# Across Time & Space: Species diversity response to fire severity in Sierra Nevada yellow pine and mixed-conifer forests

**Presenter's Name:** JonahMaria Weeks
**Presenter's Company/Employer:** UC Davis
**Presenter's Title:** PhD Candidate
**Co-Presenter's Name:** Clark Richter
**Co-Presenter's Company/Employer:** UC Davis
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**Abstract:**
Ecological disturbance regimes are changing due to a combination of effects from both direct human influences and climate change. Wildfire regimes in particular are being affected due to interactions between high fuel loads and climate warming, resulting in many regions that historically experienced low to moderate fire severity regimes now seeing increased area burned at high severity. Despite understory taxa comprising the vast majority of forest plant species and playing vital roles in overall ecosystem function, little is known of the effects of changing fire regimes on forest understory plant diversity. Furthermore, the role of time since fire when examining the relationship between fire severity and diversity is understudied, with space for time substitutions often being made. We examined understory plant diversity across gradients of wildfire severity in eight large wildfires in yellow pine and mixed conifer temperate forests of the Sierra Nevada, California, USA. Additionally, we sampled one of those fires at five time-steps across nine years. We found a generally unimodal relationship between local plant diversity and fire severity across fires and through time. High severity burning resulted in lower local diversity as well as some homogenization of the flora at the regional scale. Our research suggests that increases in fire severity in systems historically characterized by low and moderate severity fire may lead to plant diversity losses, which on a global scale may have important implications for biodiversity.
co-authors: Clark Richter, University of California-Davis; Marcel Rejmanek, University of California-Davis; Jesse E. D. Miller, Stanford University; Kevin Welch, University of California-Davis; Zack Steel, University of California-Berkeley; Evan Batzer, University of California-Davis; Hugh Safford, USDA Forest Service and University of California-Davis