



Population Genetics of Burke's Goldfields, Sebastopol Meadowfoam, & Sonoma Sunshine

In collaboration with Dr. Debra Ayres at UC Davis, Laguna Foundation lead scientist Dr. Christina Sloop is investigating the genetic variation of three endangered plants occurring in Santa Rosa Plain (Sonoma County) vernal pools (*Limnanthes vinculans*, *Lasthenia burkei*, and *Blennosperma bakeri*) using nuclear DNA markers. This work is supported by a US Fish and Wildlife Service ESA section 6 grant and the California Department of Fish and Game.

The [Santa Rosa Plain Conservation Strategy \(2005\)](#) outlines that the recovery of the listed plant species will require conservation of existing populations and the establishment of additional populations on protected land. Conservation genetics involves the detection and preservation of evolutionary significant units (ESUs) within species, providing knowledge of the levels of genetic variation and its distribution among populations. This is of paramount importance for evaluating critical fitness attributes of rare species, and in developing recovery plans that can meaningfully sample and preserve genetic diversity. Within the context of mitigation, populations of endangered plants are increasingly being relocated to created seasonal wetland sites. Haphazard mixing of potentially genetically distinct populations in created sites could disrupt ESUs and prove harmful for long-term viability due to outbreeding depression. The pending knowledge of the genetic composition will help us to more appropriately design any reintroduction efforts, to conduct focused seed collection efforts, and possibly, to identify any populations with particularly unique genetic resources.

The second phase of this study focuses on vernal pool seed bank dynamics. Analysis of potential year-to-year genetic differences within a given population will deepen our understanding of which environmental factors may stimulate the germination of specifically adapted seed types each year. Seeds germinating today may in fact be historic in origin, rather than originate from the prior year's generation. Vernal pool plant seeds can live in the soil for decades or more. This illuminates the question of whether we are 'drawing down' this seed bank 'account' without adequately re-stocking it, as many endangered populations get smaller and smaller each year. Will certain populations draw down to a point in the near future where they are permanently gone? Our study will help clarify the need for continuous seed collection and *ex situ* seed banking to avoid such a scenario.

In conjunction with genetic and seed bank information it is imperative to establish baseline data on the most recent population sizes and habitat conditions throughout the Santa Rosa Plain, as many extant populations on private and preserved lands are at present not under favorable management regimes. The establishment of this [endangered vernal pool species baseline assessment](#) in

conjunction with long-term monitoring research addressing the various management methods will allow for the best possible adaptive management strategy implementation and preserve planning.