

# How does using prescribed burns as a forest management technique impact ecosystem health in Mark Twain National Forest?

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## INTRODUCTION/BACKGROUND

### Background

- Mark Twain National Forest (MTNF) in Rolla, MO is primarily composed of eastern upland oak hardwood and southern (loblolly) pine forests, as well as grassy woodlands and savannas (Forest Niche Statement).
- MTNF has been using prescribed fires as a management tool since the 1960s (Prescribed Burn Program..., 2020).
- Fire influences various ecosystem processes, like controlling insect and disease populations, maintaining biological diversity, recycling of nutrients, reducing biomass, and regulating plant succession and wildlife habitat (Rideout, 2003).
- Some species, such as the loblolly pine, thrive on soil that has recently been subjected to fire (Carey, 1992).

### Major Problem #1

- Ecosystems such as the southern pine forests of MTNF rely on fire to thrive, and forests across the world have been suffering due to exclusion of fire over the past 100 years (Rideout, 2003).

### Major Problem #2

- Large wildfires have been increasing in frequency and intensity as a result of both human limitation of fire and land use (Rideout, 2003).

### Made to Burn

Some American ecosystems are adapted to burn frequently

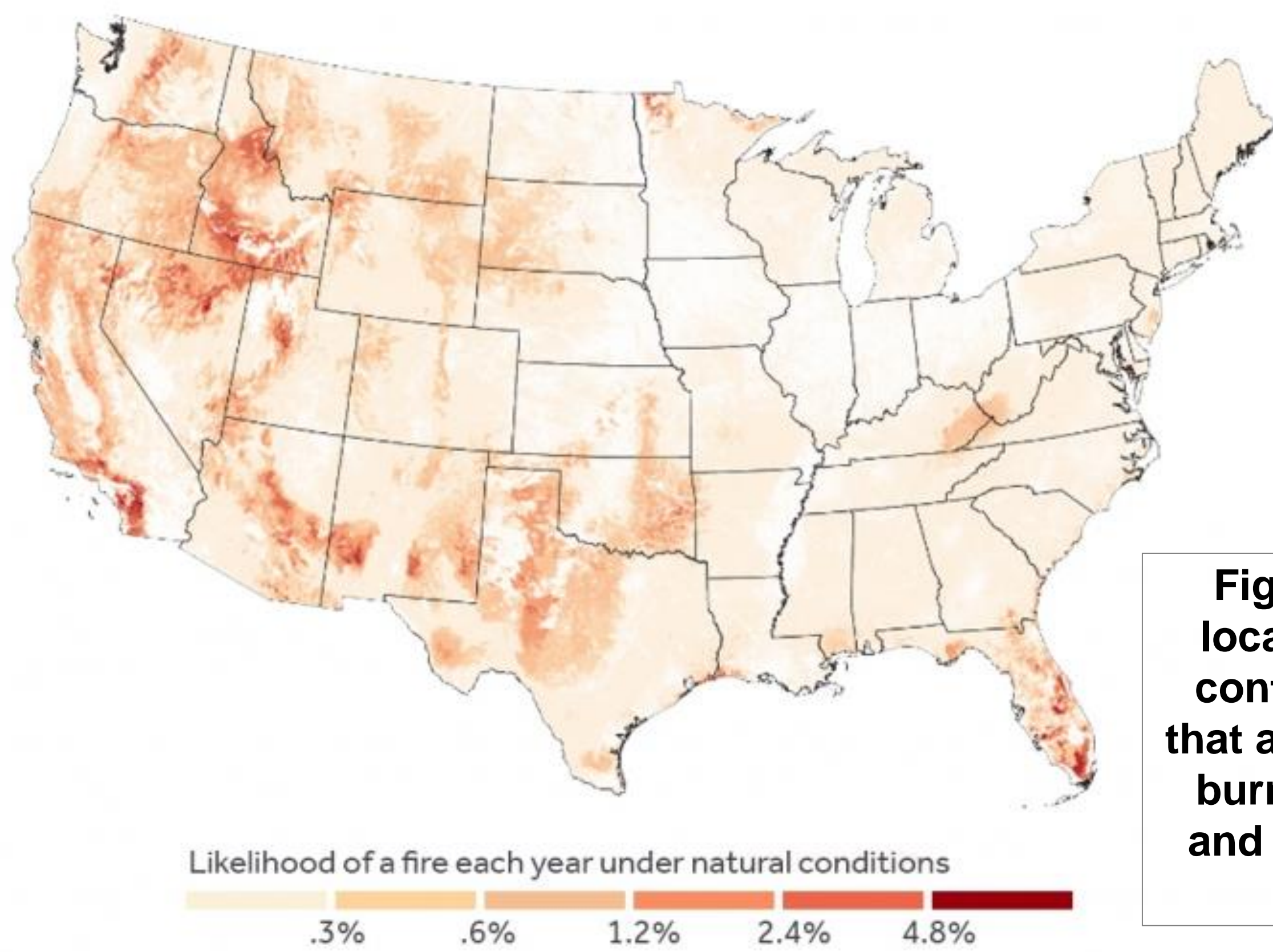
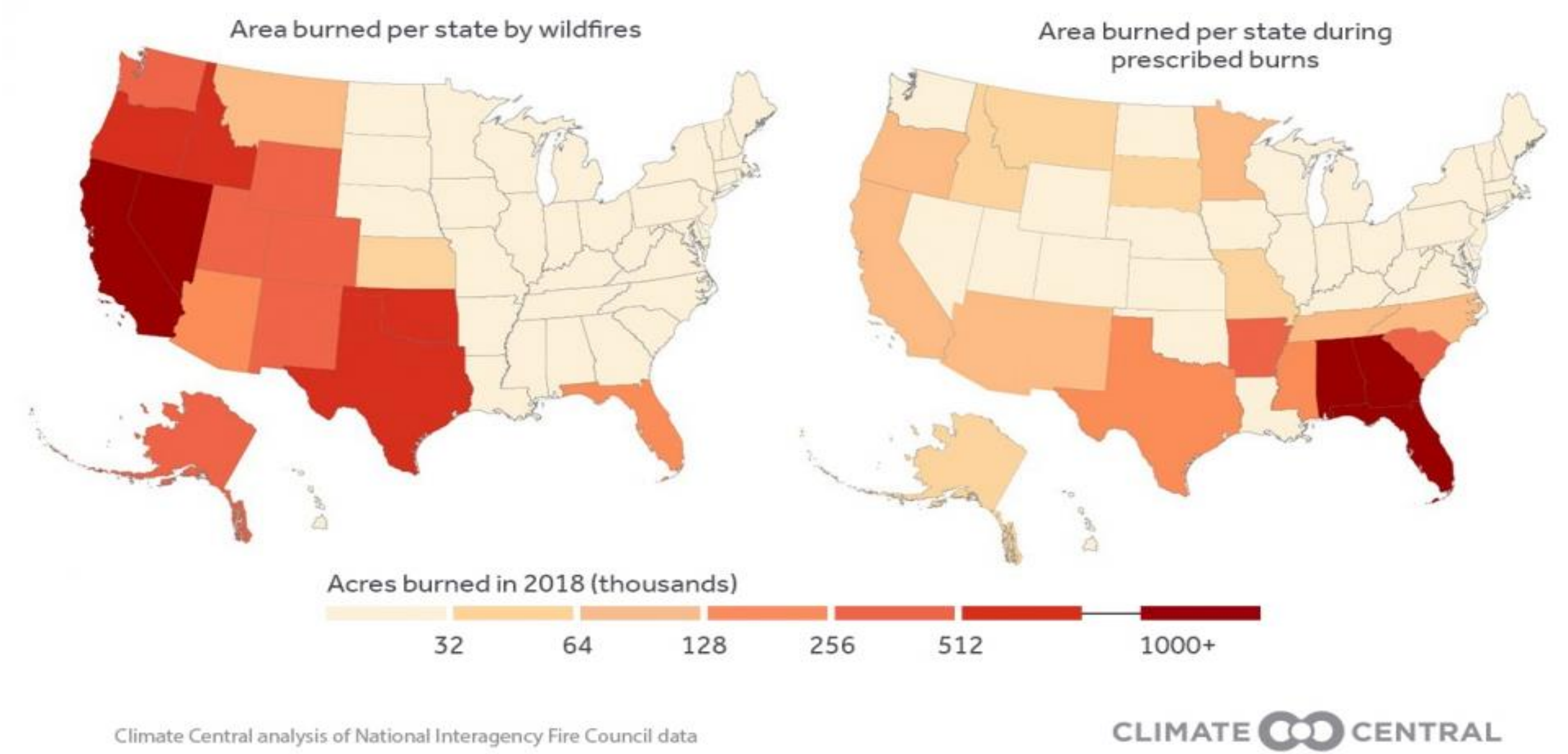


Fig. 1. Shows locations in the continental U.S. that are adapted to burn frequently, and even benefit from it.

Adapted from modeling findings by Mark Finney and Karen Short of the Missoula Fire Sciences Lab and U.S. Forest Service.

CLIMATE CENTRAL

## Wildfires vs. Prescribed Burns



## METHODS

Fig. 3. Shows the devastating effects of wildfires, versus the comparatively small controlled effects of prescribed burns. Also note the correlation between Fig. 1 and Fig. 3: the western portion of the states and the southern portion experienced more fires overall, which correlates with the ecosystems that have adapted to burn.

### Experimental Design:

We will conduct a field experiment in Mark Twain National Forest, measuring 3 plots of southern (loblolly) pine forest and their response to prescribed burning techniques. More specifically, in this study, underbrush will be burned as it often acts as fuel for wildfires when left to accumulate. There will also be 3 control groups of southern pine forest, each with the underbrush left untouched. The frequency and severity of future forest fires will be measured in both forests over time, and then compared to see how beneficial prescribed underbrush burnings are in the management and prevention of these disasters.

### Intended Analysis:

We will be conducting a t-test to compare the differences and similarities between two populations, as the dependent variable (the frequency of wildfires in southern pine forests) is continuous and the independent variable (type of prescribed underbrush burnings) is categorical. The results from the t-test will tell us if prescribed underbrush burnings reduce the frequency and severity of wild forest fires, based on the differences in data from the group with prescriptively burned underbrush and data from the unburned control group.

## OBJECTIVES

### Objectives:

- To measure the effectiveness of prescribed burns on loblolly pine forests.

### Hypotheses:

- We hypothesize that prescribed underbrush burnings will decrease the frequency and intensity of underbrush-related wildfires in the southern (loblolly) pine forests, which will in turn promote ecosystem health and tolerance.

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