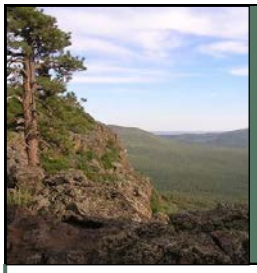

Ecological Restoration Institute

Fact Sheet: Understory Plant Community Responses to Hazardous Fuels Reduction Treatments in Pinyon-Juniper Woodlands of Arizona, USA

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Northern Arizona University Ecological Restoration Institute

Understory Plant Community Responses to Hazardous Fuels Reduction Treatments in Pinyon-Juniper Woodlands of Arizona, USA

By David W. Huffman

Introduction

Hazardous fuels reduction projects with the primary goal of reducing potential for uncontrollable wildfire are being implemented widely in dry forests of the western United States. Information concerning ecological responses to fuels reduction treatments is becoming increasingly available for frequent-fire forests. However, response data are lacking from other major ecosystems, such as pinyon-juniper woodlands, where natural fire regimes may be characterized by infrequent, high-severity fire. Such woodlands are being treated, particularly in wildland-urban interface areas, using fuels reduction principles most appropriate for frequent-fire types (Schoennagel and Nelson 2011). In this study, we examined understory plant community responses five years after implementation of a fuels reduction experiment at a pinyon-juniper woodland site in Arizona (Huffman et al. 2009). Treatments were overstory thinning (Thin), thinning followed by prescribed burning (Thin + Burn), burning alone (Burn), and untreated controls (Control). We wanted to understand if understory cover and species richness differed between fuels reduction approaches. We also wondered if treatments affected understory community composition. In addition to these questions, we evaluated differences in cover of invasive species, biological soil crusts, and bare soil as indicators of ecosystem integrity and function. Answers to these questions provide information to help managers balance the potentially competing goals of hazardous fuels reduction and conservation of ecological integrity in pinyon-juniper woodlands.

Research Findings

- Experimental units that received thinning, and thinning followed by prescribed fire, showed significantly greater understory cover after five years (2006-2011) than units that were only burned and those that were not treated (Fig. 1).
- Cover changes were driven primarily by increases in annual forbs and nonnative species (primarily cheatgrass).
- We found no significant effects of treatments on understory species richness or community composition.
- Cover of biological soil crust and bare soil cover — indicators of changes in ecosystem function — were not affected by treatment.

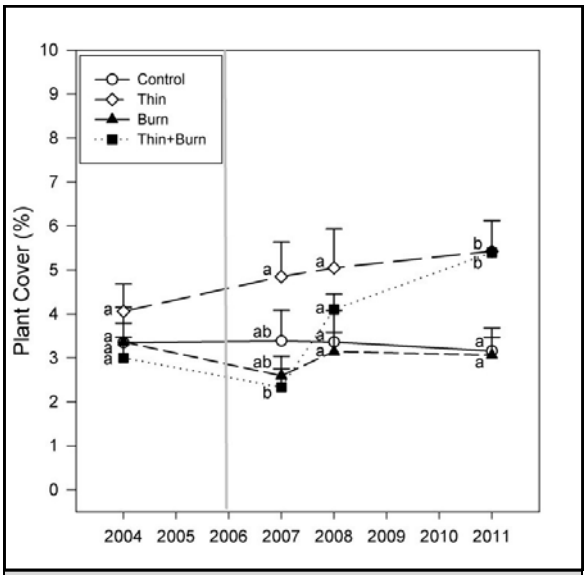

Figure 1. Understory plant cover on thin-only and thinned plus prescribed fire plots was significantly greater than cover on burn-only plots five years after treatment (2006–2011).

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Management Implications

- Hazardous fuels reduction principles have been developed for frequent-fire forest types, but these treatment approaches may negatively affect ecological conditions when applied to infrequent-fire systems such as persistent pinyon-juniper woodlands (see Romme et al. 2009).
- Although results from our study indicated that hazardous fuels treatments in pinyon-juniper woodlands may increase understory abundance within five years of treatment, changes were not large (Fig. 2).
- A lack of significant differences between fuel reduction alternatives in cover of biological soil crust and bare soil suggested that these treatments may not have produced strong effects on functional attributes such as soil stability or hydrological processes.
- Results from this study indicated that thinning treatments followed by prescribed fire may lead to rapid increases in nonnative species cover. This may be of particular concern where populations of cheatgrass (*Bromus tectorum*) occur. Increases in community dominance by this species may substantially alter disturbance patterns in infrequent-fire systems.
- Managers that desire to reduce hazardous fuels while simultaneously conserving integrity of pinyon-juniper woodlands should consider utilizing thinning treatments that emulate stand structural patterns that result from natural disturbance (Huffman et al. 2012) and not burning thinning slash.

Figure 2. Ecological Restoration Institute staff compared understory cover on permanent quadrats (bottom) within experimental units that were thinned only, thinned and burned (middle), burned only, and left untreated (top).

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This Fact Sheet summarizes information from the following publication:

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