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An Analysis of Coyote (*Canis latrans*) Abundance, Movement Patterns & Distribution

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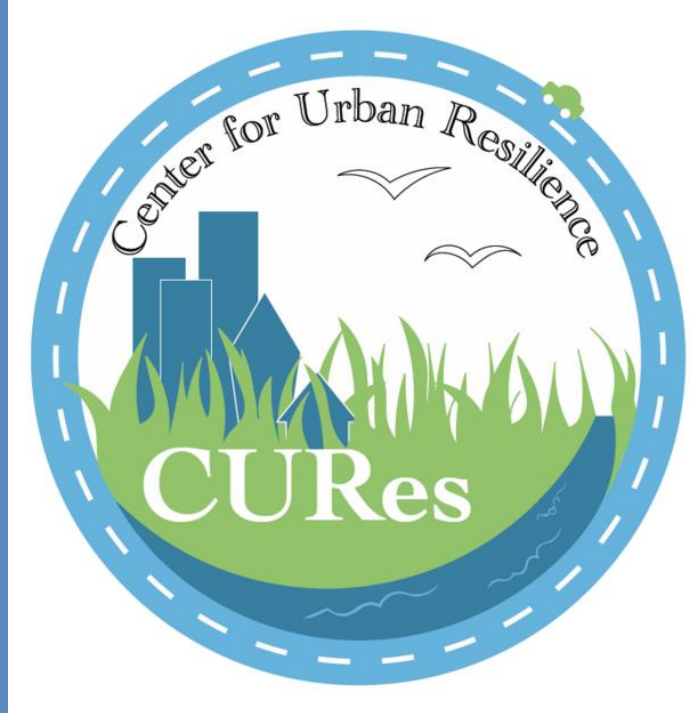
Findlay, Jaclyn; Baechler, Dominic; Auger, Peter; Strauss, Eric; Curley, Maria; Kleya, J.; and Simso, Emily, "An Analysis of Coyote (*Canis latrans*) Abundance, Movement Patterns & Distribution" (2019). *Center for Urban Resilience Research Posters*. 40.

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An Analysis of Coyote (*Canis latrans*) Abundance, Movement Patterns & Distribution

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Center For Urban Resilience | Loyola Marymount University | Spring 2019



Abstract

The LMU Center for Urban Resilience (CUREs) is currently in the third year of a three-year project to inform a long-term coyote *Canis latrans* management plan for the City of Long Beach, California. This plan will be applied by the Long Beach Animal Care Services Bureau. The project consists of using game cameras set up at a tree nursery study site in Long Beach to determine coyote abundance, movement patterns, and distribution. This includes studying where the coyotes are spending the most time, if they are transient / mobile, what packs are present, and peak activity. Preliminary analysis of temporal data indicates that the coyotes at this location do not overlap in movement patterns with other species such as humans and cats. Game camera data show coyotes are abundant when other species are not present. This is an indicator of niche partitioning. Another finding is that there is an average of 47 coyote sightings per week at the location. From this it can be inferred that coyotes are present and abundant at this study site in Long Beach. Further data collection, including collaring study coyotes, will inform the City on coyote movement patterns and distribution through the area. These data will help inform the City's long-term coyote management strategies.

Introduction

Wildlife and human interactions are increasing due to human development, forcing many animals to adapt from a once rural area to an increasingly urban environment. Evidence suggests that wildlife residing in urban areas may not exhibit the same life history traits as their rural counterparts because of adaptations to human-induced stresses (Ditchkoff et al., 2006). Therefore, the analysis of species in urban areas are important when making city management plans in an attempt to protect the species present in the ecosystem.

Coyotes are common predators throughout North America, yet little is known about how they respond to urban development and habitat fragmentation (Riley, et al., 2003). However, coyotes can benefit waterfowl nest success and increase mammalian and avian biodiversity by numerically and behaviorally suppressing other mesopredators (Gallagher et al., 2019). Therefore, there is substantial interest in the ecological implications of expanding coyote populations (Gallagher et al., 2019).

Question: What is the abundance, movement patterns, and distribution of coyotes in the City of Long Beach?

Hypothesis: Coyotes at this study site are abundant, have ample natural prey such as rabbits, and have adapted their behavior and foraging habits to minimize their interactions with humans and cats.



Figure 1: This google maps image highlights the study site in Long Beach, California.



Figure 2: This image was obtained by one of the game cameras on November 18, 2018.

Methods

Study Site

- The area of study and the coyote habitat is located in urban Long Beach, California (Figure 1).
- There are currently one Bushnell game camera and 2 Browning game cameras in different locations within the Jauregui tree nursery.
- The nursery is a main site frequently visited by the coyotes, however, they are also known to scavenge in the surrounding neighborhoods and grasslands.

Data Collection & Analysis

- The primary form of data collection was game camera traps.
- These cameras can be a vital tool in recording consistent data over long periods of time and are used frequently in ecology and animal studies.
- The cameras are motion activated to best capture the movements of humans, coyotes, and other species in the area.
- Each picture is labeled with the date, time of day, temperature, and wind speed.
- 9,000 photos analyzed using Picasa 3 image analysis software (Figure 2).

Data

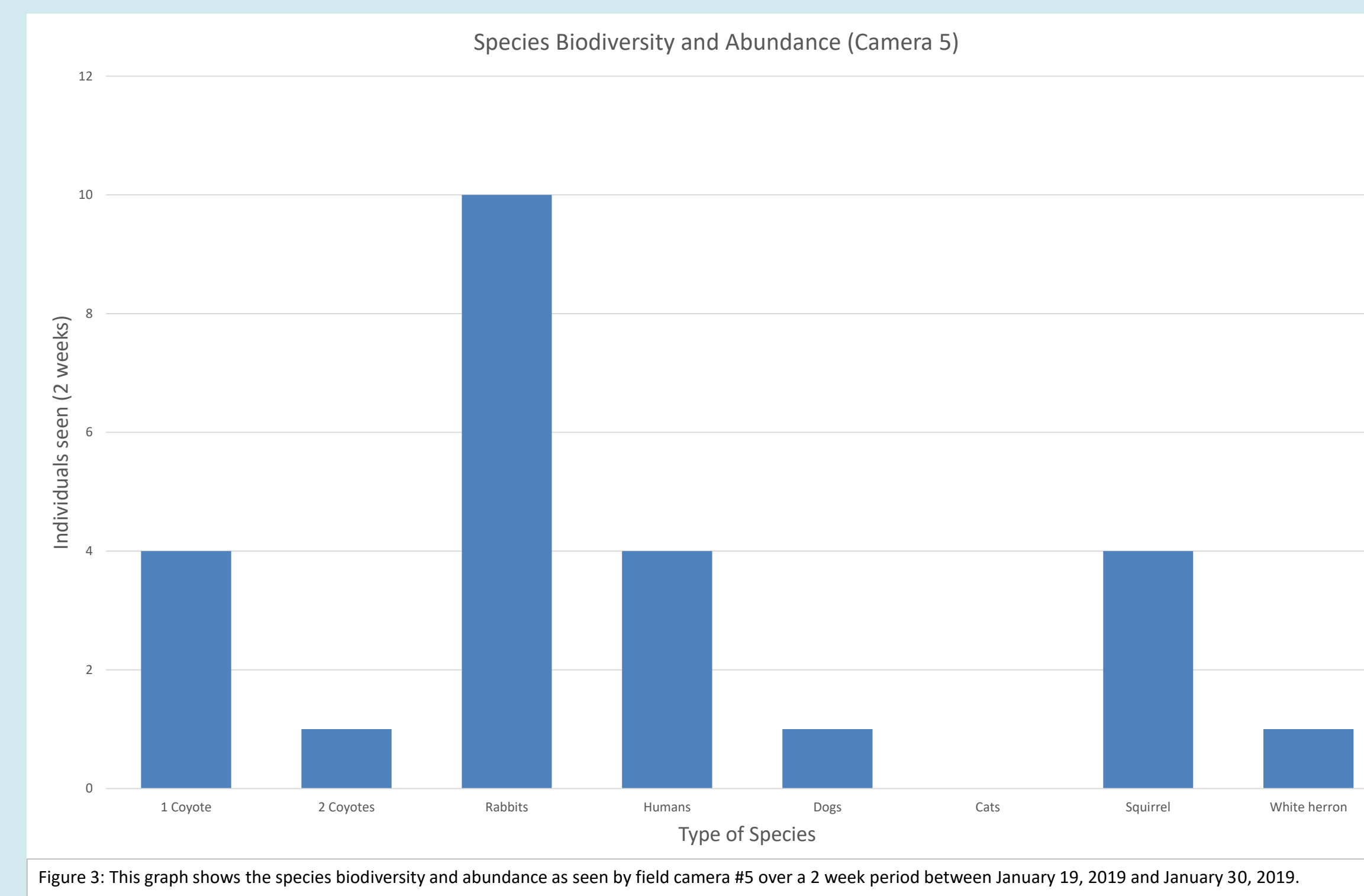


Figure 3: This graph shows the species biodiversity and abundance as seen by field camera #5 over a 2 week period between January 19, 2019 and January 30, 2019.

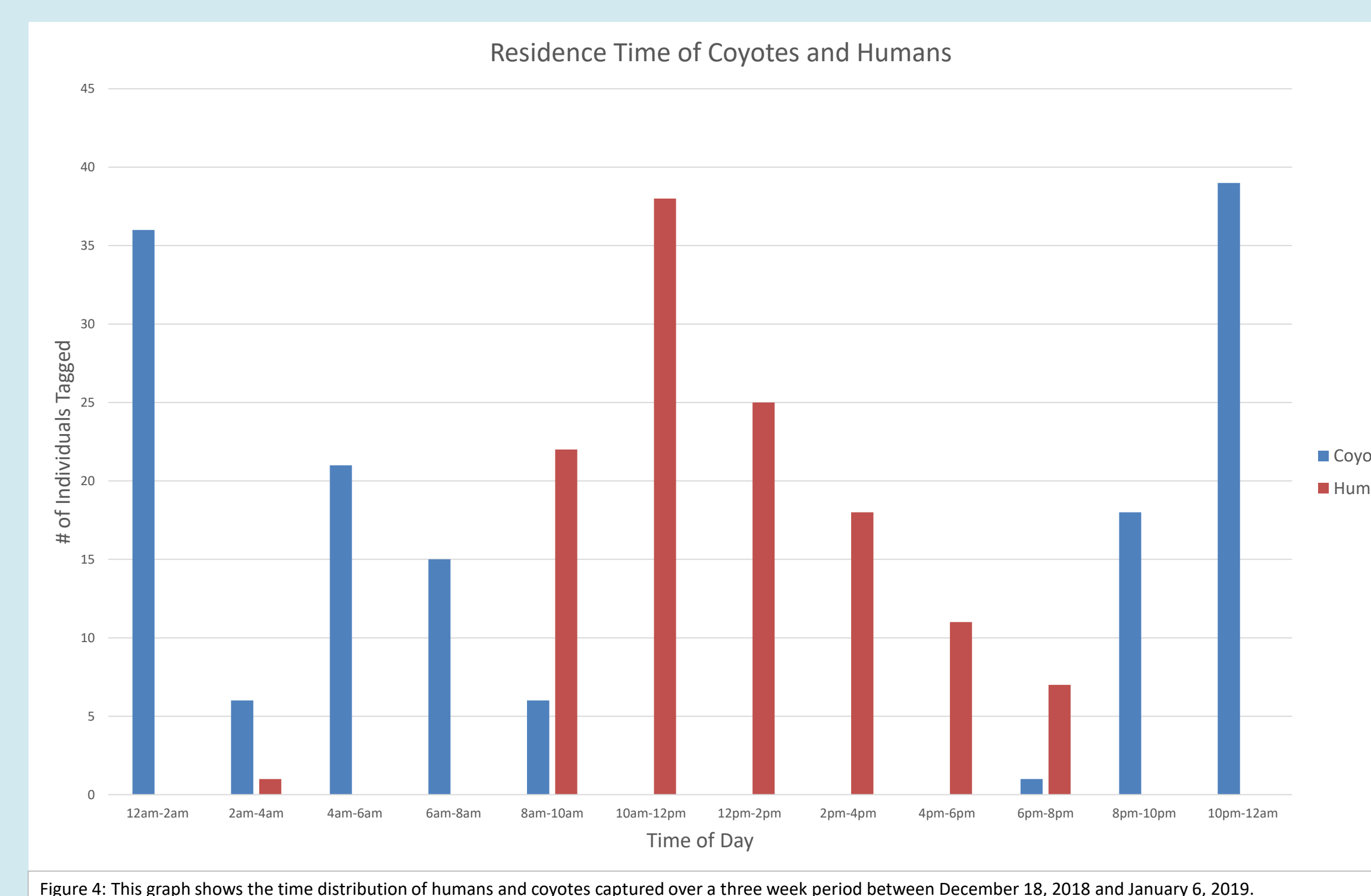


Figure 4: This graph shows the time distribution of humans and coyotes captured over a three week period between December 18, 2018 and January 6, 2019.

Results

Data Analysis

1. The coyotes are sharing their ecological niche with a variety of species such as humans, dogs, cats, rabbits, squirrels, and herons (Figure 3).
2. Over a two week period, camera 5 did not capture any cats venturing in the specific area, although they were seen on other cameras.
3. The abundance of rabbits in the area suggests that they may be a significant portion of the coyotes' diet.
4. There were on average 47 images captured of coyotes per week on the three cameras.
5. The coyotes are seen most frequently in the evenings between 10pm-6am and humans are seen most often between 8am-6pm (Figure 4).
6. Although the coyotes are sharing this ecological niche with other species, there is minimal to no temporal overlap in their movement patterns.

Coyotes are synanthropes, coexisting with humans in human-dominated landscapes. These data at the Long Beach study site suggest that they can occupy different temporal niches through niche partitioning, leading to peaceful coexistence. This, combined with a known abundance of natural prey food in the area, and diligent citizen compliance with food ordinance laws of not feeding coyotes and not leaving out food subsidies, can result in minimal human-coyote interactions.

Discussion

The purpose of this research is to bring awareness and understanding regarding the coyotes in Long Beach by informing and educating the public on how to co-exist with the natural world. Future research includes radio collaring; this approach would allow for the tracking of coyotes' exact movements in the area to determine range distribution. These data would help determine which coyotes are resident vs. transient.

Additionally, the transfer to a new software program for image analysis would allow for more efficient time management and provide better analytic tools.

As this three year project comes to an end, the research team is aiming to implement a similar study within Culver City, California.

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Acknowledgements

- We would like to acknowledge the Loyola Marymount University Center for Urban Resilience for the mentors and resources, including laboratory, equipment and technology.
- Additionally, thanks to the Long Beach Animal Care Services Bureau for the research opportunity and funding.