

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

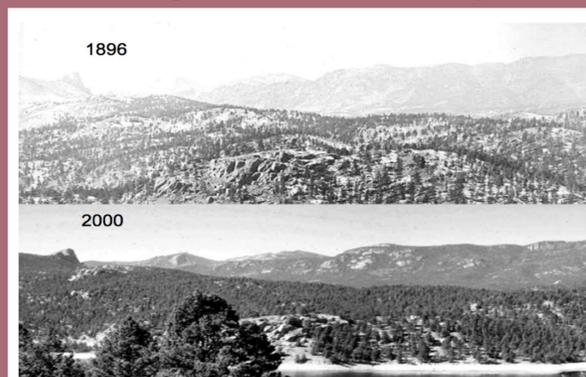


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Introduction

- 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 which has led to unnaturally dense stands with closed canopies and low understory



- 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

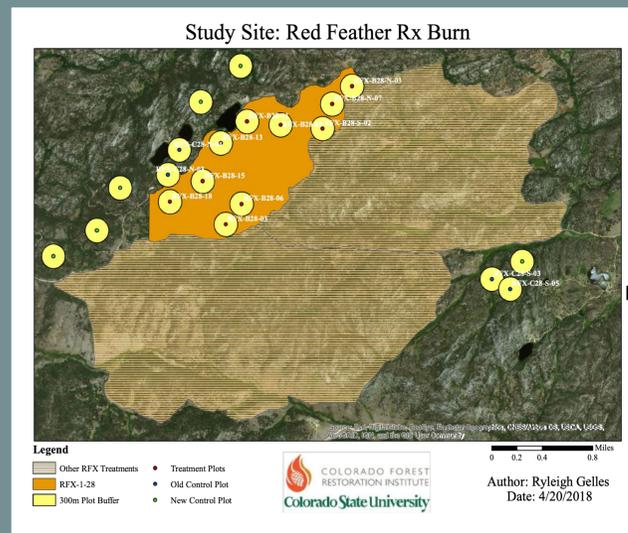
Research Question

- 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

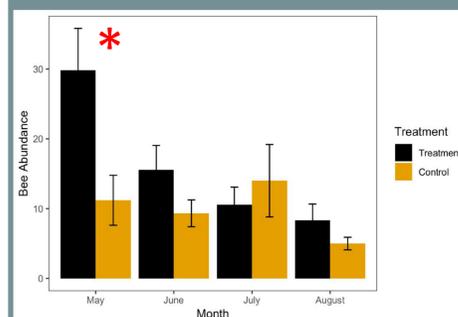
- Collection took place once a month throughout the growing season: May – August
- Deployed blue vane traps for 48 hour periods
- Specimens were then sorted to morphospecies



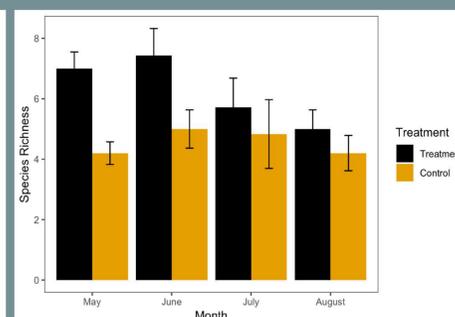
Statistical Analysis

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.

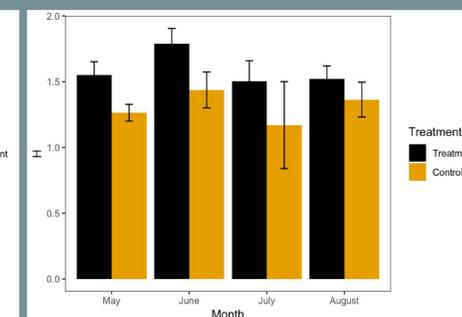
- 612 specimens collected
- Gamma diversity represented by 60 unique morphospecies
- Bombus* was the most common genera



Bee abundance: The interaction between treatment and date is significant ($p = 0.0375$). In May, mean bee abundance was 62.4% higher in treated plots compared to control sites ($p = 0.0051$).



Species richness: Interaction between treatment and richness is significant ($p = 0.0466$). There is a 28% difference in species richness between treatment and control plots.



Species diversity: Interaction between treatment and richness is marginally significant ($p = 0.0843$). There is an 18% difference in species diversity between treatment and control plots.

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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