Impacts of Climate on Four Perennial Forb Species in Pacific Northwest Prairies

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Introduction

To determine how Pacific Northwest prairies could respond to climate change, we are studying the demography of 16 natural populations of four perennial forb species native to Pacific Northwest prairies. These populations are distributed along a 700 km latitudinal gradient in the interior valleys of the Pacific Northwest. To separate the influence of climate from local factors, elevation, aspect, and other abiotic factors are as different as possible at each site. One species, *Ranunculus austro-oreganus*, has its northern range limit in southern Oregon. *Sidalcea malviflora* spp. *virgata*, has its northern range limit in central Oregon. *Microseris laciniata* is found as far north as Washington, and *Eriophyllum lanatum* is widespread.

Figure 1. *Microseris laciniata* (cutleaf silverpuffs).

Figure 2. *Sidalcea malviflora,* ssp. *virgata* (rosy checkermallow).

Figure 3. *Eriophyllum lanatum* (Oregon sunshine).

Figure 4. *Ranunculus austro-oreganus* (Southern Oregon buttercup).

Methods

Each population was censused once between March and June 2015. Approximately 200 plants were marked along transects (1-30 m long, depending on density) at each site, and data on productivity and fitness were collected (e.g., size of largest leaf, number of leaves, number of flowering stems, number of flowers, seeds per flower, etc.) (Figures 8-11). Additionally, a number of analyses to characterize each site, such as total soil carbon and soil bulk density, were performed. Finally, 30-year normals from the OSU PRISM Climate Group dataset were used to characterize climate at each site (Figures 6 and 7). The data were then analyzed using regression based statistics to determine the relative strength of factors influencing these species.

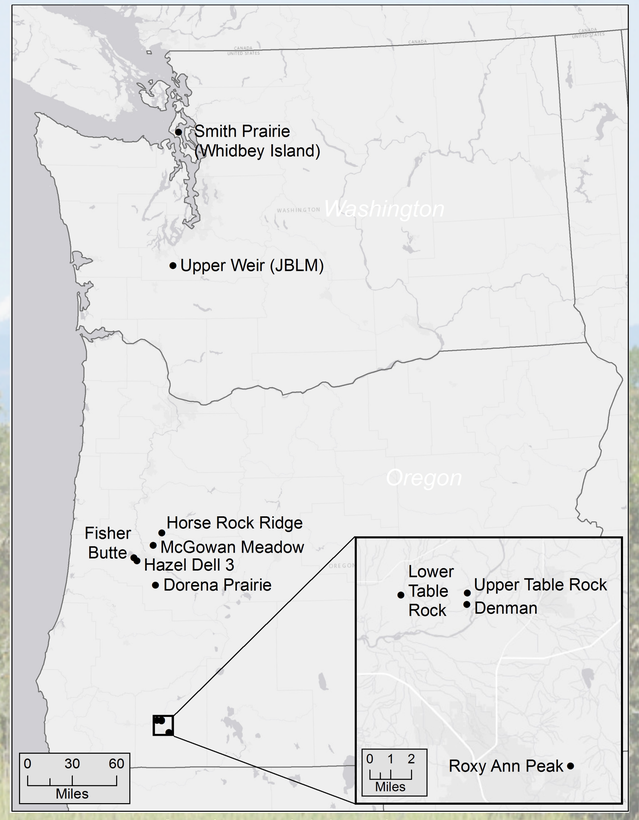

Figure 5. Location of populations included in study.

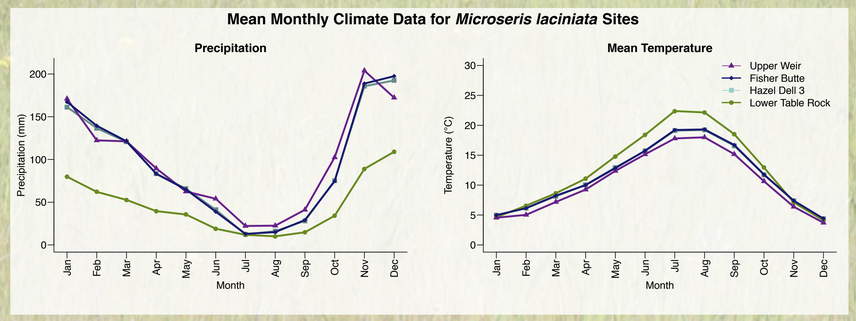

Figure 6. Climate data for *Mircoseris laciniata* populations.

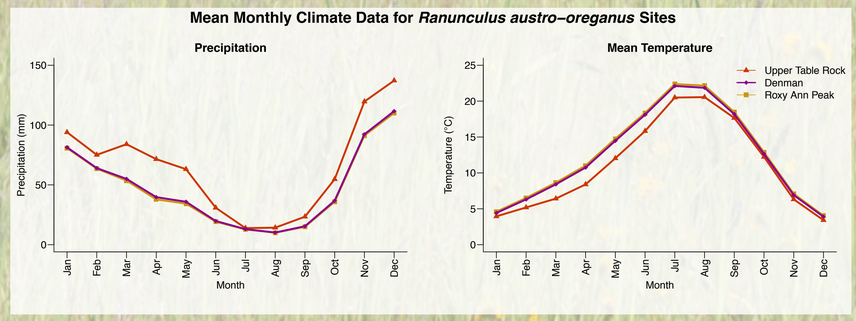

Figure 7. Climate data for *Ranunculus austro-oreganus* populations.

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Selected Results and Discussion

The results and discussion presented here will focus on initial results for *Microseris laciniata* and *Ranunculus austro-oreganus*.

For *Microseris laciniata*, Fisher Butte was significantly different for both proxies of biomass and fitness. This is particularly interesting given its close proximity and nearly identical climate data to Hazel Dell 3.

For *Ranunculus austro-oreganus*, Denman is significantly different than the other sites for both proxies of biomass. Again, this is surprising due to its physical proximity to and identical climate data with Upper Table Rock.

These results suggest that the climate gradient alone does not explain variation between populations; local factors, such as soil depth, are likely responsible for much of the variation.

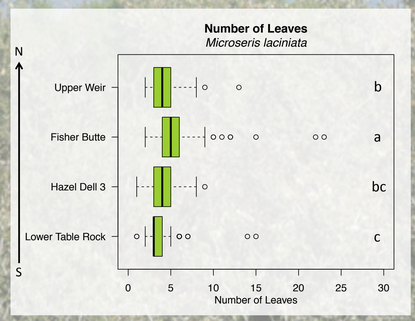

Figure 8. Boxplots showing number of flowers per plant by site for *Microseris laciniata* populations. Different letters indicate significant differences ($p < 0.05$).

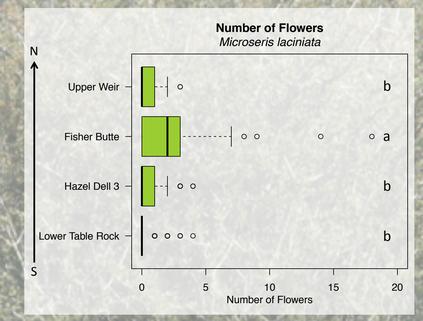

Figure 9. Boxplots showing number of leaves per plant by site for *Microseris laciniata* populations. Different letters indicate significant differences ($p < 0.05$).

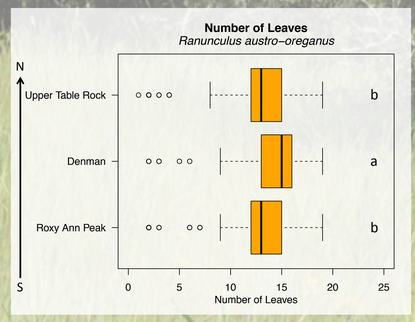

Figure 10. Boxplots showing number of leaves per plant by site for *Ranunculus austro-oreganus* populations. Different letters indicate significant differences ($p < 0.05$).

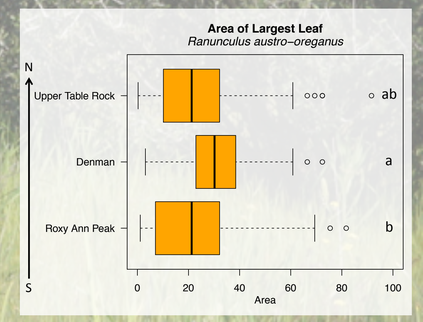

Figure 11. Boxplots showing area of largest leaf per plant by site for *Ranunculus austro-oreganus* populations. Different letters indicate significant differences ($p < 0.05$).

Next Steps

Next steps include completing the analysis for all four species, as well as determining the allometric relationship between biomass and the metrics used to describe each plant. This dataset will be used in population projections for each species. Data collection will be continued for 5 years and resulting data will be put into a regional climate demographic model.

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