Dozer Line Impacts on Local Vegetation Recovery after the Carr Fire

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Introduction

As wildfires grow in extent and frequency, the scope of fire suppression activities has increased as well.^{1,2} During wildfires bulldozers are used to build fire lines as they are typically able to construct them faster than hand crews and with a larger impact. These dozer lines, however, leave large swaths of forest bare of canopy, understory, and duff layers. Though these lines are effective and necessary, they incur a high ecological cost on the areas where they are constructed. The ecological detriment includes areas with bare soil, increased propensity for non-native invasion, and the potential to alter community trajectory so that it does not return to a similar pre-fire state.³ Although dozer line construction is a common fire suppression practice, there is very little research investigating post-fire recovery of these heavily disturbed areas.

Research Goal

This research sought to examine the post-fire recovery within and adjacent to four novel dozer lines, specifically examining the potential impact from non-native species. Dozer lines were located within the burn perimeter on land managed by both the Bureau of Land Management (BLM) and United States Forest Service (USFS).

Methods

Field research involved vegetation sampling within and adjacent to the dozer lines on 117 one m² plots along 20 total transects. Additional metrics, such as percent bare ground, canopy cover, litter depth, slope, elevation, and aspect were collected using Daubenmire cover classes at the transect and plot level as well. The four dozerlines were located within high elevation shrublands and mixed oak and pine woodlands vegetation types. They were both located within high/moderate burn severities.



Summary statistics were calculated to compare native versus non-native species percent covers. Average percent covers were calculated using only plots where the species was found. Percent covers were calculated using the midpoint of each Daubenmire cover class.

Figures and Results



- The vegetation patterns I found adjacent to the dozer lines were indicative of an early succession community. I found high numbers of Bromus tectorum, Ceanothus integerrimus, and Toxicodendron diversilobum.
- Plots within the dozer line showed **little evidence of recovery** 2.5 years post-fire. Plots within the dozer line were on average nearly 50% bare ground, and absent of vegetation and most organic material.





There was a significant relationship between the distance of plots from the dozer line and their non-native presence, indicating that as the distance from the dozer line increased the likelihood of finding a non-native species decreased. There was also a strong relationship between non-native presence and dozer line width. As the dozer line increased in width, there was an increased likelihood of finding non-native species in plots within or adjacent to the dozer line.

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Conclusions and Recommendations

- As fire frequency and severity increase with climate change⁴ the use of fire suppression tactics such as the creation of dozerlines will become more commonplace.
- Although necessary in some cases for wildfire suppression in the WUI, bulldozer use has been shown to significantly increase the propagation of non-native species on fuel breaks². While the majority of non-native species impacts are benign or pose negligible impact, the minority of nonnative species pose a considerable risk to ecosystem function and local biodiversity⁵.
- Since there is already evidence to suggest that western forests are susceptible to ecological conversion, participating in fire suppression activities that aid in nonnative establishment has the potential to expedite the loss of forested vegetation types.⁶
- Due to a limited understanding of the ecological effects of dozerlines⁷ it is important to continue studying short- and long-term vegetation responses to dozerline construction.





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