

Fire is good. Fire is bad. What exactly we think about fires in nature has changed dramatically over the past century including how to protect and manage the lands susceptible to burns. The Grand Canyon region in Arizona is a perfect example of how fire management practices have changed and adapted as our knowledge of fire ecology grows. Fires in the Grand Canyon not only affect the trees, grasses, and wildlife but also have a major impact on the growing number of people who use the land and the millions of people who rely on its several reservoirs for water. The intersection of all these needs shape modern day fire management but its path to this point took many turns.

The history of fire management in the Grand Canyon is also a reflection of fire management practices in the United States. The American Southwest was burned periodically by the native population, which continued with the first arrival of European settlers. This era of controlled burns did not last and by the early 1900s the Forest Service worked to put out any fires man-made or natural by 10am the next day. This policy would persist on most government managed lands in the Grand Canyon until the late 1960s when the National Park Service began allowing natural fires to burn if weather conditions allowed and prescribed burns, which are fires started and controlled by the parks service to reduce the build up of grasses and brush. This practice was not implemented by the Forest Service until nearly a decade later and even now is still not completely accepted as a means of combating large scale fires and maintaining a healthy ecosystem.

Grand Canyon National Park has five goals with regard to its current fire program. The goals include: 1) Keep park visitors and residents safe, 2) Restore and maintain park ecosystems in a natural resilient condition, 3) Protect the park's natural, cultural, and social resources, 4) Implement a fire program based on the most current and best available scientific information, and 5) Educate, inform, consult, and collaborate with the public. These goals may sound ideal but many questions are raised with regard to their true intentions and feasibility. For example, what is the original base state to which the parks service is restoring? Is it still possible to return the ecosystem to reflect conditions before human intervention? Furthermore, if they seek to implement a program that takes into account the most recent scientific evidence, how do they decide which literature to use given that there has yet to be a consensus on the best approach for fire management within the scientific community? It is is easy to set goals to protect those who visit and live on park land, as well as, keeping the public engaged and informed with the program but outside of dealings with the public it is unclear how effective this program may be.

Regardless of the plans or paths chosen to manage fires, it is clear by studying the different fire regimes in the Grand Canyon that fires occurred naturally and many plants had adapted to them. The Ponderosa Pine, for example, has many adaptations to help it in a fire ecosystem including the loss of needles and branches close to the ground as it grows, and a bark up to four inches thick, which protects the living cambium of the tree. These adaptations prevent the spread of fires by limiting fuel sources and allow the tree to survive prolonged burns. These natural adaptations fail to work though when the frequency of fires in this ecosystem is reduced allowing the build up of dense vegetated undergrowths, which are an excellent fuel for fires. This dense vegetation also allows fires, when they do break out, to travel greater distances since more surface area is covered by a fuel source, and may irreparable damage the trees in their path. It isn't just the Ponderosa Pine at risk to long term damage by infrequent large burns but many other trees inhabiting the different fire regimes of the Grand Canyon such as the Pinyon-Juniper, Conifer, and Aspen. Further understanding how these trees and other wildlife are adapted to fires will be critical in the future for establishing new fire management programs.



Ponderosa Pine (*Pinus ponderosa*)

