

Investigating Pollinators Along a Gradient of Flower Diversity: The Importance of Tall Forb Communities in the Rocky Mountains

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Introduction

Tall forb communities (TFC's) are plant communities unique to high elevations in the Rocky Mountains from Montana to Utah. They contain tall, diverse wildflowers (Fig. 1a) and provide food and shelter for many animals. Many TFC's were damaged by past management practices (Fig. 1b), and as little as 10% of TFC areas remain in healthy condition (Fig. 1a). Interest is increasing in restoring damaged TFC's, but there is no empirical information about the status of their pollinators. My project and its sister project are designed to reduce this information gap.

My main research question is "What is the relationship between tall forb community diversity and pollinator diversity?"

Predictions

- (1) Bee and butterfly diversity increases with floral diversity in TFC's.
- (2) Pollinator diversity is higher in larger and more connected TFC's.
- (3) TFC recovery can be limited by pollination services.

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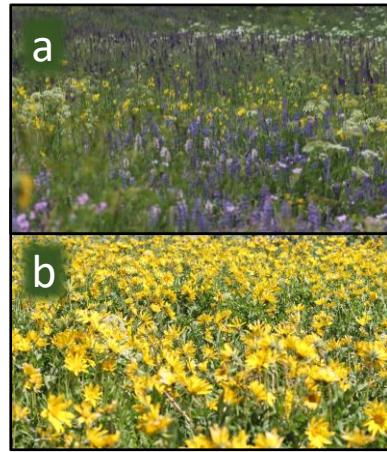


Figure 1
Contrast between high diversity TFC (a) and a low diversity TFC (b).

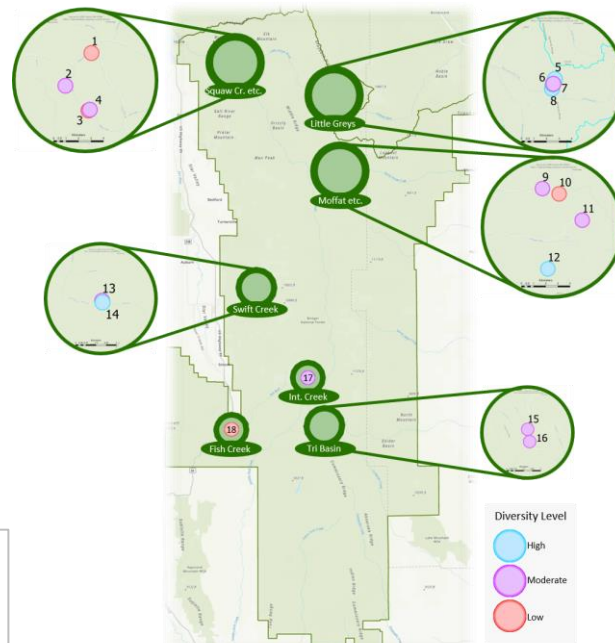


Figure 2
Map of sites; all sites are within the Greys River Ranger District of the Bridger-Teton National Forest

Methods

We surveyed 18 TFC's (ranging from low to high diversity) in the Wyoming Range. I selected sites at varying distances from each other (Fig. 2) to allow us to evaluate how TFC size and connectedness affects pollinator diversity.

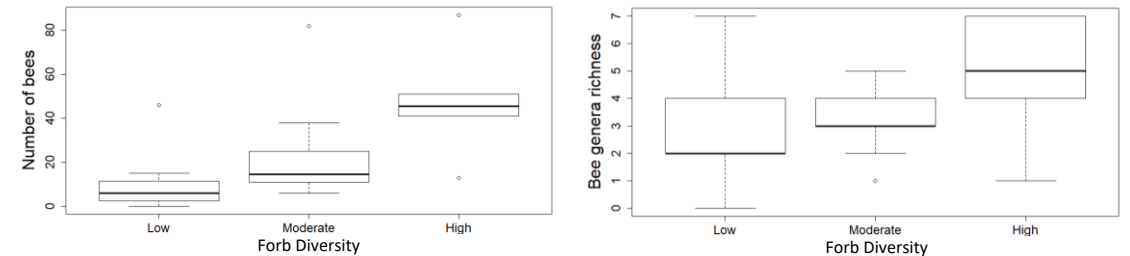
I surveyed along transects, sweep netted, and set traps to estimate the degree to which floral diversity affects bee and butterfly diversity. My research partner carried out vegetation surveys to quantify TFC composition. We quantified TFC diversity based on the density and species richness of the forb (non-woody flowering plant) species present.

To determine whether pollination services limit seed production in TFC's, I selected a moderate diversity site and a low diversity site, where I treated flowers with a hand-pollinated treatment, a bagged treatment (where pollinators were excluded to see if flowers could self-pollinate), and an ambient treatment.

Results

Preliminary results from the transects show that healthy, diverse TFC's support significantly more bees than TFC's with low to moderate flower diversity (ANOVA $p = 0.00627$). There is also a trend suggesting that higher TFC diversity contributes to higher bee richness.

Both results should become clearer after I get bees identified to species and process more bees. It may also help to treat TFC diversity as a continuous trait instead of three discrete traits (low, moderate, or high).



Discussion

Visual surveys along transects should give us an idea of which pollinators are using the floral resources at each site. Sweep netting should supplement visual surveys because they may detect species that are present at sites but are not detected during visual surveys. Traps can draw bees in from surrounding areas and therefore may both catch bees present in the community and indicate which bees can return during site recovery.

My research partner is creating a spatial model to predict where TFC's and other forbland occur. We will use this model to calculate the size and connectedness of TFC's.