

# **Where and when to plant trees after fire in the face of water limitation and shrub competition.**

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**Topic:** Natural areas management in light of climate change

**Proposal Type:** Symposium - select this if you are part of an organized session

## **Abstract:**

Wildfires in the mid-elevation forests of California's Sierra Nevada mountain range have massively increased in size and intensity over the past half-century due to a century of fire suppression and possibly climate change. Disturbance on this scale was rarely seen in the Sierra Nevada prior to the initiation of fire suppression. As a result, post-fire forest tree regeneration has become weak in many areas, leading forest managers to invest in tree planting as a strategy to hasten forest recovery after fire. Despite the critical importance of tree planting for forest recovery, it remains unclear how environmental variation in tree stress determines natural regeneration versus planting success. To address this gap, we joined efforts with the U.S. Forest Service to ask how variation in the physical environment (e.g., temperature, precipitation, light intensity, etc.) and competition from shrubs impact natural regeneration and tree planting success after forest fires throughout the Sierra Nevada. We found that natural regeneration is lowest at the hottest, driest sites and that tree planting can provide a moderate boost to forest recovery under these conditions. We also found that the timing of tree planting matters but depends on competition from shrubs. In places where shrub competition is intense, tree planting is much more successful if planting occurs the year immediately following a fire (the soonest that it is practical to plant). Alternatively, in places where shrub competition is weak, waiting a few years to plant trees until some shrubs establish actually facilitates tree survival, perhaps by providing shelter from harsh conditions. Overall, we recommend forest managers prioritize the hottest, driest sites for reforestation projects and plant trees as soon as possible where competition from shrubs will be most intense.