Research at the James: ***Variations in fire-adapted traits in the shrub Ceanothus***

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California is home to a variety of fire-prone ecosystems, each with its own characteristic wildfire regime (i.e. frequency, intensity, and severity) and with its own set of native plants adapted to the type of fires common to their local habitat. Shifts in fire frequencies and severities due to climate change and human activity may threaten the health of native plant communities that are adapted to a particular pattern of fire. Though adaptations to fire help native plants to withstand a particular fire regime, species can show variation in adaptive traits both within and across populations, which suggests a capacity to respond to fire with a wide breadth of responses. Evaluating potential impacts of fire regime shifts on fire-adapted species requires examining how these fire-adapted traits have evolved in response to environmental variability in space and time. Prior work has found that traits that affect plant survival and reproduction, including fire-stimulated germination and flammability vary with fire frequency, but most of this work has involved coniferous forest systems rather than chaparral shrublands. Alexandra aims to extend this body of research to California shrublands in order to understand how these habitats will fare in the face of change.

Alexandra is studying post-fire seeding species of the genus Ceanothus in chaparral systems of island, coastal, and inland regions of all parts of California. She is investigating the relationship between fire-adaptive or fire-related traits to historical and recent fire history. Focal traits include fire-triggered germination (FTG), flammability, nitrogen fixing ability, and seedling growth rates. Data will be derived from field observations, laboratory experiments, and a common garden experiment. Variation in traits across and within populations will be considered in conjunction with historical, modern, and predicted fire regime information in order to assess extent and rate of past adaptation and potential for future adaptation in California. Alexandra is doing her field observations at a number of sites across the state. Many are at or near several University of California Natural Reserves, including the James Reserve, which represents the southernmost sitesin her research project. As this project is a multi-reserve effort, it is one of the projects to receive support from the UC NRS Institute of the Study of Ecological and Evolutionary Climate Impacts (ISEECI), which seeks to encourage such multiple site studies among the Reserves.