Do Animals Use Urban Streams As Corridors?

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By Lacey Fever (She/Her) and Dr. Catherine O'Reilly (She/Her)

Department of Geology, Geography, and The Environment

Abstract

Wildlife are increasingly found in urban environments. However, it is not clear how wildlife moves around the urban landscape. The purpose of our project is to determine whether animals use urban streams as corridors to move through town. We speculated that animals use the town's streams as a corridor to cross into residents' yards. To test this hypothesis, trail cameras were set up alongside the creeks at Hidden Creek Nature Sanctuary, Anderson Park, Oakdale Elementary, and North Blair Drive in Normal, Illinois. The cameras were used to collect data between September 2021 and September 2022. The footage was reviewed on a weekly basis and the images were routinely uploaded onto Colorado Parks and Wildlife (CPW) Access database. Information identified by visually inspecting the images was then used to create graphs. The input data consisted of the animals' species, location, and time of day. Results from the camera images and our graphs indicated that ducks and dogs are the predominant animal species at Anderson Park, raccoons and squirrels are the predominant species at Hidden Creek Nature Sanctuary, raccoons and cats are the predominant species at Oakdale Elementary, and rabbits and birds are the predominant species at North Blair Drive. Different animals were active during different times in the day. We also saw herons, chipmunks, dogs, foxes, opossums, and rabbits. There was seasonality in animal activity. The data collected through the trail cameras support our hypothesis; animals do use streams as passageways through town. By inspecting the trail camera footage and noting wildlife location and direction of movement, we observed various native species using the streams to travel through town.

Introduction

Wildlife are increasingly found in urban environments. However, it is not clear how wildlife move around the urban landscape. The purpose of our project is to determine whether animals use the town's streams as corridors to move through town. I speculated that animals use the town's streams as a corridor to cross into residents' yards. To test this hypothesis, trail cameras were set up alongside the creeks at Hidden Creek Nature Sanctuary, Anderson Park, Oakdale Elementary, and on North Blair Drive in Normal, Illinois. Hidden Creek Nature Sanctuary has a stream that is under a lot of shade and consists of rocks and mud, Anderson Park consists of no shade due to the lack of trees and the creek consists of sand, Oakdale Elementary also consists of no shade due to no trees and the creek has a cemented base, and the creek on North Blair Drive has no shade as well as a sandy and rocky creek.

Research Questions

- What types of animals and birds are using the streams? Are there differences in the different parks?
- When are these animals and birds using the streams? Are there differences in the different parks?
- Does seasonality affect animal's visits to the creek?

Methodology

The streams used in this experiment are located at Anderson Park, Hidden Creek Nature Sanctuary, Oakdale Elementary, and North Blair Drive, all located in Normal, Illinois. We placed trail cameras at these streams from October 2021 to September 2022. At Anderson Park, data was collected from Tuesday, October 12th, 2021 to Thursday, September 29th, 2022. At Hidden Creek Nature Sanctuary, data was collected from Tuesday, October 12th, 2021 to Thursday, September 29th, 2022. At Oakdale Elementary, data was collected from Thursday, October 14th, 2021 to Monday, May 9th, 2022 due to the camera getting too many images of people. At North Blair Drive, data was collected from Monday, May 23rd, 2022 to Thursday, September 29th, 2022. These cameras are strapped to a post near a stream or located under bridges at each of these sites and locked with a cable to something secure. I have placed about 2-3 cameras per site, facing different directions of the stream.

These cameras trigger whenever an animal motions in front of them. The photos are then automatically saved to the SD cards within the camera and these SD cards are changed weekly. To change the SD cards, the camera is first turned off, then the SD card with the photos is switched with an SD card that is empty. Once the new SD is in the camera, the camera can be turned on. The SD card with the photos is taken back to the lab to be put into a laptop. This is done at each camera from each site. The data and photos from the SD cards are uploaded onto the Colorado Parks and Wildlife (CPW) Access database on a laptop.

Each photo is individually analyzed as weeds or grass swaying in the wind would trigger the cameras as well. Photos with animals are labeled based on the animals' species and a note is made of their behavior, direction of movement, the environment, and how many animals there

are. Photos with people were noted but not used in the analysis to retain privacy. Information is identified by visually inspecting the images and then used to create the graphs. Graphs are created using R software by downloading the flat data file from the CPW software and coding this data into graphs that show our results. With the results shown in graphs and charts, a conclusion can be made of the different sites and the different species of animals that visit these sites.

Study Sites

- Anderson Park: Includes two cameras, one camera is located under the middle walking bridge facing towards west and the other camera is located under the last walking bridge facing towards east. The camera located under the last walking bridge has experienced some difficulty and had to be replaced. Anderson Park has no trees to shade the stream and it consists of plants that are good for pollinators such as bees. Anderson Park also has a lot of native plant species.
- Hidden Creek Nature Sanctuary: Includes three cameras, one at the culvert on a tree facing the culvert towards south and the other under the first and last downstream bridges on a post facing towards north. One of the cameras under the bridge experienced difficulty and had to be replaced. Hidden Creek Nature Sanctuary is full of dense trees and invasive plant species with a cooler, rocky creek bed that could be good for the animal species.
- Oakdale Elementary: Includes one camera that is located under the walking bridge facing east. The stream is surrounded by cement near a residential area. This camera was removed on Monday, May 9th, 2022 because the site was getting too many images of people.
- North Blair Drive: Includes two cameras, one camera is located in the backyard of Dr. Jed Day's home (1207 Brentwood Ct., Normal, IL 61761) and is facing north and the other camera is located on a tree and is facing south. There are not a lot of trees that shadow the creek. The creek bed consists primarily of sand. There is a great density of overgrown, invasive plant species.

Plant Species Summary

With Michael Brown, from the Ecology Action Center, we went and identified the different plant species that we saw at each of the camera locations at each study site; Hidden Creek Nature Sanctuary, Anderson Park, Oakdale Elementary, and North Blair Drive. We went and identified these plant species in mid June of 2022. We examined each plant at these study sites and determined their purpose, whether they were invasive plant species or not, and whether these plants were likely beneficial or not for animals and birds. We also examined the overall habitat of each study site and determined the habitat's condition and if it was a popular and comfortable habitat for the animals. Results of the plant surveys from each site are detailed in Appendix I and summarized in the study site descriptions provided above.

Results

What types of animals and birds are using the streams? Are there differences in the different parks?

- The cameras effectively captured a wide range of different animals and birds at these different sites. Some representative images are included in Figure 1.
- The behaviors of these animals and birds mostly use the streams as corridors and for hunting. For instance, we caught multiple photos of a heron at Anderson Park using the stream to hunt for food sources, such as fish. By inspecting the trail camera footage, we observed various native species using the streams to travel through town.
- The data support our hypothesis; animals do use streams as passageways through town (Figure 2, Figure 3, Figure 4, Figure 5, and Figure 6).
    - Anderson Park: Dogs and ducks were the dominant species (Figure 2).
    - Hidden Creek: Raccoons and squirrels were the dominant species (Figure 2).
    - Oakdale Elementary: Raccoons and cats were the dominant species (Figure 2).
    - North Blair: Rabbits and Birds were the dominant species (Figure 2).

When are these animals and birds using the streams? Are there differences in the different parks?

- The animals and birds are most active at the streams at 4:00am, 11:00am, 7:00pm, and 8:00pm, with different groups dominant at different times (Figure 3).
    - Anderson Park: Dogs were most often present around 6:00am to 9:00pm. Ducks were often present around 9:00am to 4:00pm (Figure 4).
    - Hidden Creek Nature Sanctuary: Raccoons were most often present around 6:00pm to 7:00am. Squirrels were often present around 6:00am to 7:00pm (Figure 4).
    - Oakdale Elementary: Raccoons were most often present around 9:00pm to 6:00am. Cats were often present around 2:00am to 8:00pm (Figure 4).
    - North Blair Drive: Rabbits were most often present throughout all of the hours of the day. Birds were often present around 5:00am to 9:00pm (Figure 4).

Does seasonality affect animal's visits to the creek?

- Animal activity is greatest during the summer and winter seasons (Figure 5 and Figure 6).
    - For the summer season, there are more sightings of rabbits (Figure 5).
    - For the winter, fall, and spring seasons, there are more sightings of raccoons (Figure 5).

Public Outreach

- We shared our results with the public through the EAC's social media and website (Twitter: https://twitter.com/ecoactioncenter?lang=en Facebook: https://www.facebook.com/EcologyActionCenter Website: https://mcleanwater.org/?page_id=1712), and the Town of Normal website (https://www.normalil.gov/1576/Creek-Studies). We posted one photo each month with the goal of showing what we were seeing at each site at different times of the year. Here, we described what the research was and our results through photos of animals and graphs. We were able to get public opinion and feedback through the EAC's social media by commenting on the photos of the animals that I post on Twitter and Facebook. People enjoyed seeing photos of animals and giving us advice on other possible study sites that

seem to be a popular area for animals (Appendix II). I was able to work with Michael Brown from the Ecology Action Center as part of my internship credit as well for Illinois State University.

Discussion and Conclusion

The creek is always being used by some sort of organism, but only certain animals and birds use the creek during a certain time of day. The different animals were found in the different parks as they each have different habitats. Raccoons, opossums, and coyotes were commonly seen during the night as they are nocturnal, meaning that they are active during the night time hours and non-active during the day time hours. Although they are not nocturnal, cats were also seen throughout the late night or early morning hours. Birds, dogs, ducks, rabbits, and squirrels were commonly seen during the day hours as they are not nocturnal. We have not seen snakes, mice, and rats. This research project was a great way to educate the town about the animals and how they navigate in town by using the streams as corridors. We have received positive outreach by the public. People enjoyed seeing and learning about the animals and suggested areas to continue and expand the project to.

Recommendations

- Trim grass and plants around the cameras as they cause the camera to trigger often.
- Spray cameras with spider killer as spiders like to nest inside of the cameras in the late summer / early fall seasons.
- Avoid the camera facing at an angle where the sun is going to reflect off of the water and trigger the camera.
- Add more study sites in Bloomington. We have received public outreach from those that live in Bloomington and they have suggested Ewing Park and the concrete creek bed near Illinois Wesleyan University.
- Because citizens responded positively to the shared images, the cameras have the potential to engage the public for stream restoration or other relevant projects.
- Allow townspeople to input their own data. People have told us about their personal experience with animals using their streams within the town. People have shown us photos from their trail cameras of the animals, and this can be valuable data to use.
- Check cameras at least once a week as there are a lot of photos to go through and it takes time.

Acknowledgements

The Town of Normal and the Ecology Action Center provided support. Dr. Jed Day allowed us to use his backyard near North Blair Drive, Valerie Kurgan helped with the cameras and data collection, and Michael Brown from the Ecology Action Center helped with public outreach and with plant species identification. Bill Perry helped with coding in R. Lynn Christenson, Vassar College, provided input to study design.

Figures

Figure 1a-h. Examples of camera photos. The images below include one photo from each of the sites. Date and time of the image are included in the photo.

Figure 1a. Raccoon at Hidden Creek Nature Sanctuary, caught on camera #1 (HC_culvert_south).

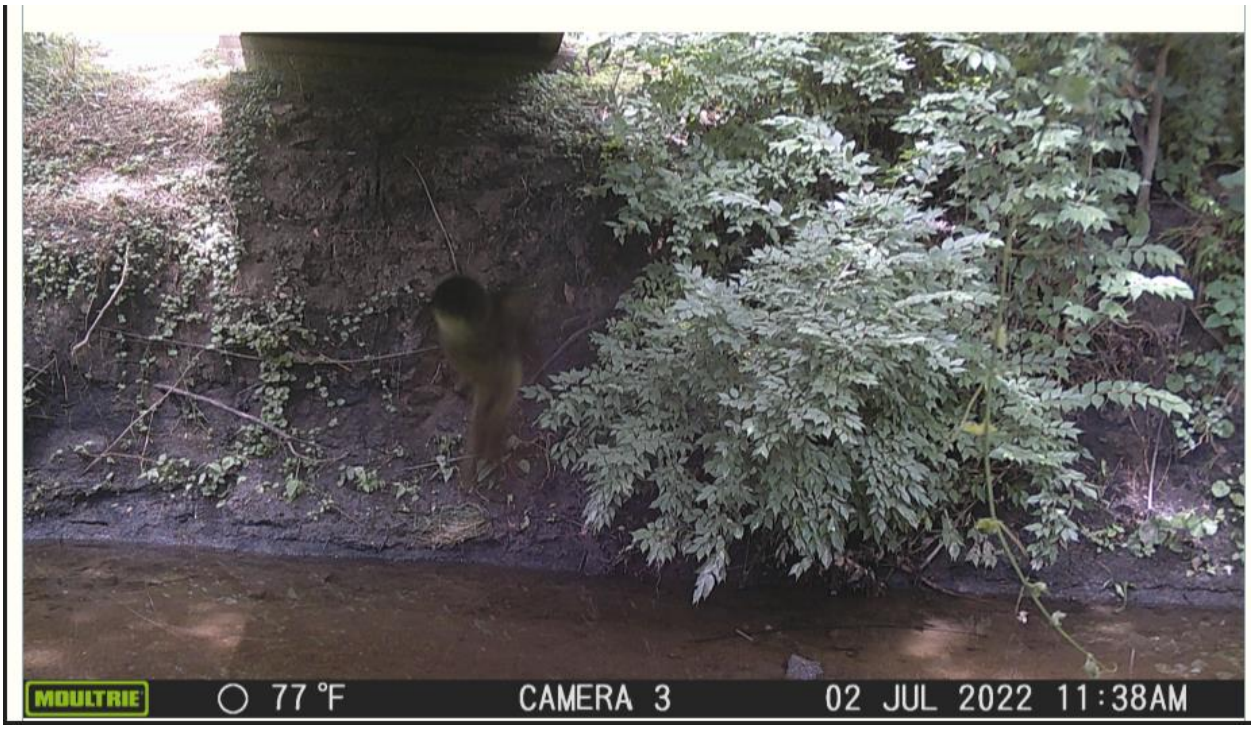


Figure 1b. Hummingbird at Hidden Creek Nature Sanctuary, caught on camera #3 (HC_firstbridge_south)

Figure 1c. Heron at Hidden Creek Nature Sanctuary, caught on camera #5 (HC_lastbridge_east).

Figure 1d. Bluejay at Anderson Park, caught on camera #2 (AP_middlebridge_west).

Figure 1e. Dog at Anderson Park, caught on camera #8 (AP_lastbridge_east).

Figure 1f. Raccoon at Oakdale elementary, caught on camera #6 (OD_walkingbridge_north).

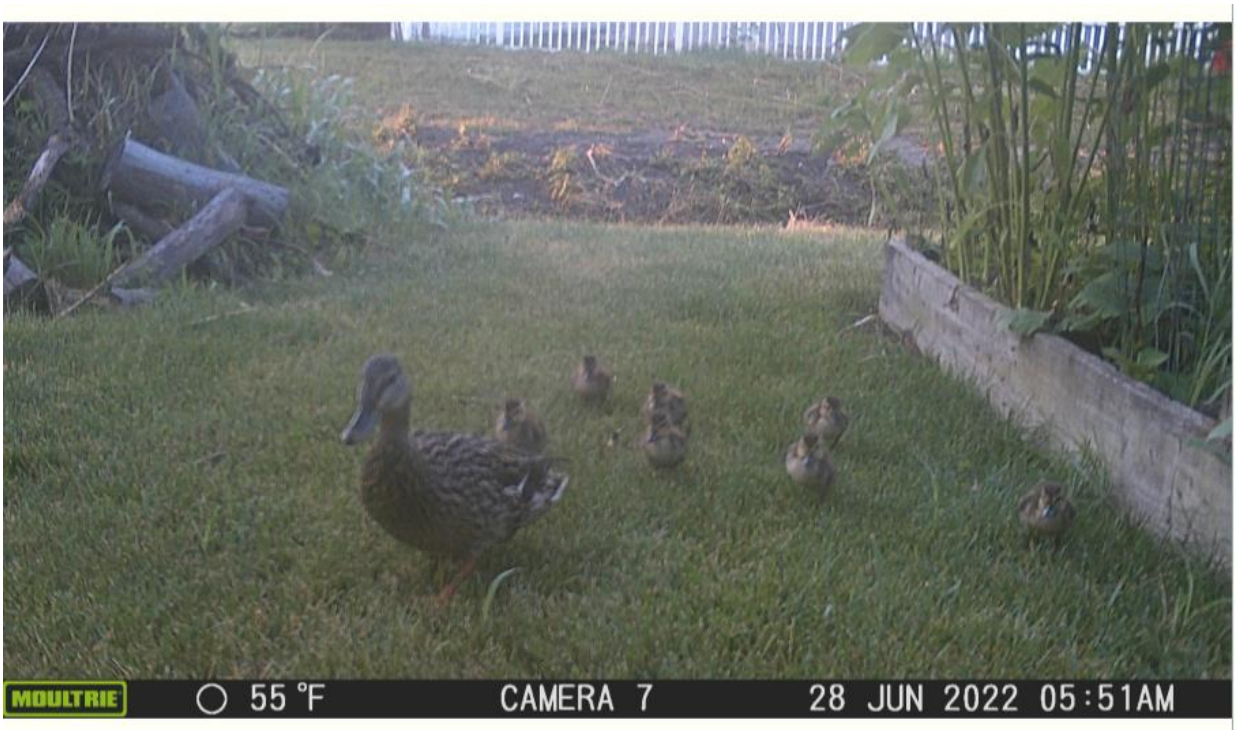


Figure 1g. Duck and babies at North Blair Drive, caught on camera #7 (NB_backyard_north).

Figure 1h. Coyote at North Blair Drive, caught on camera #10 (NB_tree_south).

Figure 2-6.

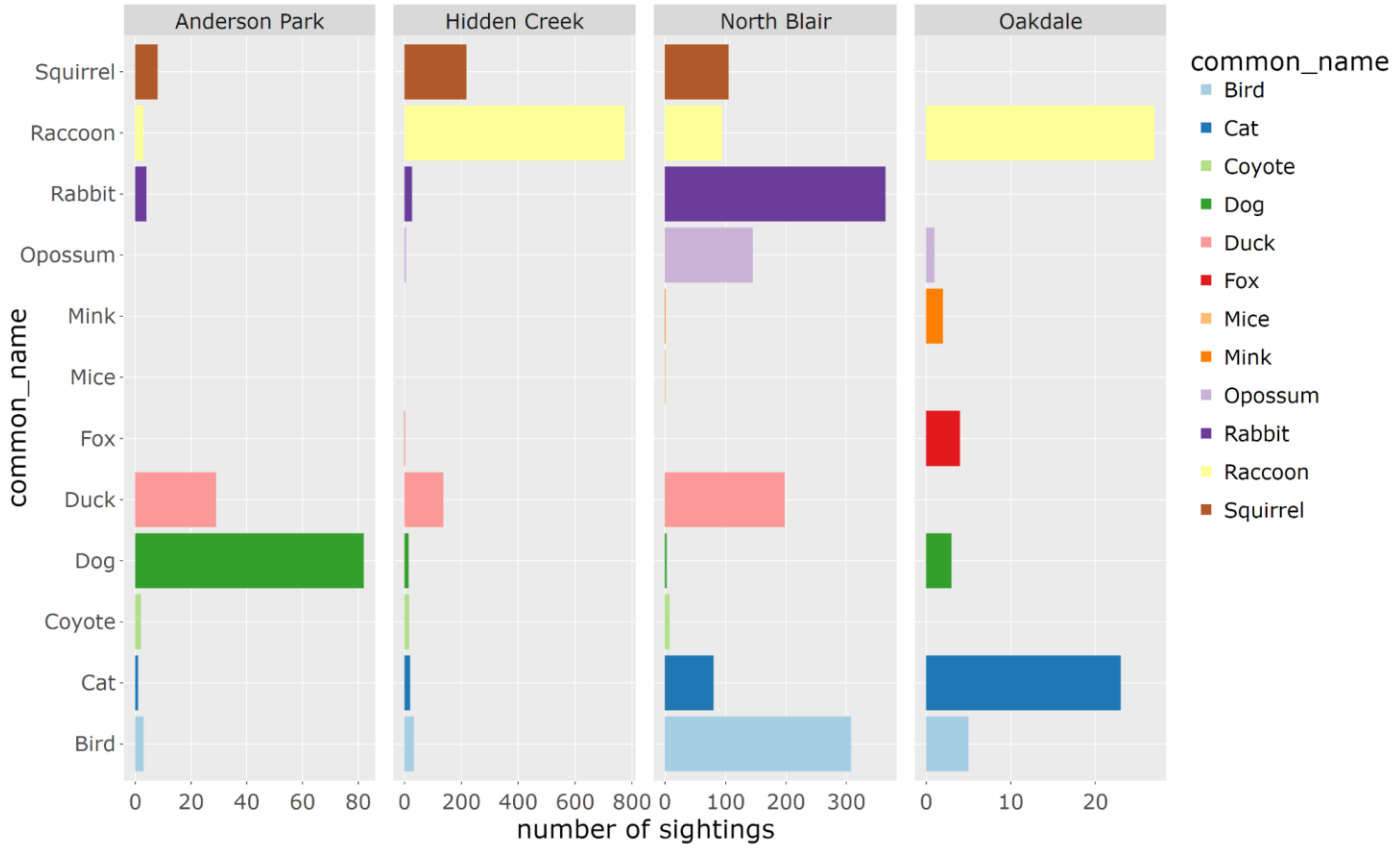


Figure 2. This activity graph shows the number of animal species based on what the trail cameras caught at Hidden Creek Nature Sanctuary, Anderson Park, Oakdale Elementary, and North Blair Drive.

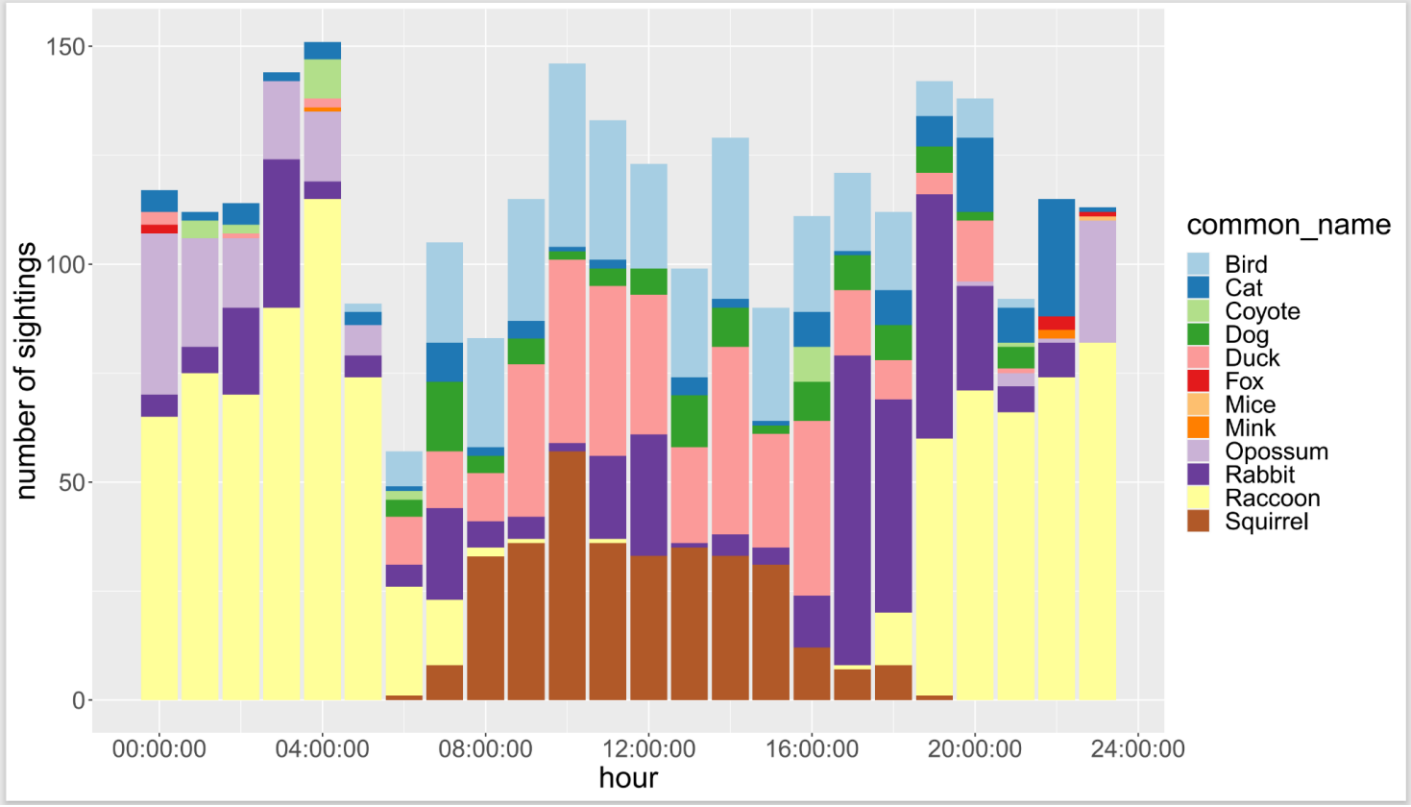


Figure 3. This activity graph shows the animal species across all sites and the time of day they were out using the creeks based on what the trail cameras caught at Hidden Creek Nature Sanctuary, Anderson Park, Oakdale Elementary, and North Blair Drive.

Figure 4. This graph shows the time of day and the number of species sightings at each of the sites based on what the trail cameras caught at Hidden Creek Nature Sanctuary, Anderson Park, Oakdale Elementary, and North Blair Drive.

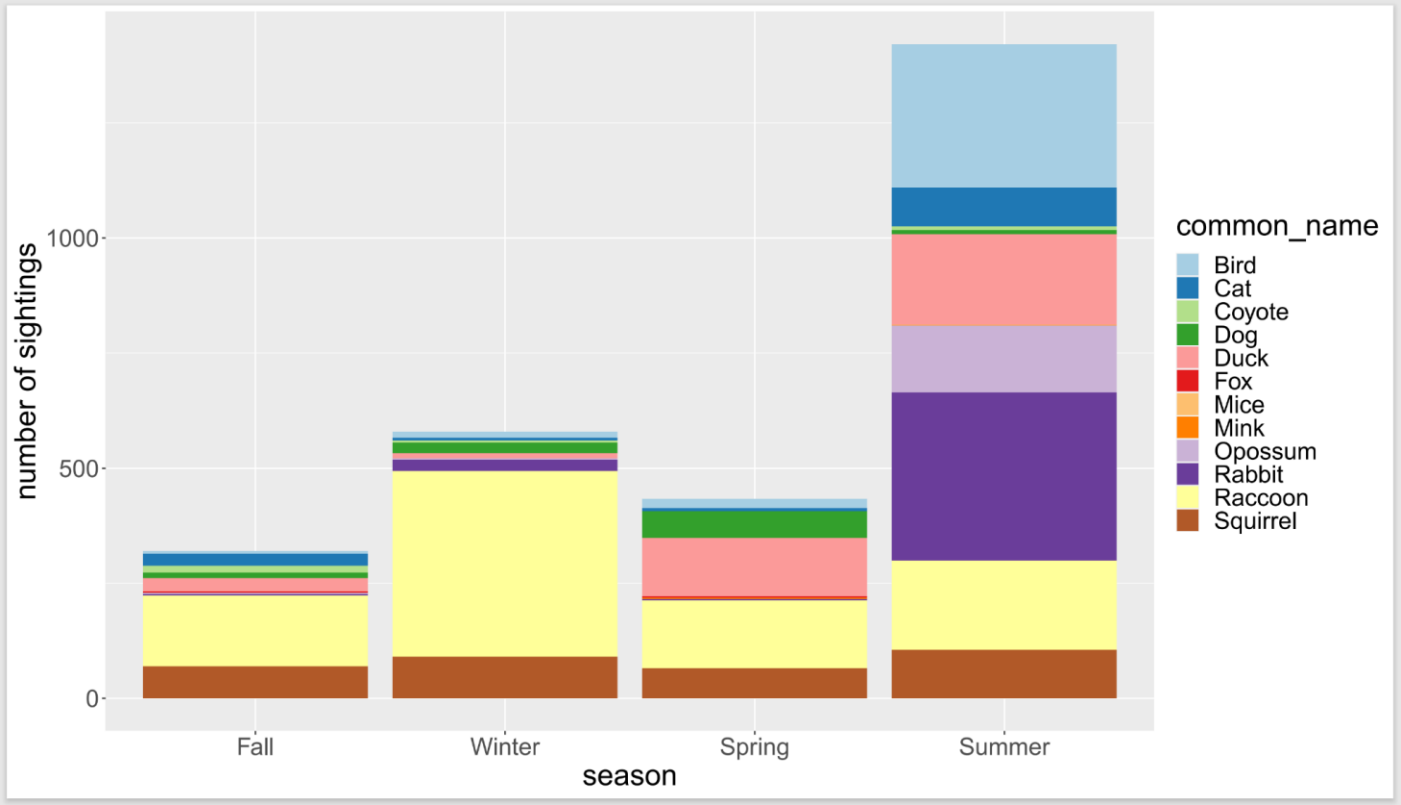


Figure 5. This activity graph shows the animal species and their activity rate over the course of the seasons based on what the trail cameras caught at Hidden Creek Nature Sanctuary, Anderson Park, Oakdale Elementary, and North Blair Drive.

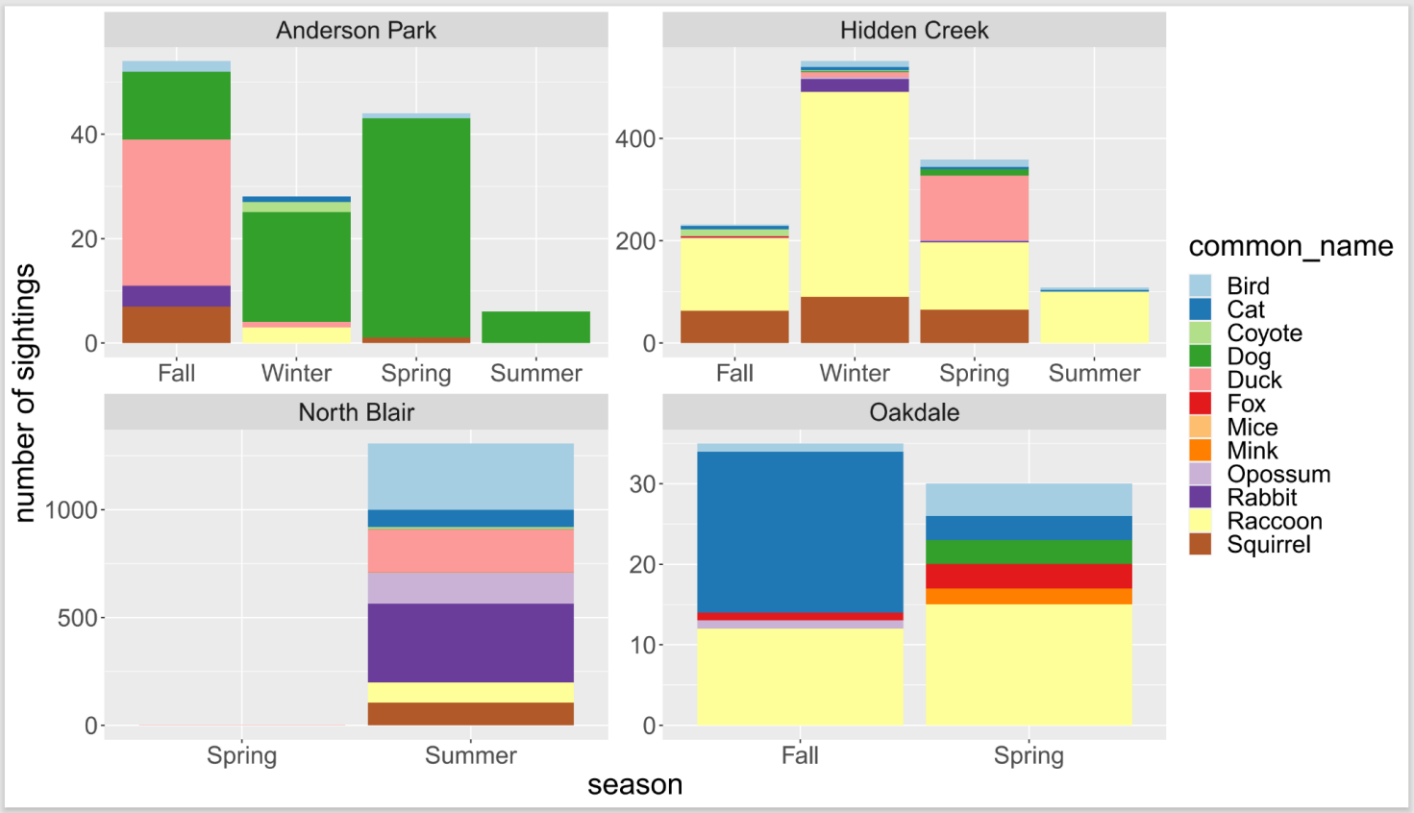


Figure 6. This graph shows the seasonality and the number of species sightings at each of the sites based on what the trail cameras caught at Hidden Creek Nature Sanctuary, Anderson Park, Oakdale Elementary, and North Blair Drive.

Appendix I (Plant Species Identification)

* invasive

Camera #1 (Hidden Creek Culvert)

- Pokeweed
- Bindweed
- Bush Honeysuckle*
- Buckthorn*
- Reed Canary Grass*
- Poison Hemlock
- Garlic Mustard*
- Golden Alexander (Good because it attracts good insects such as butterflies)
    - Nearly complete tree canopy (about 80%)
    - More weedy species
    - More invasive species
    - Cooler creek and rocky → better habitat → more animals

Camera #2 (Anderson Park Middle Bridge)

- Foxglove Beardtongue
- Indian Plantain
- Gray Headed Coneflower (Good for pollinators)
- Stiff Goldenrod
- Compass plant (Leaves orient N+S)
- Pale Purple Coneflower
- Curly Dock
- Wild Hemlock - (NOT Good because when touch, it can be dangerous to one's health)*
    - Zero Trees
    - Heavier of pollinators (good for the bees)

Camera #3 (Hidden Creek First Bridge)

- Nettles

Camera #8 (Anderson Park Last Bridge)

- Big Bluestem
- Regular Bluegrass
- Reed Canary Grass*
- Purple Coneflower
- Wild Bergamot
- Crown Vetch
- Prairie Dock (Good because the roots grow as deep as 14 feet to keep itself and surroundings cooler in hotter weather)
- Ragweed
- Woodland Sunflower
- Spiderwort
- Black-eyed Susan
    - Greater percentage, more dominance of native gasses and plants, less invasive species
    - Zero Trees

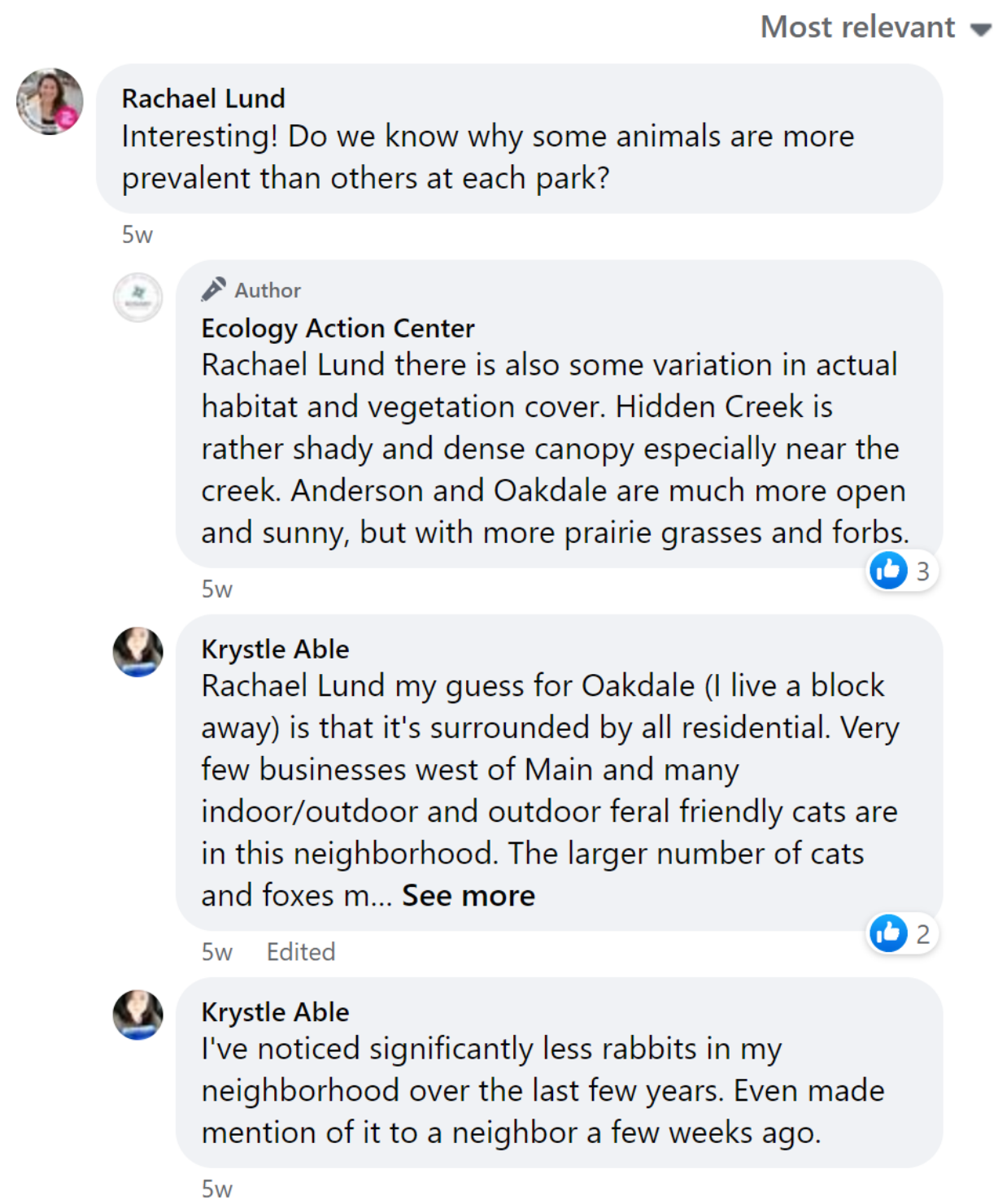
Camera #9 (Hidden Creek Last Bridge)

- Elderberry
- Tree of Heaven*
- Hickory
- Silver Maple (Tree)

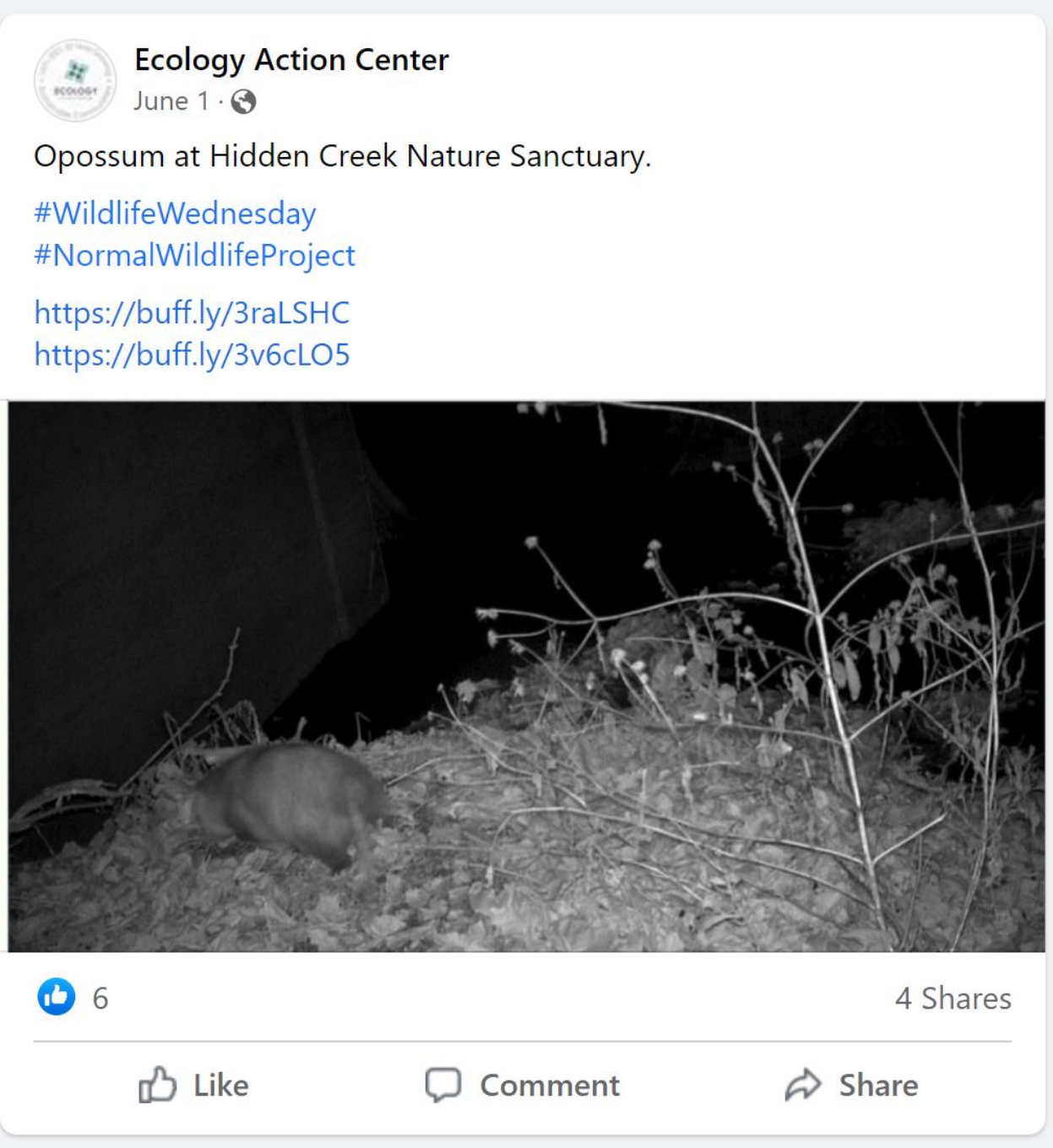
Camera #7 (North Blair Drive)

- Wild Hemlock / Poison Hemlock
- Curly Dock
- Health Aster
- Sweet Clover
- Burdock
- Ragweed
- Teasel*
- Moss / algae (in the water) → Due to higher water temp.
- Reed canary grass*
    - Zero Trees
    - Overgrown, invasive species
    - Dense and invasive

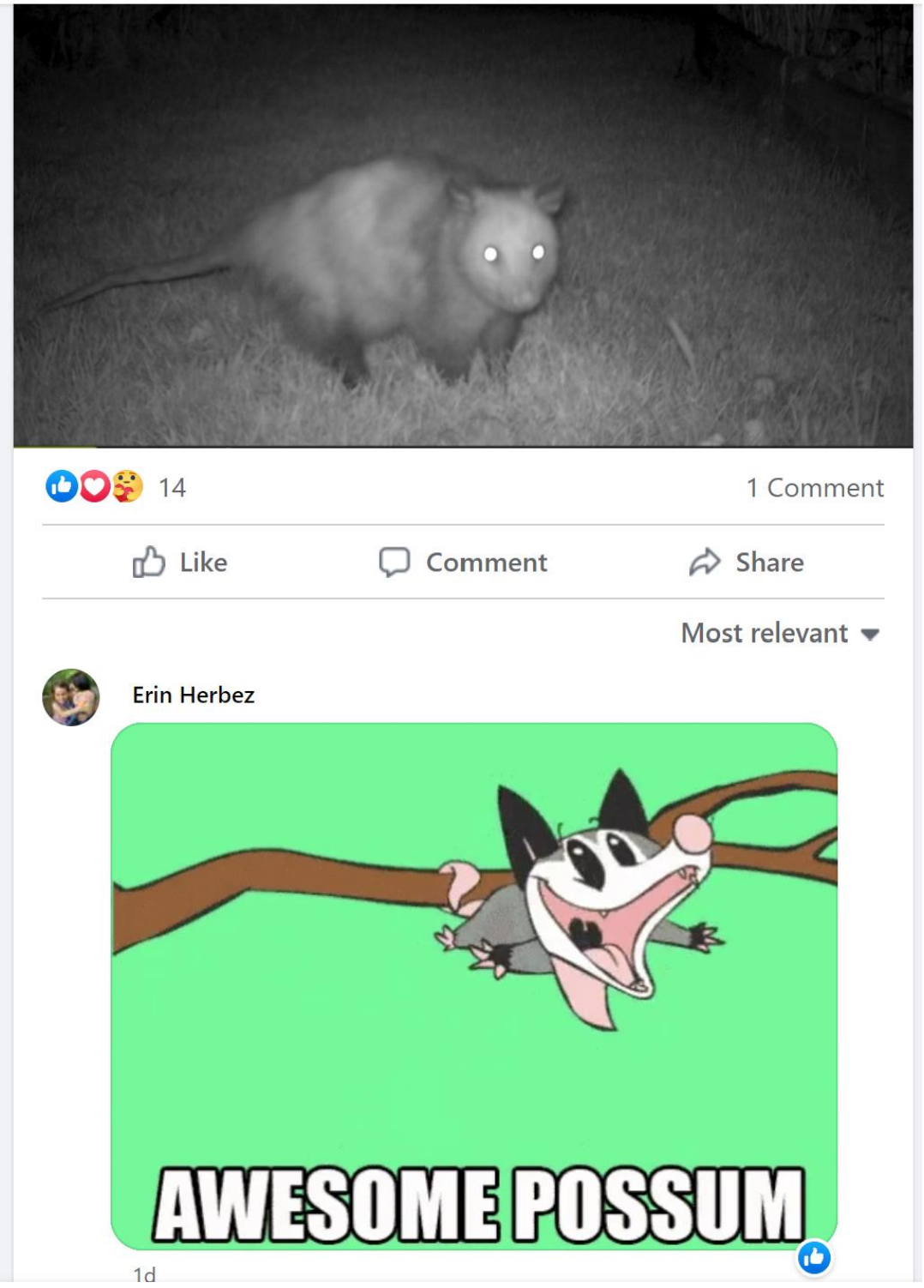
Appendix II Examples of EAC's Social Media Comments



A Facebook commenter asks about the animals being more prevalent than others at each of the parks in reference to the *figure 1* that we posted on Facebook. Other Facebook users were adding in on their knowledge of the streams as well.



Each post has the hashtag “WildlifeWednesday” and “NormalWildlifeProject.” Each post also has a link to the EAC website and the Town of Normal website. People can like or share these posts as well.



People have also reacted positively to the images of the animals that we post on social media. As we go out to change the cameras in the EAC's yellow safety vests, citizens have approached us stating that they look forward to the weekly posts as well as giving us suggestions of other areas to study.

Appendix III (Excel File)

The complete data file from all the animal camera images is provided as a separate Excel file, titled Normal_wildlife_project_data_9-29-2022.

Summary of the file information (metadata):

- Study Area Name = Name of the study sites.
- Study Area ID = ID number of the study areas.
- Location Name = Name of the locations of the cameras within the study areas.
- Location ID = ID number of the locations.
- UTM_E = Coordinates (Not used in this study)
- UTM_N = Coordinates (Not used in this study)
- UTMZone = Coordinates (Not used in this study)
- LatitudeDD = Coordinates (Not used in this study)
- LongitudeDD = Coordinates (Not used in this study)
- Field Season = The year of the captured image.
- Filename = The file name of the locations of the cameras within the study areas.
- Visit ID = The number of visits. Each chunk of photo has a specific photo ID for the date that we changed the SD on the cameras.
- ImgID = The image ID. Each individual photo has its own image ID number.
- ImageNum = The image number. Each individual photo has its own image ID number.
- Image Date = The date that the image was captured.
- Highlight = FALSE
- Image Path = Link to image.
- Species ID = The ID number of a species.
- Common Name = Name of the species in the photo.
- Detail Text = Special comments about the photo
- Individuals = Number of animals in a photo.