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## **The Genetic Diversity and Heterozygosity in Six Sagebrush Populations: Estimating the Evolutionary Potential of a Keystone Species in a Changing World**

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## The Genetic Diversity and Heterozygosity in Six Sagebrush Populations: Estimating the Evolutionary Potential of a Keystone Species in a Changing World

### Abstract

Global change threatens worldwide biodiversity and the structure of communities. This is of critical importance for keystone species within endangered ecosystems. For such species, an assessment of the level of genetic diversity within populations and level of heterozygosity of individuals is important for estimating the evolutionary (adaptive) potential of populations and the fitness of individuals. Sagebrush steppe ecosystems occur over a great expanse of western North America, and it supports many understory grasses and forbs, as well as the Greater Sage-Grouse (*Centrocercus urophasianus*). Sagebrush populations face many threats to their survival, including overgrazing, invasive species, and climate change. We will use enzyme electrophoresis to determine the level and structure of genetic diversity within and among four populations of *Artemisia tridentate* subsp. *tridentate* (Basin big sagebrush) and two populations of *A. tridentate* subsp. *wyomingensis* (Wyoming big sagebrush). We will also estimate the mating systems (the amount of outcrossing versus self-pollination) of these sagebrush populations. The data collected in this project will provide insights into the evolutionary potential and fitness of the sagebrush populations and individuals analyzed in this study. These findings can be used to further support conservation efforts of sagebrush in a changing world.

# THE GENETIC DIVERSITY AND HETEROZYGOSITY IN SIX SAGEBRUSH POPULATIONS: ESTIMATING THE EVOLUTIONARY POTENTIAL OF A KEYSTONE SPECIES IN A CHANGING WORLD



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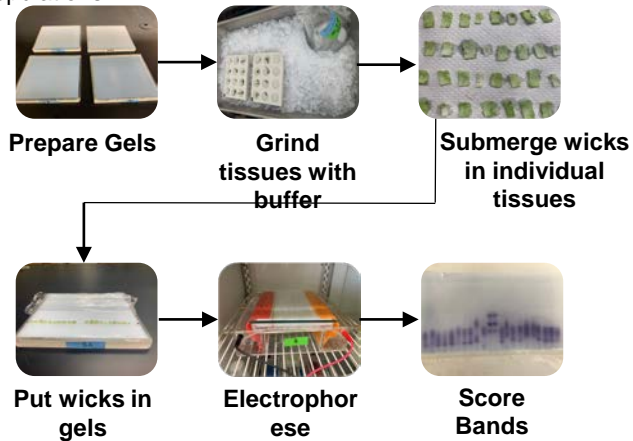
Sagebrush (*Artemisia tridentata*) steppe ecosystems occur over a great expanse of western North America. For such species, an assessment of the level of genetic diversity within populations and level of heterozygosity of individuals is important for estimating the evolutionary (adaptive) potential of populations and the fitness of individuals.

## My Goals

- Determine level & structure of genetic diversity
- Estimate mating systems (amount of outcrossing vs. self-pollination)

Assess evolutionary potential & fitness of sagebrush populations

## Methods



## Results

We predict that Sagebrush Populations (*Artemisia tridentata*) exhibit primarily wind pollination, suggesting a heterozygous level of genetic diversity and high evolutionary (adaptive) potential through diversification and speciation processes. Understanding the phylogenetic vs. ecological relationships of *A. tridentata* subspecies will have bearing on how to restore these desert ecosystems (Richardson et al., 2012).

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## Conservation Implications

Total land use and demands on sagebrush lands for all purposes have increased since Euro-American settlement. Holistic consideration of all human-associated disturbances is required to address the complexity of multiple, interacting, or additive factors if sagebrush areas are to be effectively maintained or restored (Knick et al., 2011). As a major keystone species in the northwest of the United States, further conservation is necessary to effectively maintain and restore the species.

## Future Research

The inherent resistance and resiliency of sagebrush communities to land use varies considerably. We cannot fully appreciate how the cumulative effects of these unprecedented intensities and current trajectories of land use will influence long-term conservation of sagebrush landscapes and sage-grouse populations (Knick et al., 2011). This research has been temporarily halted due to COVID-19 and should continue to further analyze the significance of the bands on the gel runs to investigate the heterozygosity levels.

## References

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