

Tree recruitment and forest expansion following reforestation in the Sierra Nevada, CA

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Topic: Natural areas management in light of climate change

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Abstract:

In post-wildfire landscapes in the western Sierra Nevada, the availability of live, reproductive trees is a strong predictor of conifer regeneration. One proposed management strategy is to reforest small patches as a means of establishing future conifer seed sources in areas where high mortality from wildfire inhibits natural regeneration and where reforestation is difficult at scale. However, certain post-fire successional processes (e.g., the growth of competing vegetation) are also known to inhibit tree establishment and growth, and these processes may become dominant before planted trees become reproductive. Thus, it is unclear whether a small planted stand that produces viable seed could plausibly result in seedling establishment and forest expansion in this system. In Summer 2019, we conducted an observational field study testing the contribution of now-reproductive planted trees relative to site characteristics in driving conifer seedling recruitment in unplanted areas. We found that regeneration was significantly higher closer to the plantations, suggesting that plantations do contribute to tree establishment outside of the planted area. We did not find a significant effect of shrub cover nor overstory cover on recruitment, leading us to reject the hypothesis that shrub cover limits recruitment even when seeds are present. Though we focused the study on areas that had high post-fire tree mortality, we still found that proximity to surviving trees was a significant predictor of recruitment. Collectively, these results suggest that plantations are a viable option for catalyzing tree recruitment in unplanted areas, but this effect may be most relevant for practitioners in areas where large, surviving trees are not available as seed sources. Co-authors: James N. Sanchirico, Department of Environmental Science & Policy, UC Davis; Hugh D. Safford, Department of Environmental Science & Policy, UC Davis and USDA Forest Service, Pacific Southwest Region