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# Relationship between stand-replacing fire and stand age in subalpine forests

Why do fires in subalpine forests severely burn some areas but not the adjoining areas?

Is there a significant relationship between the age of a subalpine forest and the likelihood that it will burn in a stand-replacing fire?

Subalpine forests often comprise trees of a certain age that germinated after an earlier fire. A fire that kills most of the trees, and is replaced by new trees, is called a stand-replacing fire. Stand-replacing fires cause immediate long-term changes that affect soil chemistry, watersheds, wildlife, recreation, and livestock and timber uses.

Most forest fire research has focused on forests that historically had surface fires, not stand-replacing fires.

Stand-replacing fires usually create a mosaic of burned and unburned forest.

Uncertainty exists as to the relative importance of stand-replacing fire and forest age in determining when stand-replacing fires occur.



Effects of Trampas fire

## Study site

The Pecos Wilderness is a Congressionally designated wilderness area on the Santa Fe and Carson National Forests in northern New Mexico. The wilderness contains the headwaters of the Pecos River, the primary water source for much of eastern New Mexico and west Texas. In June, 2002, lightning started the Trampas fire in the Pecos Wilderness. The final fire perimeter included approximately 5,000 acres of subalpine and upper mixed conifer forest. The 5,000 acres include both burned and unburned areas with clearly delineated boundaries, providing an opportunity to pursue a case study of the relationship between forest age and fire behavior.

Extracting a core to determine tree age



## Why is this important?

Watershed managers, fishery managers, and downstream water users need information on how stand-replacing fires might affect the headwaters of western rivers, most of which are in subalpine forests. Fire managers need to know how the attributes of a forest affect fire spread, whether during a wildland fire or when planning prescribed burns. Fire prevention officials need to know if fuel reduction is effective for reducing the likelihood of stand-replacing fire in subalpine forests.

Ecologists try to decipher the relationships among the factors that define forests, including the trees and physical and biological influences on growth and mortality. This study is revealing that subalpine forests have surface fire and understory burns as well as stand-replacing fire, which affects the interpretation of the existing age structure.



Did the fire stop at this age boundary by chance or is this a predictable occurrence?

## Methods

In the summer of 2004, plots were located throughout the fire area according to a systematic random sampling design. Plots were placed in burned areas and at the common boundaries of burned and unburned patches. The largest trees at each site were cored to determine their age; additional information was collected on the topographic setting and the number, diameter, and species of trees in each plot. These data will be analyzed to determine if there are characteristics that consistently distinguish forest stands that had stand-replacing fire from those that did not.