

# Potential Impacts of Artificial Feeders on Hummingbird Behavior

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## Abstract

Hummingbirds act as important pollinator species in many Western Hemisphere ecosystems. In urban environments, artificial feeders have become an important food resource and may affect hummingbird behaviors that provide important ecosystem services such as pollination. Over the past four years, hummingbirds have been observed and video recorded at feeders on the campus of LMU in order to evaluate how the presence of artificial feeders affect hummingbird behavior and distribution. Additionally, observations are now being recorded at a second Burbank, CA study site where hummingbirds have been consistently fed for the last 40 years and adjacent feeders often attract as many as one hundred birds at the same time. This present study, in part, serves to update and summarize observations from the LMU campus from various independent research projects. We plan to compare basic hummingbird behaviors on the LMU study site with the Burbank location by comparing behaviors and interactions of hummingbirds visiting feeders of varied levels of activity through the analysis of video footage and acoustic recordings. This investigation aims to enrich the understanding of the broader impacts artificial hummingbird feeders may have within the urban environment.

## Introduction

- In urban environments, artificial feeders may alter hummingbird behavior and distributions (Clarke 2017).
- Previous work has shown that feeder visitation rates vary by
  - Species (Anna's (*Calypte anna*) and Allen's (*Selasphorus sasin*))
  - Sex
  - Temporally (daily and seasonally)
  - Spatially (within sites at LMU and sites throughout Los Angeles)
- Territorial behavior may vary with visitation rates based on costs and benefits of defending the resource (Optimal Foraging Theory) (Camfield 2005)

**Question:** How do hummingbirds interact with one another at artificial feeders and how do the behaviors differ between species and gender?

**Hypothesis 1:** At a feeder of low visitation, single male hummingbirds will display dominance

**Hypothesis 2:** At feeders of high visitation all hummingbirds will tolerate conspecifics.



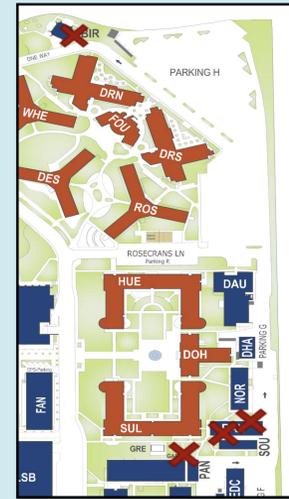
## Methods

### Feeder

- 4 at LMU campus; established for 2 years; varied visitation rates.
- 1 at Burbank, CA, established for 10+ years; high visitation rate.
- 20% sugar water.
- Changed weekly

### Data Collection

- Remote monitoring: Web cameras, Foscam IP cameras, Yi Home IP cameras (Foscam and Yi Home)
- Direct observations



Locations of feeders on LMU's campus (red X)

## Data



Female Anna's at LMU's Research Annex North



Male Allen's at LMU's Research Annex North



90-110 hummingbirds crowd four feeders in Burbank, CA site



20 hummingbirds crowd one feeder in Burbank, CA site



Male Anna at one of the feeders at LMU in the LIONS Garden

## Results

### LMU Research Annex

- On a single day (3/16/2017) motion activated videos showed low visitation, only one hummingbird feeding at a time.
- Preliminary trends show females feeding after males leave, with no evidence of aggression.
- Direct observations at the Birds Nest and LIONS Garden show higher visitation rates

### Burbank

- Over 100 hummingbirds congregate daily at feeders at Burbank location
- Multiple species and both genders present
- Majority of activity is tolerant and not aggressive.

## Discussion

- Preliminary results are consistent with predictions of varied territorial behavior at feeders of different visitation rates.
- Hummingbirds appear to minimize contact with each other at feeders of low and medium visitation
- Hummingbirds appear to be very tolerant of other individuals at feeders of high visitation
- Calculating visitation rates will allow for determining how often each hummingbird visits each feeder
- More in depth analysis of feeders is needed to quantify interactions between different types of hummingbirds
- Bioacoustic analysis may show territorial vocalizations that are not apparent in video data.
- The simple and low cost methodologies make this type of inquiry based learning optimal for incorporation into in K-12 educational curriculum

## Literature Cited

Camfield, A. F. (2006). Resource value affects territorial defense by Broad-tailed and Rufous hummingbirds. *Journal of Field Ornithology*, 77(2), 120-125. doi:10.1111/j.1557-9263.2006.00031.x

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