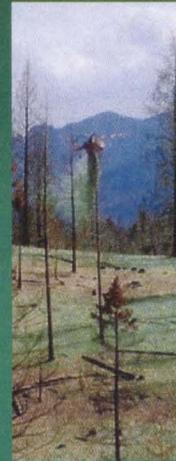


Short-term effects of fire and postfire rehabilitation on the forest understory: a case study from the Colorado Front Range

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Land managers often rehabilitate portions of recently burned areas



- Rehabilitation treatments often include:
 - Seeding
 - Mulching
 - Contour felling
 - Soil scarification
- Main objective: to reduce erosion, so that the impact of the fire on streams, roads, and other values at risk can be minimized

But how do these postfire rehabilitation treatments affect the forest understory?

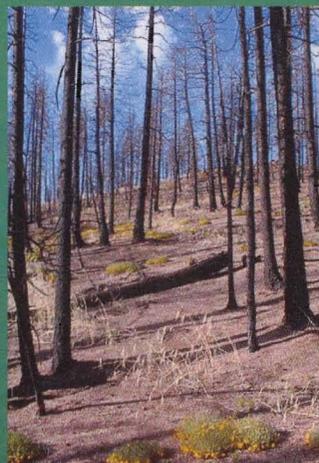
Research Objectives:

To assess the effects of fire and post-fire rehabilitation on understory species composition and cover

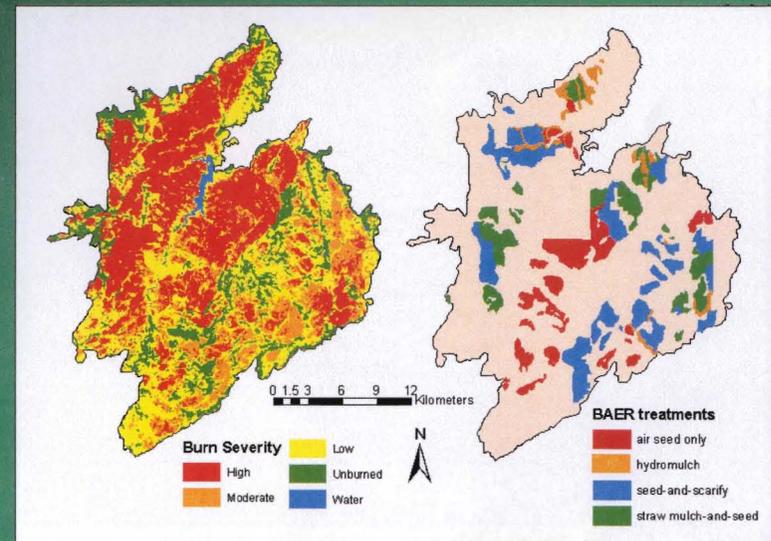
We compare the response of:

- Natives
- Non-natives
- Individual species of concern

in unburned, burned, and burned+rehabilitated areas



Hayman Fire



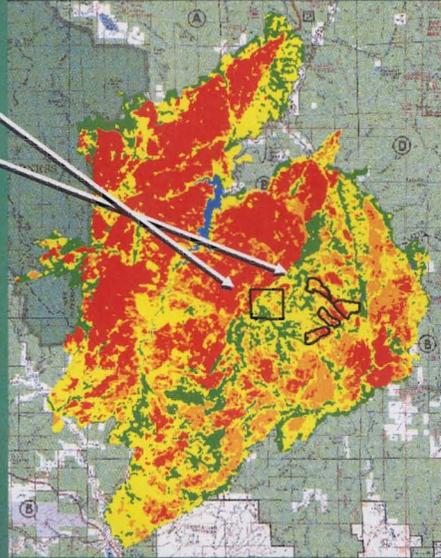
Methods: Study Areas

Burn-only: Turkey Creek

Burn+rehab: Sheep Nose

- Scarify/ hand seed treatment in 2002
- Scarification done by ATVs and by hand
- Seed treatment: certified weed-free mixture of 70% barley, 30% triticale
- Seed spread: 80 kg/ha, or 280 seeds/ m²

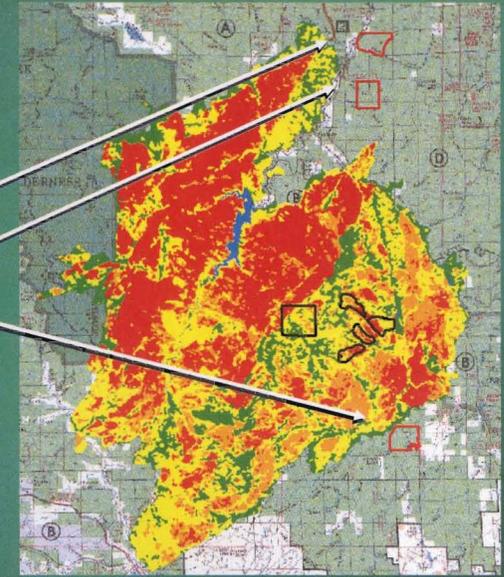
(Robichaud et al 2003)



Methods: Study Areas

Reference:

- Unburned
 - Sugar Creek
 - Hatch Gulch
 - Manchester Cr.



Methods

For all study areas:

- 15 plots per study area
- Plots stratified by topographic position

For all plots:

- Plot size: 20 x 50m (1000 m²)
- 1 m², 10 m², and 100 m² subplots nested within it
- Complete understory inventory in each subplot
- Cover estimates by species in 1 m² subplots



Methods: total species richness, cover

- Species richness per plot: tallied the number of species in each plot (for natives and non-natives)
- Percent cover per plot: averaged cover across 1-m² subplots (for natives and non-natives)

Methods: individual species analysis

Used individual plant frequency and cover data to classify each understory plant of interest:

1. Tolerant: the species was unaffected by the fire +/- the postfire rehabilitation treatment
2. Stimulated: the species was positively affected
3. Sensitive: the species was negatively affected

Post-fire rehabilitation treatment

- Seeded grass species were not found in any of the reference plots
- Seeded grasses were present in the burn+rehab plots and in the burn-only plots (even though burn-only plots were not intentionally seeded)
- Of the two seeded species used, only triticale established in our plots
- Triticale frequency and cover were marginally higher in burn+rehab plots than in burn-only plots
- However, they were low in both cases
 - Frequency: <10% of the subplots (1 m² each)
 - Cover: <1%

Post-fire rehabilitation treatment

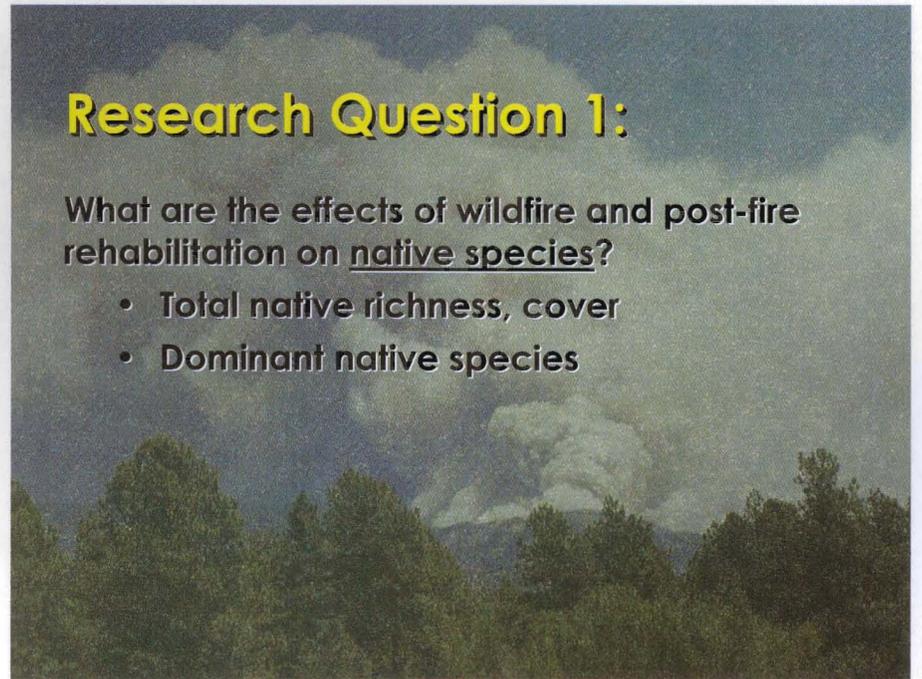
- No apparent signs of the post-fire scarification treatment in 2004
- Consequently, the intensity of scarification cannot be determined



Research Question 1:

What are the effects of wildfire and post-fire rehabilitation on native species?

- Total native richness, cover
- Dominant native species



Bottom line: natives

Native richness, cover were not affected by fire or by fire+rehab



Bottom line: natives

- 13 dominant native species identified
- Most native dominants were tolerant of the fire and fire+rehab, though stimulated & sensitive species were also found
- Of the stimulated & sensitive species, most were affected by the fire, but not additionally affected by the rehab treatment



Research Question 2:

What are the effects of wildfire and post-fire rehabilitation on non-native invaders?

- Total non-native richness, cover
- Dominant non-native species



Bottom line: non-natives

Non-native richness, cover were positively affected by fire, but additional effects due to rehab treatment were not found



Bottom line: non-natives

- Mullein was the only dominant non-native, and was stimulated by fire but not by rehab treatment
- Contamination of seed with weedy species is often a concern, but did not seem to be a problem here



Research Question 3:

What are the effects of wildfire and post-fire rehabilitation on individual species of concern?

- The two main food plants for Pawnee montane skipper (threatened butterfly)
- Threatened, rare, sensitive plants
- Noxious weeds



Bottom line: species of concern



- Pawnee montane skipper food plants: blue grama and dotted blazing star
 - Little/ no effect of fire or fire+rehab
- Blue grama was tolerant of fire but sensitive to fire+rehab, but its ability to sprout may allow it to meet or exceed pre-burn levels
- Dotted blazing star was tolerant of fire and fire+rehab



Bottom line: species of concern

- Threatened, endangered, rare, or sensitive plants: none found
- 3 plants considered to be at moderate risk for extinction:
 - Rocky Mtn Indian parsley (*Aletes anisatus*)
 - Jeweled blazingstar (*Mentzelia speciosa*)
 - Front Range milkvetch (*Astragalus sparsiflorus*)
- All were tolerant of fire and fire+rehab



Bottom line: species of concern

- Noxious weeds: 6 found
 - *Bromus tectorum* (cheatgrass)
 - *Carduus nutans* (musk thistle)
 - *Cirsium arvense* (Canadian thistle)
 - *Hypericum perforatum* (common St. Johnswort)
 - *Linaria vulgaris* (butter and eggs)
 - *Verbascum thapsus* (common mullein)
- All were tolerant of fire and fire+rehab, except for mullein: mullein was stimulated by fire but not by fire+rehab

What does all this mean?

Conclusions/ recommendations:

- Hayman Fire had some short-term effects on plant community as a whole, and on individual species
- Seed-and-scarify rehab treatment had little additional effect
- However, rehab treatment intensity was low (Lee MacDonald, pers comm: treatment did not affect erosion)

What does all this mean?

Conclusions/ recommendations:

- If seed-and-scarify rehab treatment is continued, effects on erosion and on forest understory must be monitored
- This will allow us to determine the relationship between rehab treatment success and understory response

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