

## ABSTRACT

Hummingbirds act as important pollinator species in many Western Hemisphere ecosystems. In urban environments, artificial feeders have become an important food resource.<sup>1</sup> Without artificial feeders, hummingbirds move around to different flowers locations to find nectar and thus may be less predictable to a predator. However, as feeders provide abundant food, hummingbirds often habitually return to the same feeder. This provides a unique opportunity to predators. If hummingbirds are not able to properly identify or respond to threats near a feeder, they are likely more susceptible to predation. This may significantly affect hummingbird demographics in urban areas and/or apply selective pressure towards behaviors that minimize predation. In this study, various predators and threats are presented at established feeder sites using both artificial predator decoys and vocalizations. Visitation rates are monitored using video cameras in order to analyze and interpret responses. This investigation aims to enrich the understanding of the broader impacts artificial hummingbird feeders may have within the urban environment.

## Question

How do hummingbirds react differently to various threats when feeding at artificial hummingbird feeders in a highly managed urban area?

## Hypotheses

**H1A:** Hummingbird activity will decrease with the presence of any predator decoy and vocalization playback.

**H1B:** Hummingbird activity will initially decrease with the presence of a predator and vocalization playback, but will increase back towards the threshold.

**H2C:** Hummingbird activity will decrease with exposure to either the hawk or cat decoy and vocalization playback, but will increase with exposure to a hummingbird decoy and vocalization playback.

## Decoys



Male Anna's hummingbird decoy



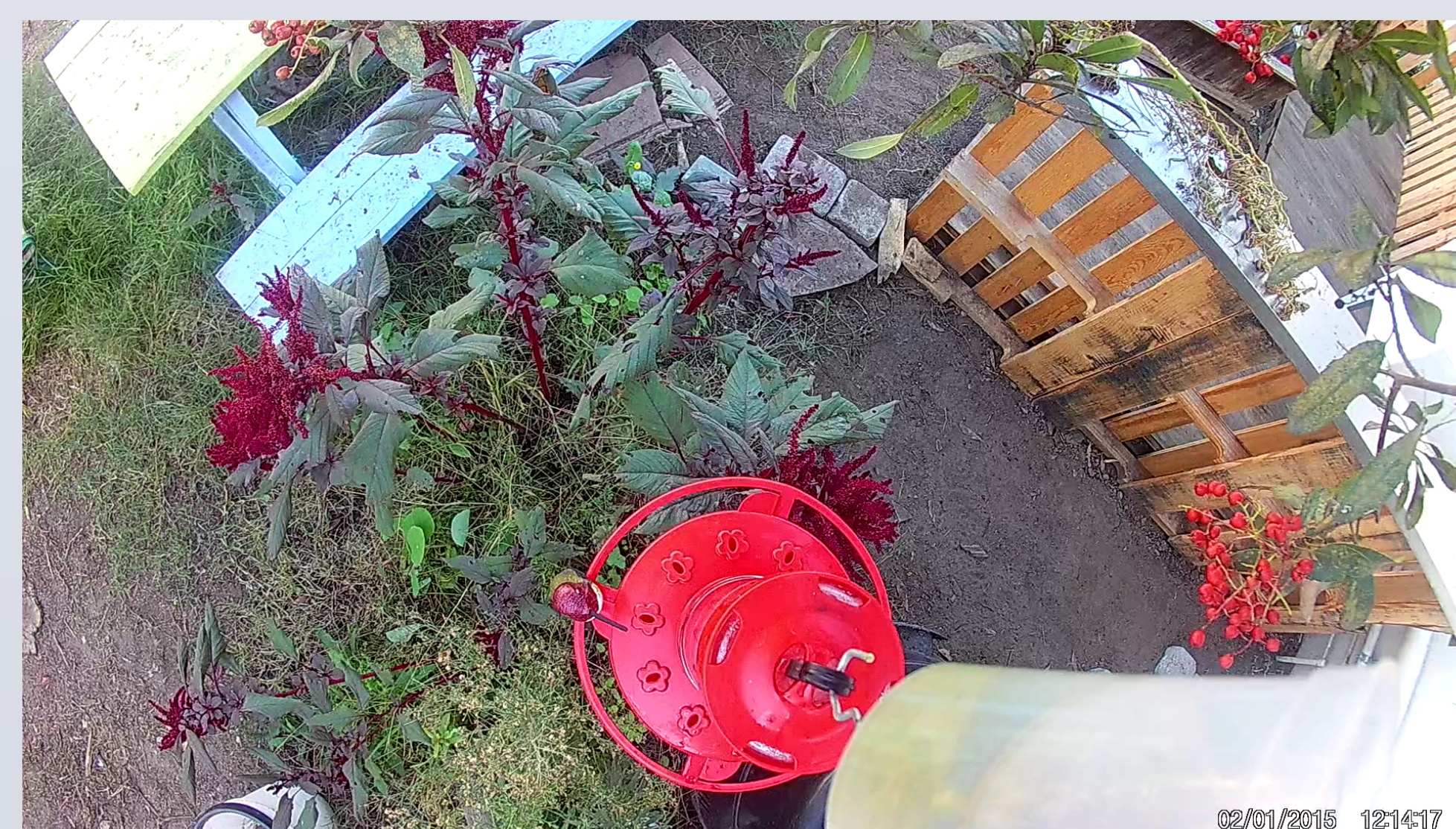
Female Kestrel Decoy



House Cat decoy

## Decoy Placement

- Cat => On ground near feeder
- Kestrel => Mounted on tree branch near feeder
- Hummingbird => Attached directly to feeder



## Methods

### Decoy and Vocalization Presentation

- One of three decoys are placed in close proximity to the feeder.
- Placement of each type of decoy varies to ensure that each will mimic natural behavior as best as possible.
- A predator call unit is programmed to play vocalizations of the respective decoy.

### Locations

- Three active feeder locations on the LMU campus at a time. Locations include sites in a garden and directly adjacent to buildings on the LMU campus.
- Feeder locations are established and maintained for at least one week prior to experimentation to draw hummingbirds to it.

### Time Period

- Trials began on August 29, 2016 and will run through December 9, 2016 or longer if needed.
- Baseline trials are run before each experimental trial with no decoy or vocalizations to gauge feeder activity.
- Each trial lasts for exactly one hour, after which the decoy and equipment are removed.

### Data Collection

- One camera monitors the feeder, decoy, predator call unit, and any activity in same camera frame.
- Direct observations are made on some trials to ensure the accuracy of counts from videos.

### Hummingbird Feeder Content

- A 20% aqueous solution of standard cane sugar is used to fill the feeders. To make the solution, sugar is added to warm water and stirred and then tested using a refractometer.

## Methods (cont.)

### Quantification of Hummingbird Activity

- Hummingbird activity near a feeder is quantified based on individual visits to a feeder, and whether it feeds or not.
- If field and video observations suggest that another method of quantification, such as mobbing of a threat, would be beneficial it will be evaluated.

### Preliminary Findings

- No noticeable changes in feeder activity were observed when using the Kestrel or the Cat decoys.
- No mobbing or other forms of aggression from hummingbirds has been observed towards the Kestrel or the Cat decoys.
- **Male hummingbirds have been observed aggressively attacking the male Anna's hummingbird decoy on multiple occasions.** In some instances, the hummingbird will attack the decoy, stop to feed, then continue its attack. It is unclear if the presence of this decoy has changed feeding activity.
- Students and faculty walking past a trial in progress on campus have believed the decoys to be real.

### Potential Implications

If hummingbirds are not able to properly identify or respond to threats near a feeder, they may be more susceptible to predation. This may have an impact on populations in urban areas and/or apply selective pressure towards behaviors that minimize predation.

### ACKNOWLEDGEMENTS

- LMU's Center for Urban Resilience
- Rachel E. McCaffrey and Susan M. Wethington (2008) How the Presence of Feeders Affects the Use of Local Floral Resources by Hummingbirds: A Case Study from Southern Arizona. The Condor: November 2008, Vol. 110, No. 4, pp. 786-791.