



We need to re-introduce fire in fire-adapted ecosystems

What is a fire-adapted ecosystem?

Fire-adapted ecosystems evolved with fire. Many species in these ecosystems are dependent on fire for reproduction and growth. On Colorado's Front Range, species have devised different strategies for dealing with fire.



P. Brown

Resistance Model:

Ponderosa Pine

Ponderosas require full sun, and seedlings grow best in an open forest. As ponderosas age, they develop thick bark and shed lower branches that would give fire a path into the tree crown. A large, healthy ponderosa is very likely to resist fire, and survive a low-intensity blaze.



NPS

Resilience Model:

Lodgepole

Rocky Mountain lodgepole pines house seeds within serotinous cones. Cones are held closed by a resin that melts and releases when exposed to the high temperatures from a fire. The seeds then spill into a sunny, mineral seed bed, and establish and grow together. High-severity stand-replacing crown fire may not be uncharacteristic at all for a lodgepole forest. While the individuals that were present before the fire may not survive, the species is resilient.



M. Chambers

The Bet Hedger:

Aspen

Aspen stands can be resistant to fire, and can even serve as fuel breaks within a burning conifer forest. However, individual trees are very sensitive and not resistant to fire. When aspen overstory is killed, the root system is triggered to produce huge amounts of suckers along the shallow, lateral root system. Aspens are an early successional species that can colonize disturbed ground quickly only to be later replaced by conifers.

Definitions for understanding fire:

Fire severity: a measure of the impacts fire has on an ecosystem (e.g. tree mortality). When impacts on an ecosystem are *severe*, the fire was likely very *intense*.

Fire intensity: a description of the energy released by the fire itself. In fire modeling, "flame length" is a proxy measurement—the higher the flame, the hotter and more *intense* the fire.

What do these adaptations mean for the Front Range?

The Front Range hosts diverse habitat types: grassland, shrubland, ponderosa pine, mixed conifer, aspen, and high-elevation subalpine forests. Combined with different topography and climate, this varied landscape also supports diversity in fire. Fire historically burned at different sizes and intensity—the result was a mosaic of forest patches, where some stands of trees would be completely killed, and others would experience removal of understory and smaller trees only.



This image from the 2012 High Park Fire outside Fort Collins, CO gives a sense of what the “mosaic” effect looks like after fire.



This image from the same fire shows a large patch of forest that has burned at higher severity.

Fire Options on the Front Range

Suppression: Put it out ASAP. For most of the last 150 years, fires have been suppressed on the Front Range. This strategy has resulted in nearly one million acres of dense, uniform forests that are now vulnerable to large and severe wildfires. Fire suppression tactics work best on smaller, lower-intensity fires. By the time a fire becomes a high-intensity crown fire, it's impractical and unsafe to send in firefighters to confront the blaze.

Prescribed Fire: Human ignitions under carefully planned and controlled conditions re-introduce fire on a fire-adapted landscape. When appropriate, prescribed fire can be used in combination with or even in place of traditional mechanical or hand-thinning. Research has suggested that in some watersheds on the Front Range, prescribed fire is the most cost-effective treatment option for reducing built-up fuels over larger areas.

Managed Fire: Natural ignitions in a predefined geographic area are allowed to burn within specific parameters to accomplish ecological objectives and reduce fire risk for neighboring communities. Managed fire (sometimes called wildland fire use) represents a shift away from the model of immediate and unconditional suppression. The recent Decker Fire (2019, Chaffee County, CO) began with a lightning strike in a portion of the Sangre de Cristo Wilderness covered with beetle-kill trees. Managers made the decision to hold off on suppressing this fire where it did not threaten structures or private land, both for ecological benefit and firefighter safety.



Regular mechanical treatments on the Front Range cover a few thousand acres at a time at upwards of \$1,000 an acre. Prescribed fires are more cost effective at treating a larger area—agencies working in Poudre Canyon outside of Fort Collins are stitching together treatments to total 16,000 acres of prescribed burns on multiple ownerships over several years. The managed Decker Fire, by contrast, burned almost 9,000 acres over the course of 46 days and reduces future fire risk for surrounding communities. In collaboration with the Rocky Mountain Research Station and universities, CFRI is working to create tools (including PODs) that will facilitate the use of both prescribed and managed fire to make a difference at a landscape scale.