

# Impacts of Forest Restoration Treatments on Pollinator Communities along the Colorado Front Range

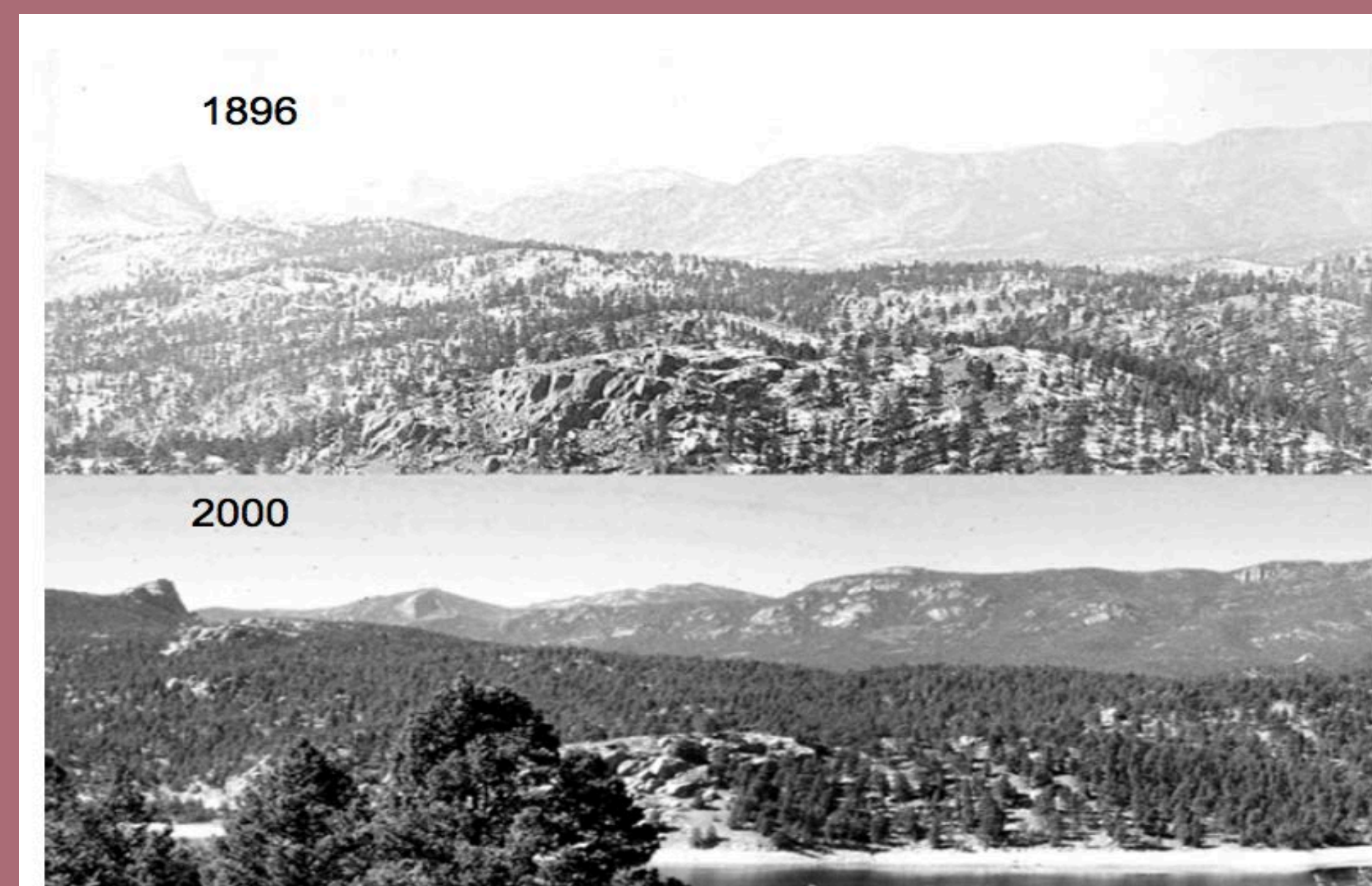


Ryleigh Gelles<sup>\*1</sup>, Kevin J. Barrett<sup>2</sup>, Thomas S. Davis<sup>1</sup>

\*rygelles@gmail.com; 1. Department of Forest & Rangeland Stewardship Colorado State University; 2. Colorado Forest Restoration Institute, CSU

## Introduction

- 90% of wild plant species are directly dependent on insects for pollination. However, recent research supports large-scale pollinator decline.
- Pollinator habitat conditions within ponderosa pine forest have been altered due to logging, grazing & fire exclusion have led to unnaturally dense stands with closed canopies and low understory production.



- Fire as a restoration treatment can assist with the reestablishment of natural ranges of variation in forest composition & structure. This promotes:
  - understory growth → food, nesting resources
  - light penetration → thermoregulation
  - connectivity between resource patches
  - prevents genetic bottlenecks

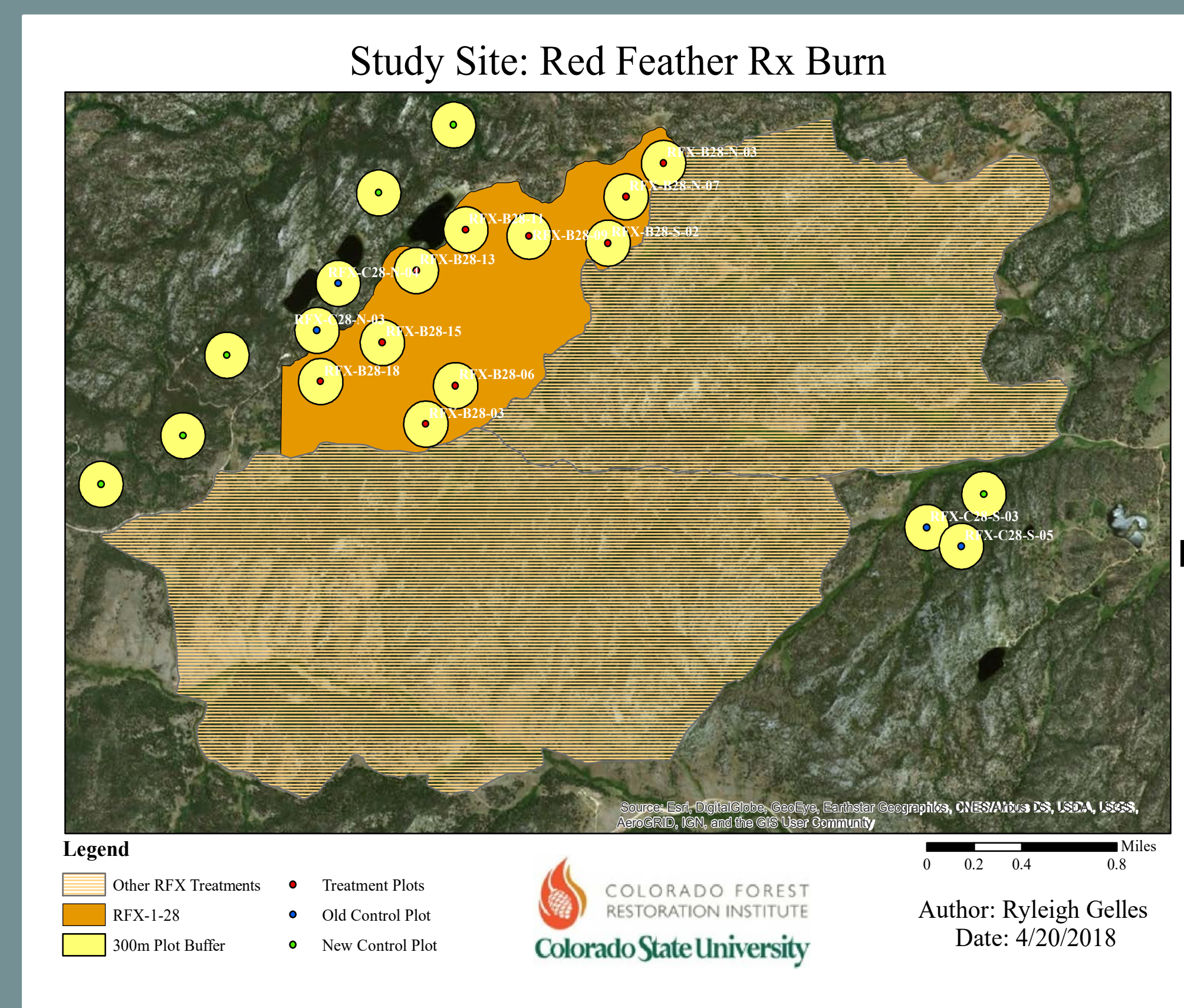
## Research Question

- How does prescribed fire impact pollinator communities in the Colorado Front Range?
- Hypothesis:** Sites that have undergone prescribed fire will experience an increase in abundance, species richness & species diversity of taxonomical groups of bees compared to control plots.

## Methods & Results

### Study Area

- Red Feather Lakes, Colorado
- Prescribed burn took place spring of 2017
- 7 control plots, 7 treatment plots



### Field Collection & Processing

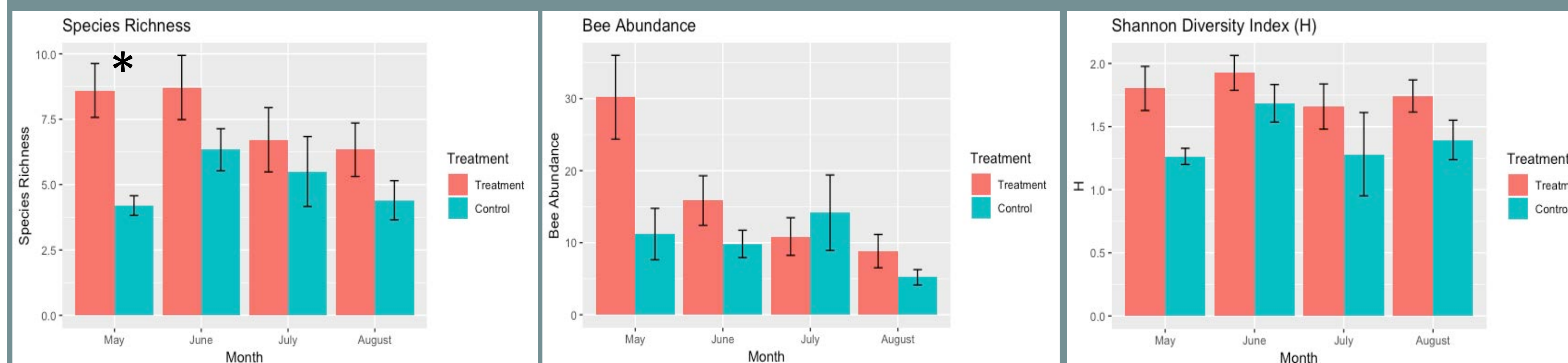
- Collection took place once a month throughout the growing season: May – August
- Deployed blue vane traps for 48 hour periods
- Specimens were then sorted to morphospecies



### Statistical Analysis

For each plot, we calculated bee abundance, species richness, and Shannon Diversity Index (H). We then conducted two-sample Student's t-tests for each month of collection in R.

- 619 specimens collected
- Gamma diversity represented by 60 unique morphospecies
- Bombus* was the most common genera



**Species richness:** Early in the growing season (May), mean species richness was 52% higher in treated sites as compared to control sites ( $P = 0.0038$ ).

**Bee abundance:** In May, mean bee abundance was 63% higher in treated plots compared to control sites ( $P = 0.023$ ) (Figure 5).

**Species diversity:** In May, mean species diversity was 30% higher in treated plots compared to control sites ( $P = 0.020$ ) (Figure 6).

## Discussion

- Bee abundance, species richness & species diversity are higher within treatment plots than control plots. However, this relationship diminishes over the course of the growing period.
- Prescribed fire benefits pollinator communities, and is associated with a higher site occupancy by foraging bees and higher overall bee richness.
- These findings can inform managers and assist with the creation of management methods utilizing prescribed fire that can achieve goals for both forest health & bee conservation.



## Future Research

- What habitat components drive this response among pollinator communities?
- What impact might fire have on pollinator communities >1 year after treatment?

## Citations

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