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Phenology and Climate

How will plant-pollinator interactions at Mount Rainier National Park be affected by climate change?

Phenology is the study of the timing of an organism's life-cycle stages, including events such as migration or hibernation, and the flowering phases of plants. As average temperatures rise with climate change, montane areas have been experiencing snowmelt earlier in the season, causing some plants to experience earlier shifts in their phenology (1, 2).

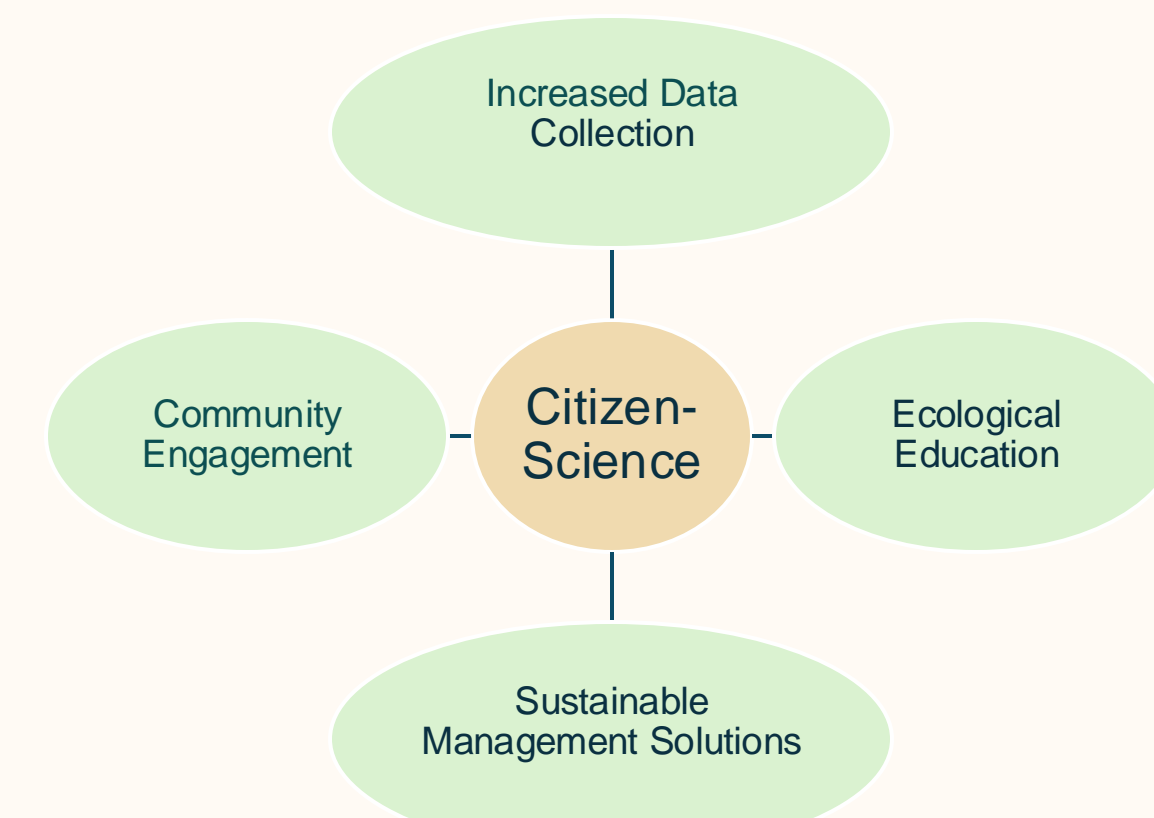
Subalpine plants have been known to use snowmelt as a phenological cue (3), whereas the exact cues of their pollinators vary and may be unrelated to climate change (e.g. photoperiod). Phenological mismatch from the misalignment of flowering activity and pollinator activity could leave ecological networks vulnerable to disruptions (4).

Project Goals:

1. Catalogue pollinator networks to identify the species-specific relationships occurring within Mount Rainier.
2. Create a long-term pollinator dataset via the MeadoWatch program to monitor potential changes over time.

The MeadoWatch Program

- MeadoWatch is a decade-long citizen-science wildflower phenology project with the goal of understanding the effects of climate change on wildflowers.



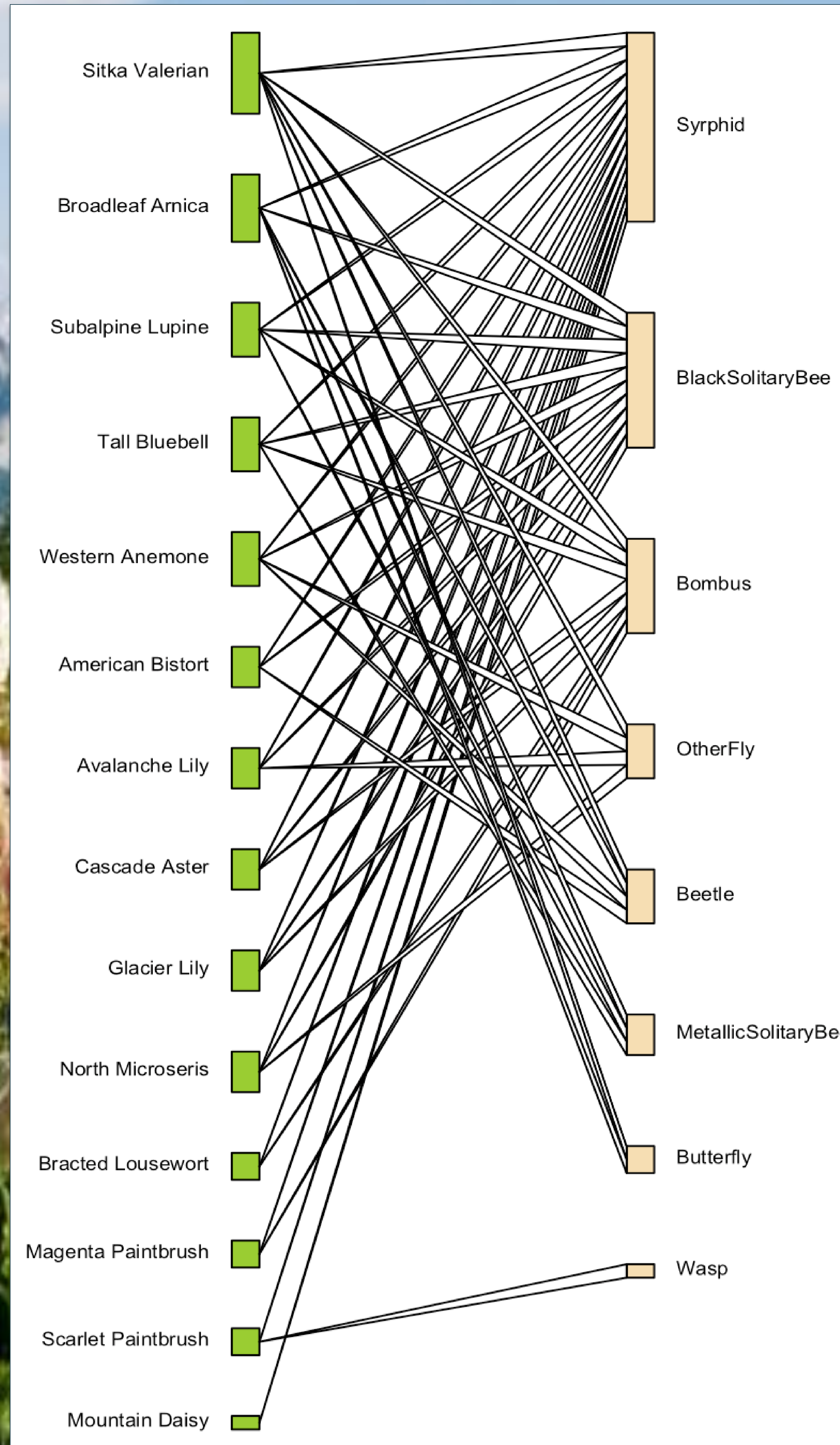
- This is the pilot year of testing data collection methods for pollinator interactions.



Methods

Data was collected in Mount Rainier National Park in 1x2 meter plots for 1, 3, or 5 minute periods.

- Any pollinator interactions occurring during observation period were recorded.
- Insects were categorized into pollinator functional groups for accurate field identification.
- Data was aggregated to reflect presence/absence of interactions.



Results

- Syrphid flies were the most generalist pollinator in the network, visiting all focal floral species..
- Sitka Valerian was the most generalist plant in the network.
- Beetles and Other flies showed a preference towards white and yellow flowers.
- Bumble bees interacted with flowers with more complex reproductive structure (e.g. subalpine lupine, tall bluebell, paintbrush) more often than other groups.
- Out of all possible interactions, 36.5% were actually observed within this pollination network (i.e. connectance of 0.365).



Future Directions

The construction of pollinator networks is crucial to cataloging potential shifts in ecosystems over time.

- Utilize citizen-science to build a long-term dataset of pollinator interactions alongside MeadoWatch floral species and detect possible phenological mismatches.
- Test the efficacy of citizen science data for accurate pollinator identification.
- Continue monitoring the impacts of climate change on shifts in phenology and potential impacts on ecological communities.



Learn more about
MeadoWatch!

Acknowledgements:

Thank you to MeadoWatch volunteers and past MeadoWatch coordinators for their contributions to this project, as well as members of the Brosi Lab for their enthusiastic support and collaboration. Additionally, we would like to thank the National Park Service for their cooperation with MeadoWatch, and finally, thank you to the OneHive Foundation to whom this research would not have been possible without.

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