



## Fire Management Plan Fire Monitoring

### FIRE MONITORING AT GRAND CANYON

Monitoring our fire management activities is important to the success of our fire program.



Why do we monitor?

- to document basic information about our fire management activities
- to detect trends in fire effects
- to ensure that fire and resource management objectives are being met
- to allow us to practice adaptive management (see right)

What do we monitor?

- fire behavior during prescribed fires and during wildland fire use
- local effects of fire on vegetation using permanently installed plots
- widespread effects of fire through burn severity analysis

Our monitoring program will be modified as needed to accommodate any new information needs prompted by the new fire management plan.

### FIRE EFFECTS MONITORING PLOTS

In 1990, Grand Canyon began installing permanent plots to measure the short-term and long-term effects of fire on vegetation. We currently have 146 such plots in place throughout the forested areas of the park. The plots are examined immediately before and after prescribed fires, and then are revisited 1, 2, 5, 10, and 20 years later. We collect data on trees, shrubs, herbaceous plants, and fuel load, and use this information in the adaptive management process to assess ecological effects and develop improvements in future fire management practices.



The photos above document changes in a monitoring plot in ponderosa pine forest. From left to right, the photos show the plot immediately before a prescribed fire, one year after the fire, and two years after the fire.

### BURN SEVERITY ANALYSIS

The NPS uses satellite imagery to analyze burn severity for large fires.

This allows us to see which portions of a fire burned at low, moderate, or high intensity, and how those areas are distributed. Burn severity ratings are defined as follows:

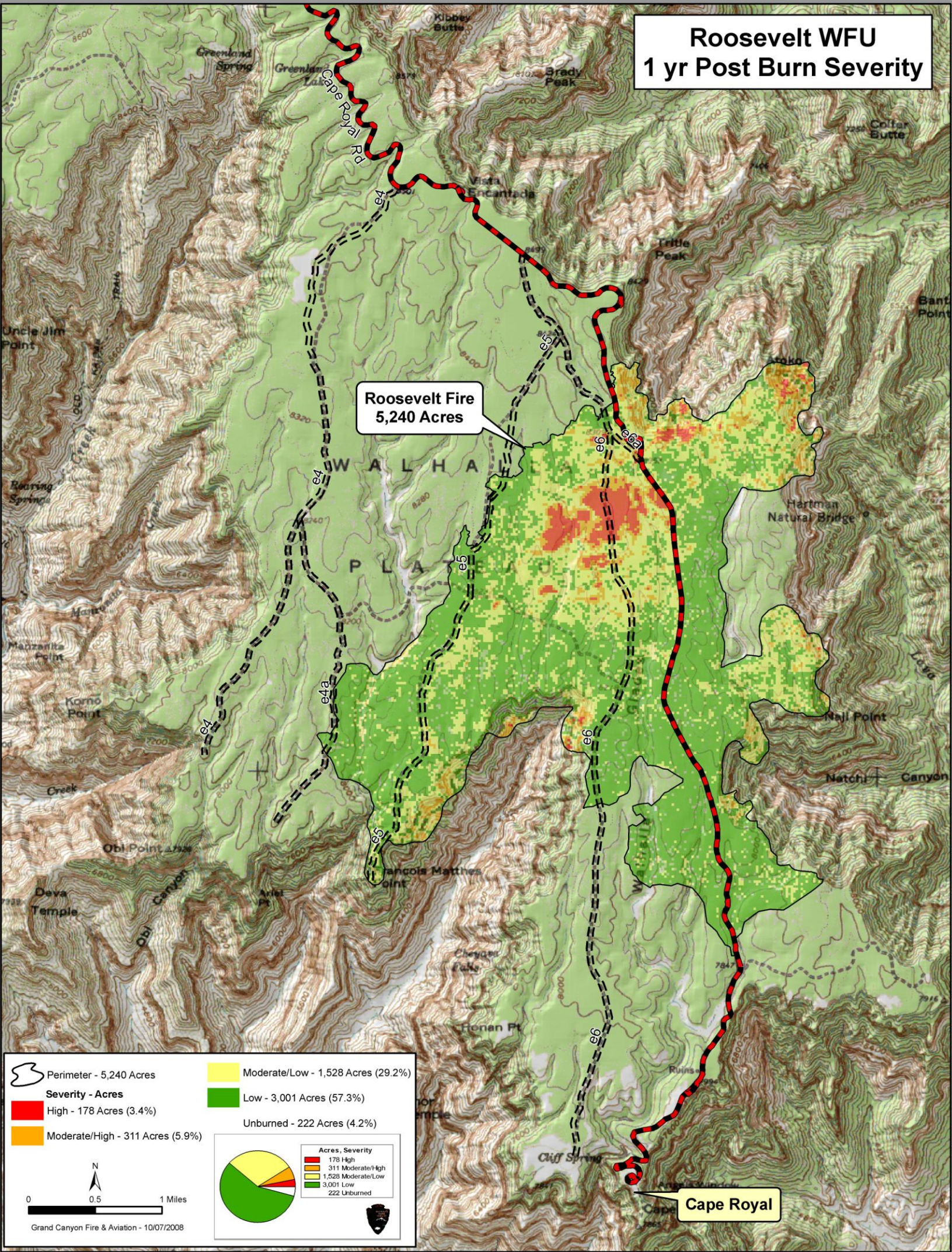
**Unburned:** No evidence of fire.

**Low:** Fire did not kill or alter the dominant vegetation. Small, unburned patches remain, and most foliage and twigs remain intact. Some small organic material on the ground was scorched or consumed.

**Low-to-Moderate:** Some foliage and fine twigs were scorched or consumed. Most overstory green vegetation remains, but some overstory trees were killed. Few unburned patches exist. Most fine organic material on the ground was partially consumed.

**Moderate-to-High:** Fire scorched most of the foliage and fine vegetation, and consumed some. Limited green vegetation remains in overstory, but some overstory trees are expected to survive. Some large logs and most woody debris and smaller organic material were consumed.

**High:** Fire killed the above-ground parts of all vegetation, changing the forest structure substantially. All foliage and fine vegetation was consumed, as well as most large logs and other organic material on the ground.



This type of analysis is an excellent tool for helping us evaluate potential effects of the fire on natural and cultural resources.

The example above is from the Roosevelt WFU Fire, which burned on the North Rim in 2007.

### What is Adaptive Management?

It's a management process in which we...



...which allows us to continuously refine and improve our fire management program

### MONITORING DURING FIRES

The firefighter shown in the background photo is collecting information on fire behavior, such as the height of the flames, and the rate of spread of the fire. This type of information is collected for both prescribed fire and wildland fire use, and helps fire managers determine if the fire is progressing in the way they expected.





## Fire Management Plan Fire Ecology



### FIRE ECOLOGY at GRAND CANYON NATIONAL PARK

Grand Canyon National Park contains a great diversity of vegetation types, ranging from desert scrub at the lowest elevations, up through grassland, pinyon-juniper woodland, and ponderosa pine forest, to spruce-fir forest at the highest elevations.

All of these ecosystems are affected by fire to some extent, and it is our goal to restore the natural role of fire wherever possible. Fire plays a larger role in the ecology of some ecosystems than others; it is especially important in the ponderosa pine forests which cover approximately 50,500 acres of the park.

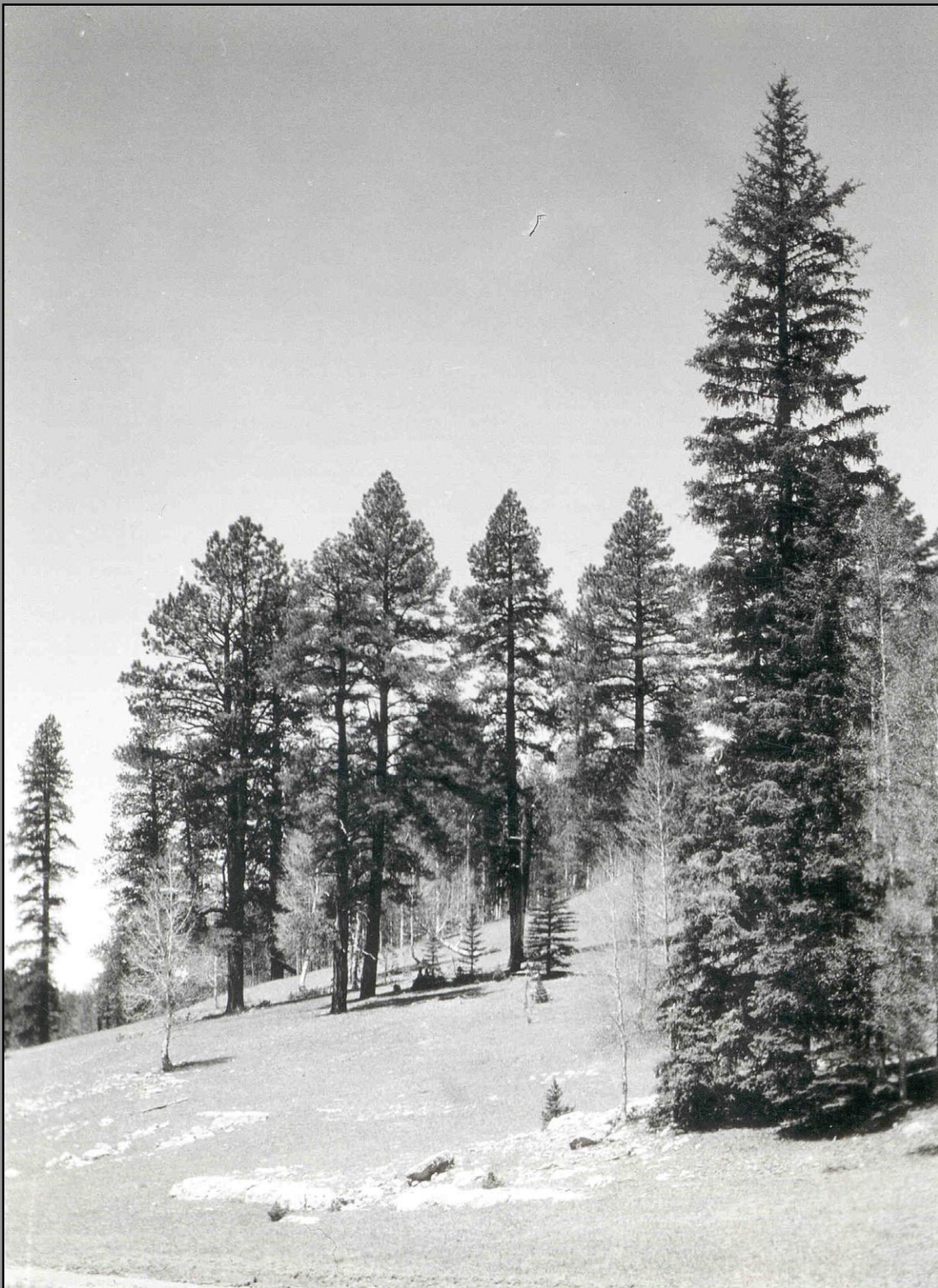
The new fire management plan will address the occurrence of fire in all of these ecosystems, and in many of them, fire will be the primary management tool for ecosystem restoration. Because of this, fire management has the potential to affect a wide range of natural resource management issues and other concerns.

### REFERENCE CONDITIONS

The conditions that existed in Grand Canyon’s many ecosystems prior to Euro-American influences (circa 1880) are important reference points for resource management.

While there is little information available for some ecosystems, there is more about others. Several sets of data, collected both recently and in the past, exist for the forested ecosystems in the park. Natural resource managers recently used this information to assess how the park’s forests have changed from past conditions.

This information will be useful in establishing and refining management goals and objectives for the fire program.



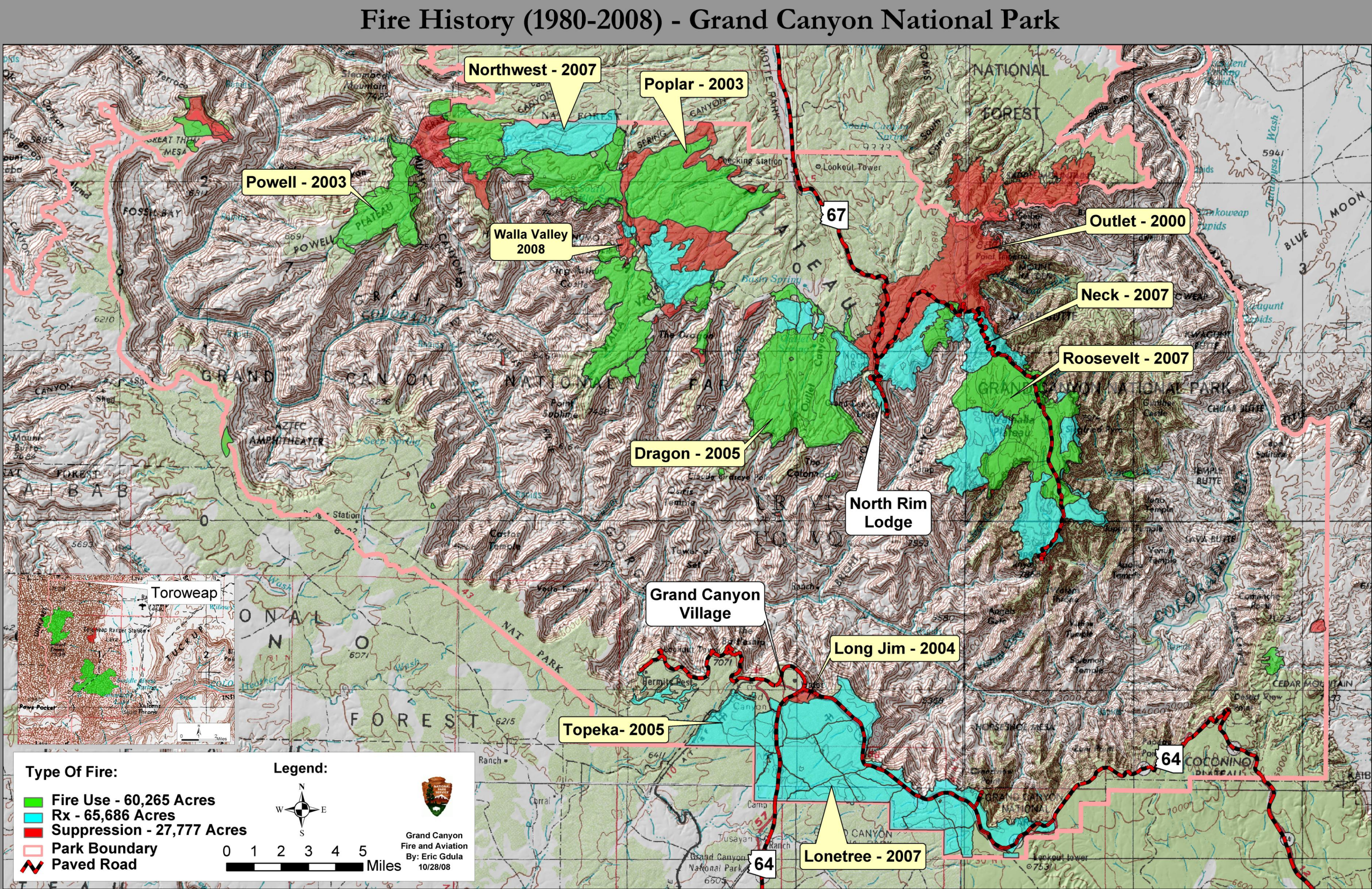
The photo above was taken on the North Rim in 1930; it illustrates the open forest structure thought to be more common in the past. Historical photos like this one can be helpful in describing reference conditions.

### FIRE HISTORY

This fire history map is a useful tool in helping managers understand the patterns of fire across the landscape of the park.

The map to the right displays those fires on the North & South Rims from 1980-2008 that were larger than 100 acres.

Approximately 42% of the acres treated have been with prescribed fire and 39% of the acres were treated with Wildland Fire Use. As you can see prescribed fire is emphasized on the South Rim to protect the Village.



### ECOSYSTEM RESTORATION

It is widely agreed that decades of fire suppression, as well as other human activities such as grazing and logging, have greatly altered our region’s ponderosa pine forests. The absence of frequent fire has lead to unusually high fuel loads and a greatly increased density of smaller trees. These conditions have set the stage for the large, intense wildfires that are becoming increasingly common in the southwest.

While the need to restore more sustainable conditions is clear, opinions differ as to how best to accomplish this. One of the major challenges is achieving a balance between effectively removing dead fuels and dense smaller trees, while simultaneously preserving the largest older trees.

The new fire management plan will be an important component in the park’s approach to this issue.

