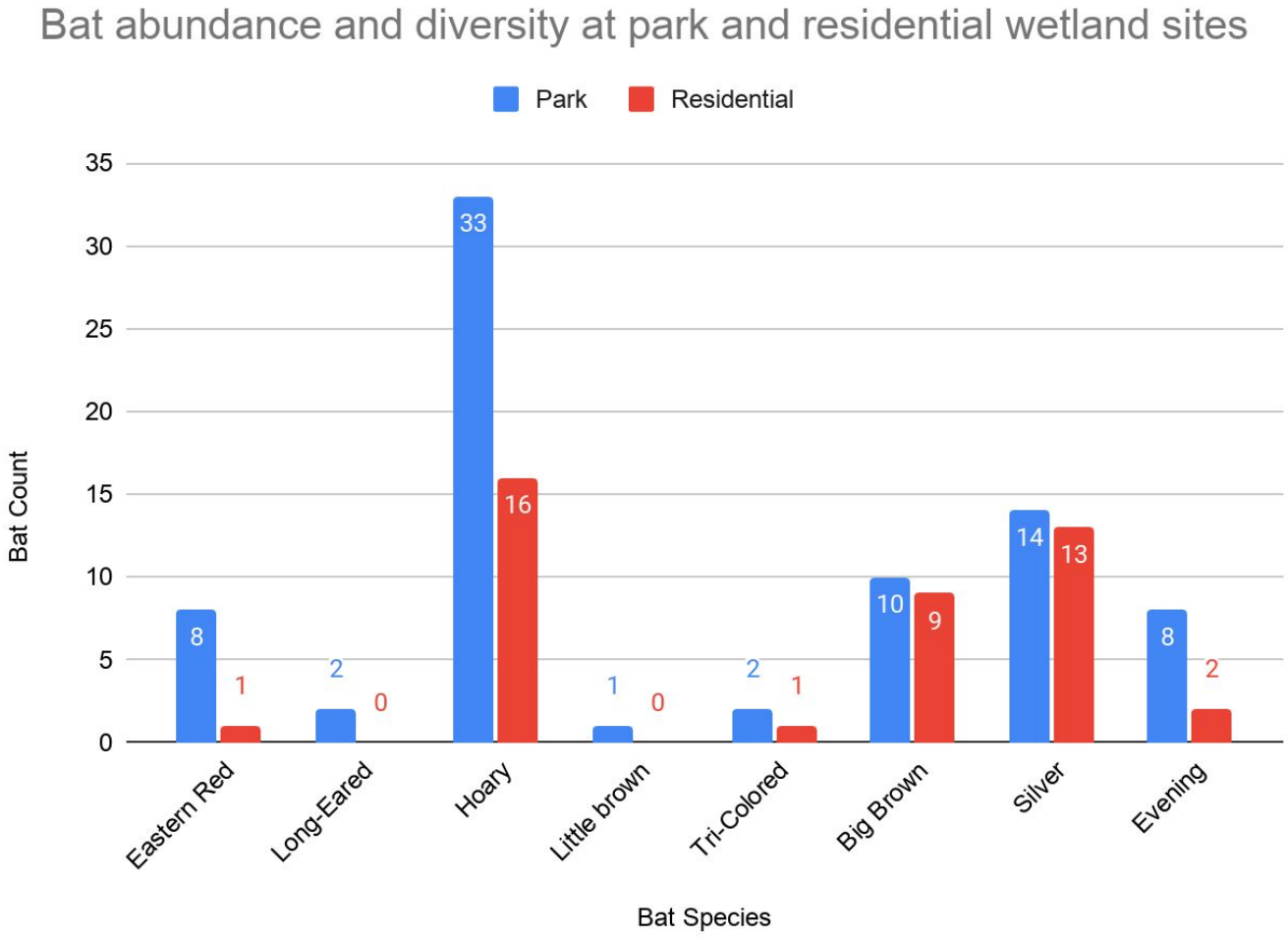
Results

Northridge Heights (residential)	Ada Hayden (park)
43 adjusted detections	78 adjusted detections
85 total detections	106 total detections
6 total species detected	8 total species detected

Discussion

Discussion

- We were pleasantly surprised with the amount of data we were able to gather.
- Although there was no *statistically significant* difference in diversity between study locations
  - There *was* a significant difference (.048) in abundance
  - And an overall appreciable difference in both measures
  - Particularly for Eastern Red and Hoary Bats
- Indiana bats are the *only* species described in Dr. Rentz's field guide that we did not observe


Bat abundance and diversity at park and residential wetland sites
Park
Residential
Bat Count
35
30
25
20
15
10
5
0
8
1
2
0
33
16
1
0
2
1
10
9
14
13
8
2
Eastern Red
Long-Eared
Hoary
Little brown
Tri-Colored
Big Brown
Silver
Evening
Bat Species

Discussion

- Fixed-point monitoring made it difficult to determine whether multiple detections of the same species could be attributed to an individual bat
    - Our group observed *at least* four separate bats hunting simultaneously during one night of sampling at site 4
- This could be ameliorated to some degree in future studies by sampling in a unidirectional manner, increasing the likelihood that each new detection is indeed a separate bat
- Perhaps future software/hardware updates will be able to do so automatically.

References

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