

Rocky Mountain Research Station Science You Can Use *(in 5 minutes)*

January 2018



Building Resilience in Colorado Front Range Forests for the Future

In Colorado, the dry mixed-conifer forests of the Front Range have undergone a sea-change. Back in the mid-1800s, Front Range forests were more open and grassy, and stands were two to three times less dense. There were trees of all size classes in a “groupy-clumpy” arrangement, where the groups of trees were separated by openings of an acre or less. At the landscape scale, there was a rich mosaic with uneven-aged, mature forest maintained by low-severity fire intermixed with early- and mid-successional forest patches and openings created by high-severity fire. Over time, however, these forests have become dense and crowded with smaller trees, increasing their vulnerability to large wildfires, insect epidemics and disease. Approximately 1.5 million acres across the Front Range have been identified

KEY FINDINGS

- Historical stand reconstruction shows that the ponderosa and dry mixed-conifer forests of Colorado's Front Range were more open and grassy than they are today, with a very variable mix of tree sizes that were often clumped together.
- Much of the Front Range is characterized by a mixed-severity fire regime, with low, moderate, and high-severity fire effects all having occurred historically, based on factors such as elevation and slope.
- The forest structure and composition of the Front Range is shaped at multiple scales by interactions among topography, natural disturbances such as fire, and forest developmental processes. This serves as a foundation for identifying priority areas for treatment and designing restoration projects across scales.



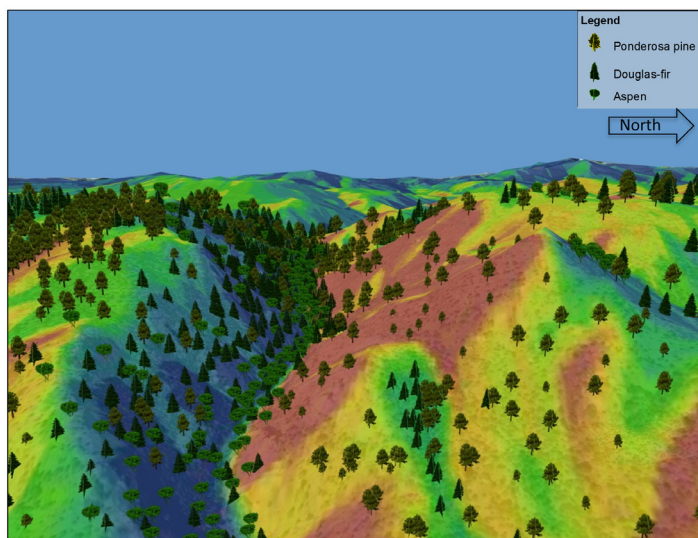
Ponderosa pine woodland in the Roosevelt National Forest near Red Feather Lakes, CO, illustrating the more open, low-density stand structure more typical of Front Range forests in the mid 1800s. Photo credit: Peter Brown.

as needing restoration to mitigate wildfire hazard, protect communities, and restore forest structure and composition.

A recently-published General Technical Report (GTR) “[Principles and Practices for the Restoration of Ponderosa Pine and Dry Mixed-Conifer Forests of the Colorado Front Range](#)” (RMRS-GTR-373) produced by Rocky Mountain Research Station scientists and a wide range of collaborators from federal agencies, environmental non-profits, and academia, provides a synthesis of information specific to restoring these forests that can be used by land managers far and wide. By using historical forest conditions to help guide the “desired conditions” of these forests, the GTR helps managers to understand where restoration should be done and provides an overarching framework for how to implement place-based approaches to forest restoration based on information specific to the Front Range. The guide is being released with a companion document, [Visualization of Heterogeneous Forest Structures Following Treatment in the Southern Rocky Mountains](#), (RMRS-GTR-365) which allows users to “see” what the recommended treatments may look like at the stand level.

So how does this guide approach restoration?

This GTR begins by describing the landscape-scale set of principles and concepts for restoration of Front



This figure shows the variation in forest structure on the Colorado Front Range, which reflects slope, aspect, and underlying moisture gradients. For example, south-facing slopes are characterized by open, ponderosa pine woodlands with trees occurring both in groups and as scattered individuals (red). Forest density increases in areas with higher moisture, such as north-facing slopes (blue) (figure by J. Feinstein and R. Addington).

FURTHER READING

Addington, Robert N.; Aplet, Gregory H.; Battaglia, Mike A.; Briggs, Jennifer S.; Brown, Peter M.; Cheng, Antony S.; Dickinson, Yvette; Feinstein, Jonas A.; Pelz, Kristen A.; Regan, Claudia M.; Thinnies, Jim; Truex, Rick; Fornwalt, Paula J.; Gannon, Benjamin; Julian, Chad W.; Underhill, Jeffrey L.; Wolk, Brett. 2018. [Principles and practices for the restoration of ponderosa pine and dry mixed-conifer forests of the Colorado Front Range](#). RMRS-GTR-373. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 121 p.

Tinkham, Wade T.; Dickinson, Yvette; Hoffman, Chad M.; Battaglia, Mike A.; Ex, Seth; Underhill, Jeffrey. 2017. [Visualization of heterogeneous forest structures following treatment in the southern Rocky Mountains](#). Gen. Tech. Rep. RMRS-GTR-365. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 72 p.

Range forests, and then focuses down to the stand level where the silviculturalists or field-level forest managers are operating, providing descriptions of what you would do in each area that would match the ecological attributes of fire-adapted ponderosa pine and the site attributes. The hoped-for outcomes of the management recommendations in the GTR are reduction in forest densities and surface and crown fuels, enhancement of spatial heterogeneity across scales, and retention of drought-and fire-tolerant species, old trees, and structures important for wildlife. “The idea is not necessarily to use treatments to mimic what a fire would do on the landscape. What we want to do is to prepare the landscape to receive fire in a way that then preserves future options for forest recovery and sustainability by limiting the size of high severity burn patches,” explains one of the authors, Tony Cheng of the Colorado Forest Restoration Institute. While restoration treatments recommended by the guide are not expected to recreate the 1860s, the goal is that pushing the stand structure of these forests back towards past conditions, they will be more resilient to the challenges of the future.

Rocky Mountain Research Station researchers work at the forefront of science to improve the health and use of our Nation’s forests and grasslands. More information about Forest Service research in the Rocky Mountain Region can be found here: <https://www.fs.fed.us/rmrs/>



Subscribe online to future Science You Can Use editions at <https://www.fs.fed.us/rmrs/science-you-can-use-bulletin>

