**Hummingbird community response to plant phenology in the Chiricahua mountains during peak migration**

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**Data:** Aug-Sep 2013 Chiricahua bird and floral census

**Justification:**

Because of their small size, high energetic requirements and dependence on flowering plants, hummingbirds may be among the “first responders” to climate change.

Changes in hummingbird occurrence, abundance, diversity, and migratory timing may indicate larger shifts in landscapes threatened by climate change.

But is unknown what the main migratory cues are for hummingbird migration, including timing of migration and locations of migratory stops.

Migratory cues may include day length, temperature, weather events, and resource availability.

The Chiricahua mountains in southeastern Arizona are located along a major migratory pathway for 14 hummingbird species.

Here, we test whether nectar abundance and plant phenology is a predictor for hummingbird arrival, abundance/density, and diversity using multiple floral patches.

**What:**

We placed bioacoustic monitoring stations (Song Meter SM2+) in nectar patches known to have suitable habitat for hummingbird species during peak migration. The Chiricahua mountains are known to be on a major migratory pathway for 14 hummingbird species.

We left the stations up for (x) days in each patch to record, for (x) hours of audio.

We conducted (x) point counts in each patch to estimate abundance and diversity.

We characterized the size, habitat , location and elevation for each site.

We estimated nectar abundance and floral abundance within each patch for (x) days.

This gives us a temporal perspective as the relatively short period of flowering and nectar availability may impact hummingbird presence and density.

We used point counts and acoustic monitoring to estimate response of the hummingbird community to nectar availability.

**TODO:**

* Descriptive plots and statistics of human-observed data
* Build song recognizers for audio data
* Check for errors in song recording on sample dates (field\_notes.docx)
* Get landscape-level information
  + Geodatacrawler, Tina

**Useful figures/tables:**

* Hb abundance across sampling periods
* Floral abudance across sampling periods
* Hb abundance x floral abundance

**References:**

Agranat, I.D. 2007 Automatic detection of Cerulean Warblers using autonomous recording units and song scope bioacoustics software. <http://www.fs.fed.us/t-d/programs/im/acoustic_wildlife/Cerulean%20Warbler_%20Report_Final.pdf>

Song Scope software. <http://www.wildlifeacoustics.com/songscope_web_help/>