**Preliminary Major Goals and Research Questions – GRFP Proposal Draft**

**Project Overview:**  
As part of the Ten Thousand Oaks Project, this research will investigate how **somatic mutations**, **standing genomic variation**, and **phenotypic plasticity** contribute to **drought adaptation** in *Quercus garryana* (Oregon white oak). Understanding how genetic diversity within and among individuals shapes adaptive potential is essential to predicting population responses to climate change and guiding future restoration and remediation strategies.

**Major Goals:**

1. **Detect and characterize somatic genetic variation** within individual oak trees and evaluate its potential contribution to local adaptation.
2. **Quantify genomic offsets** to assess how current genetic variation aligns with future climate conditions, particularly increasing drought stress.
3. **Disentangle the roles of genetic variation versus phenotypic plasticity** in shaping drought responses at early life stages.
4. **Inform admixture-based remediation strategies** by identifying genotypes and mechanisms that enhance drought resilience.

**Guiding Research Questions:**

* Do individual trees accumulate distinct somatic mutations across different branches, and could these mutations generate novel adaptive variation?
* How does genomic variation among seedlings influence their morphological and physiological responses to drought conditions?
* What proportion of drought adaptation is driven by fixed genetic differences compared to phenotypic plasticity?
* Can genomic offset analyses predict which populations or genotypes are most vulnerable under future climate scenarios?
* How might identified drought-resilient genotypes inform admixture-based conservation strategies for *Q. garryana*?

**Experimental Approach (brief):**  
Seedlings from natural populations will be grown under contrasting water regimes (drought vs. well-watered) to measure variation in morphological and physiological traits. Whole-genome and GBS sequencing (~96 individuals, ~4,000 loci) will link genetic variation, including somatic mutations, to observed drought responses. These results will help clarify the genetic basis of drought adaptation and support broader Ten Thousand Oaks Project goals related to restoration and long-term population persistence.

NOTES

ANY WAY I CAN INTERGRATE TRADITINAL POP GEN?