Post-fire Forest Restoration Considerations

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Plan for these landscapes to burn again
Lessons from the 2000 Storrie and 2012 Chips Fires

Similar trends in the 2008 BTU Complex and the 2018 Camp Fire
Consider seed sources & resilience of natural regeneration

Collins and Roller. 2013. Early forest dynamics in stand replacing fire patches in the northern Sierra Nevada, California, USA. Landscape Ecol 28: 1801–13

Post-fire landscapes are dynamic
What grows up eventually comes down


Consider development of fuel profiles over time

Observations from the 2007 Antelope Complex Fire

Restoration actions can either disrupt or perpetuate post-disturbance homogeneity


Opportunity to diversify reforestation tactics: Manipulating planting density and arrangements

Arrangement influence on pattern

Square Spaced  Wide spaced Clusters

50% Mortality

Additional Factors to Diversify:
- Density (planted trees/acre)
- Species
- Seed Lots & Elevations
- Seed Zones
How can we promote heterogeneity following large, severe disturbances?

“Planting seedlings of multiple species in clusters (2–3 seedlings over an 5 m × 5 m area) at wide and variable spacing (7–15 m) would produce higher spatial heterogeneity versus the standard grid pattern, and require less maintenance (e.g., pre-commercial thinning) as the forest stands develop (Tompkins 2007).”

From Stephens, Millar, and Collins. 2010 in Environmental Research Letters

Boulder Fire 2007: 6 months after the fire 2016: 10 years after the fire

An example from the 2012 Chips Fire
Consider competition and development of live fuel profiles
What’s the probability the site may re-burn in 25 years?

Long-term need for maintenance of reforestation investment

> 15 ft height difference over 25 yrs
What scientists predict the present → future holds:

- “Quantitative Evidence for Increasing Forest Fire Severity in the Sierra Nevada”
  Miller et al 2009
- “Temperate forest health in an era of emerging megadisturbance”
  Millar and Stephenson 2015
- “Widespread Increase of Tree Mortality Rates in the Western United States”
  van Mantgem et al 2009
- “Long-term climate and competition explain forest mortality patterns under extreme drought”
  Young et al 2017
- “Darcy’s law predicts widespread forest mortality under climate warming”
  McDowell and Allen 2015
- “Megafires: an emerging threat to old-forest species”
  Jones et al 2016
What are climate smart species?
What are climate smart species?
How to maintain?

- Targeted herbivory
- Prescribed fire
Post-fire Landscape Portfolio:
The legacy we leave the next generation of resource managers should be diverse and manage interests, values, risks, and returns.