



## Uncompahgre Plateau Collaborative Forest Landscape Restoration Program: Ecological Impacts

### CFRI-1806

Since 2009, the Colorado Forest Restoration Institute has been analyzing and reporting on the data collected by the citizen science “forest forensics” effort, Colorado State University graduate student projects, and the Forestry Internship Program to understand the ecological impacts of forest restoration treatments on the Uncompahgre Plateau as part of the CFRLP. This information is an important part of the collaborative process, and is crucial for adaptive management discussions and decision making. Additionally, the inclusion of monitoring and science-based decision making has built trust amongst stakeholders. Some key findings are:

**Treatments have achieved desired conditions, increasing ecological resilience to wildfire, insects and disease, and drought;** these desired conditions were laid out by the collaborative using best available science. Treatments have reduced overall basal area and reduced tree densities and fuel continuity, thus reducing the likelihood of crown fire (Fig. 1, 2 & 3). Desired species, such as ponderosa pine and aspen have been retained, and undesired species such as subalpine fir and spruce species have been reduced (Fig. 1 & 2).

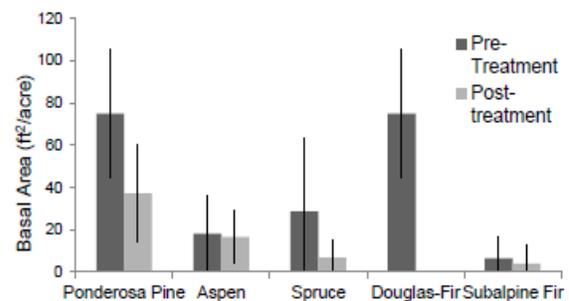


Figure 1. Mean ( $\pm$  standard deviation) of basal area by species before and after mechanical treatment.

**The potential risk of high severity crown fire has been reduced.** Fire models based on monitoring data from CFLR projects indicate wind speeds necessary to sustain canopy fire increased, suggesting active crown fire is much less likely in these stands now than before treatment (Fig. 3).

### Landscape-level fuel reduction benefits wildfire mitigation and containment. A Wildland Fire

Management Risk and Cost Analysis (R-CAT) was completed on the Uncompahgre Plateau to assess the effectiveness of treatments to reduce future fire suppression costs and to allow more use of natural ignitions to achieve desired



Figure 2: photos of the pre- (at left) and post-treatment (at right) conditions of a monitored stand. Ponderosa pine and aspen were retained, while fire intolerant species such as fir and spruce were reduced, creating conditions that will increase vegetation diversity on the forest floor.

vegetative outcomes. CFLR treatments have directly or indirectly influenced ~50% of the 550,000 acres on the Plateau, increasing fire managers' ability to implement confinement or containment strategies to achieve additional resource benefits. If such confine/contain strategies are used, R-CAT projects a 20-50% reduction in firefighting expenditures over a 5-year period. Since 2010, resource benefit confine/contain strategies have been used on approximately one fire per year, safely treating 4,000-6,000 acres.

**Treatments have reduced tree canopy cover and increased meadows, enhancing resilience across the landscape** (Figures 4 & 5). Reducing tree density and increasing the complexity of tree spatial patterns of forests through management can impact a number of important processes such as temperature, moisture, light, nutrient availability, and fire. These changes can promote re-establishment of diverse grass and forb communities, and contribute to ecosystem diversity and function such as habitat for birds and wildlife, plant-pollinator interactions, fire dynamics, and tree regeneration for the future forest.

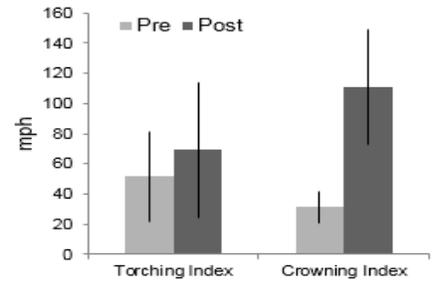
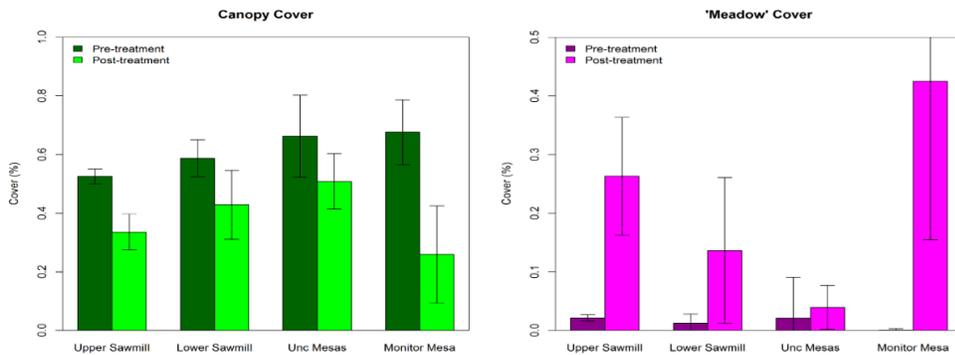
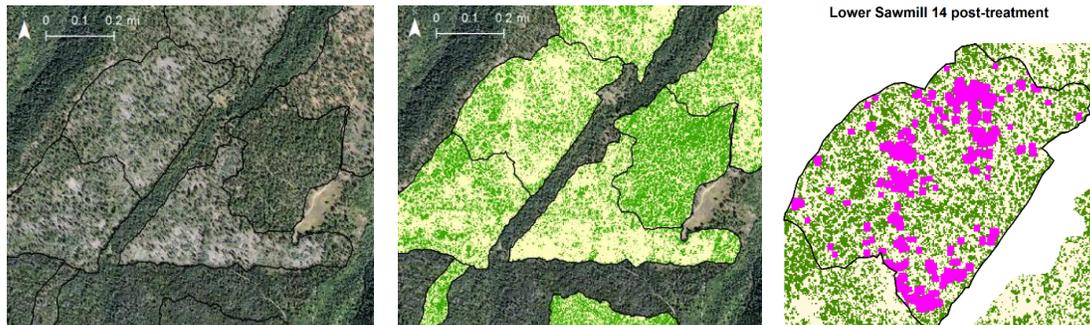


Figure 3. Mean ( $\pm$  standard deviation) Torching and Crowning Indices before and after treatment. Torching and Crowning indices are the wind speeds needed to sustain canopy fire; the higher the wind speed, the less likely crown fire is to occur. “Torching” is used to describe fire that moves from the surface into the crown of a single tree. Fire that moves from tree crown to tree crown is called “crowning” fire.



**Figure 4.** Comparison of pre- and post-treatment canopy cover (left) and meadow cover (right) for four CFLRP treatments. Results presented as simple averages within delineated units for each treatment. Error bars represent  $\pm 1$  standard deviation of the mean.



**Figure 5.** Left: Post-treatment (2015) imagery of Lower Sawmill from National Aerial Imagery Program (NAIP) overlaid with CFLRP treatment boundaries. Center: Classified map illustrating forest pattern following restoration treatments. Green=canopy, Yellow=opening. Right: Classified map illustrating delineation of “mini-meadows” (openings with > 80 ft diameter). Green = canopy, Yellow = opening, Magenta = meadow. Treatment unit in right panel corresponds to the northwestern most unit in the left and center panels.