# THE SCIENCE OF FUEL TREATMENTS

**The Joint Fire Science Program has funded more than 100 studies since 1998 to evaluate the underlying scientific basis and effectiveness of fuel treatments throughout the United States.**

## Studies Show Reduced Rates of Fire Intensity and Other Benefits

High fuel loads can significantly contribute to the intensity and severity of fires. Fuels include plant material, such as leaves, bark, needles, branches, and vegetation.

Land managers use various methods to reduce fuel levels. The two most common fuel treatment methods include forest thinning and prescribed fire. The pace of implementing such fuel treatments has increased over the last several decades. Scientific studies of fuel treatments supported by the Joint Fire Science Program (JFSP) highlight significant findings on the effectiveness of these treatments in various fuel types.

### Fuel Treatment Findings from JFSP Studies

- Appropriately designed fuel treatments substantially reduce fire intensity and detrimental ecological effects. In forest ecosystems that are adapted to frequent, low intensity fires, the combination of tree thinning followed by the regular use of prescribed fire are most effective.
- Fuel treatments can improve wildlife habitat, increase biodiversity, and increase forage production when they are designed with these considerations in mind.
- Not all wildfires have negative impacts. A wildfire that burns under specific conditions can be an effective surrogate for a fuel treatment.

JOINT FIRE SCIENCE PROGRAM

**RESEARCH SUPPORTING SOUND DECISIONS**

The JFSP provides funding and science delivery for scientific studies associated with managing wildland fire, fuels, and fire-impacted ecosystems to respond to emerging needs of managers, practitioners, and policymakers from local to national levels.

### Findings Specific to the Southeast U.S.

- Prescribed fire in the Southeast reduces the likelihood of ignitions that result in wildfires and/or reduces the intensity or amount of area affected. The generalization of this finding requires study in additional regions and ecosystems.
- Modeling studies and some empirical studies in the Southeast show that the application of fuel treatments to a portion of a landscape can reduce the likelihood of wildfires starting and spreading across a broad area.

## Real-World Results of Fuel Treatment Implementation

The following examples of JFSP-funded research results show how planning and implementing fuel treatments and wildfire management strategies effectively reduce the risk and occurrence of high severity wildfire.

**Tripod Complex Fire:** When the 2006 Tripod Complex Fire in Washington spread through untreated areas and areas treated with thinning only, it killed most of the trees in its path. However, in areas treated with both thinning and recent prescribed burning of surface fuels, most of the trees survived.

**Appalachian Mountains:** Following prescribed fires in upland hardwood forests in the Appalachian Mountains, small mammal and bird communities were either unaffected by the treatment or showed increases in abundance and number of species. As a result of this 2001 study and similar studies, fire managers increased the use of prescribed fire in the Appalachian region the last couple of decades.

**Patch-Burn Grazing:** Rotations of prescribed fire and grazing, or "patch-burn grazing," in grasslands can enhance biodiversity, reduce wildfire suppression costs, and improve livestock production. As a result of this and similar studies, patch-burn grazing is commonly practiced worldwide.

**Miller Fire:** The 2011 Miller Fire in the Gila Wilderness in New Mexico was allowed to spread with minimal suppression efforts. This fire produced beneficial effects by reducing fuels and limiting the spread of subsequent wildfires. Studies such as this, which show the beneficial effects of wildfire burning under moderate conditions, have led fire managers to adopt fire suppression strategies that allow for the spread of wildfire under certain conditions.

### Questions for Future Studies

The current understanding of fuel treatments is based on experiments conducted at much smaller scales than the size of many high intensity wildfires. In other words, experiments range from hundreds to thousands of acres, whereas wildfires often reach tens of thousands to hundreds of thousands of acres. Future fuel treatment research should apply directly to larger, landscape-scale fires.

Additional high-priority research includes:

- The relationship between proactive fuel treatments and avoidance of long-term costs and impacts on ecosystem service values.
- The evaluation of landscape fuel treatment prioritization strategies and factors that allow for successful use of wildfire to reduce fuels and provide natural resource benefits.

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