Post-Wildland Fire Prescribed Burning: Regeneration of Ponderosa Pine and Changes in Fuel Loads Following the Jasper Fire

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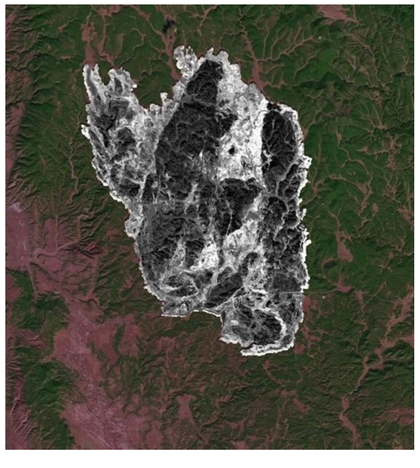
Introduction

- As the frequency and intensity of wildland fires increase, the incidence of reburn is also increasing
- The Jasper Fire (2002) burned in the Black Hills National Forest in South Dakota, USA. The Black Hills are uniquely characterized by prolific, near-monocultural ponderosa pine forest which is intensely managed for timber and has recent histories of fire exclusion, drought, and disease
- We asked: **what are the changes in ponderosa pine regeneration and in fuel loads one year post-prescribed fire and ten years post-prescribed fire?**



Methods

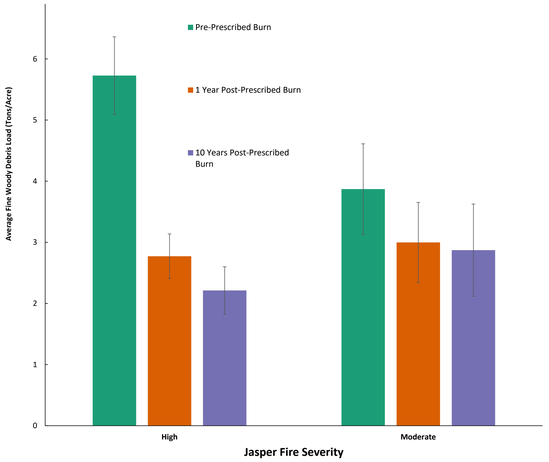
In 2011, a prescribed fire was ignited in the Lemming Draw unit within the burn scar of the Jasper Fire.

Plots were established in areas that burned at high severity (pictured) and moderate severity in the scar.

Overstory trees, regeneration (seedlings/saplings), litter and duff measurements, and fine/coarse surface fuel loads were measured pre-prescribed burn, one year post-burn and ten years post-burn.

Results

[a] Fine fuels



[b] Coarse fuels

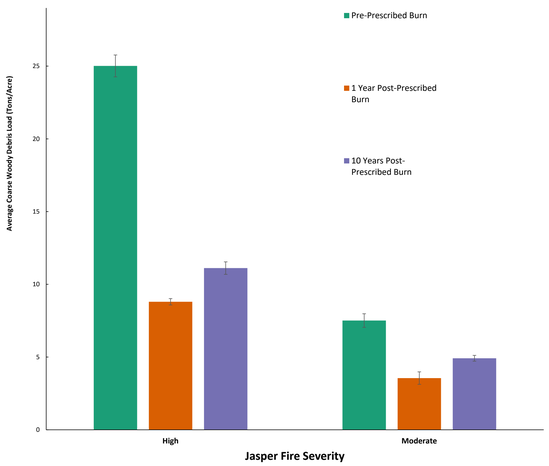
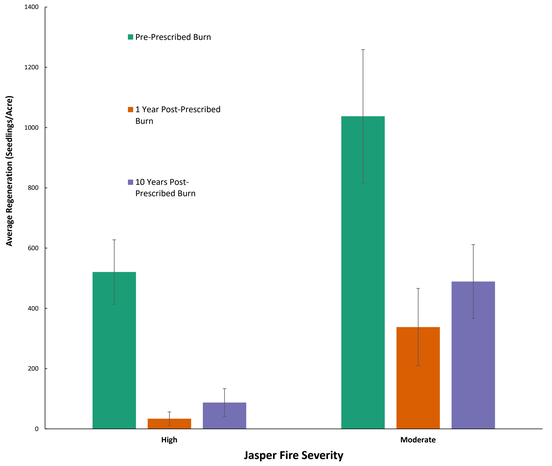


Fig. 1. a) The prescribed fire met the goal of reducing fine fuels in the high and moderate severity areas; b) Coarse fuel loads were also reduced. They increase between the one-year and ten-year measurement periods.

[a] Seedlings



[b] Saplings

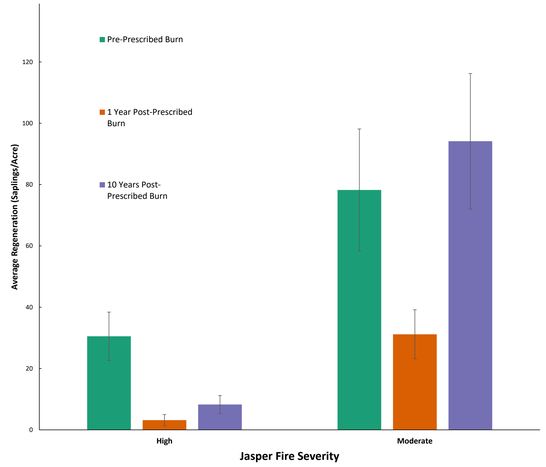


Fig. 2. a) Seedling regeneration was appreciable in the moderately burned areas, and was more limited in high-severity areas, and b) sapling regeneration was greater in the prescribed burn area after ten years than before the burn.

Conclusions/Discussion

- Regeneration of ponderosa pine in high severity areas is extremely limited, and the potential for ecosystem conversion to grassland is high
- Regeneration is considerable in moderate severity areas. Though this can be an indicator of post-fire recovery, the Black Hills are a frequent-fire adapted ecosystem and overly dense forests are causing myriad forest health issues. This creates an argument for repeated prescribed burns in the same area
- The trend of increasing coarse fuels as the time since prescribed fire increases can be considered an additional indication of the need for repeated burning

Future Research

- As the climate changes and microsite characteristics change, what is the importance of overstory survival and remaining seed source in regeneration success?
- What is the ideal set of fire behaviors and treatment timing to recreate historic heterogeneity in the Black Hills?
- If the survivability of ponderosa pine regeneration is low in high severity burn areas, what management strategies are viable for these areas?

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