

WHAT IS FOREST TYPE CONVERSION?

Forest type conversion is the permanent change of forest communities to another dominant vegetation type, like grassland or shrubfield. In some instances, such transitions have occurred following wildfires in the Southwest. Whether or not these changes represent permanent type conversions remains an open question, but new research found that Gambel oak shrubfields can

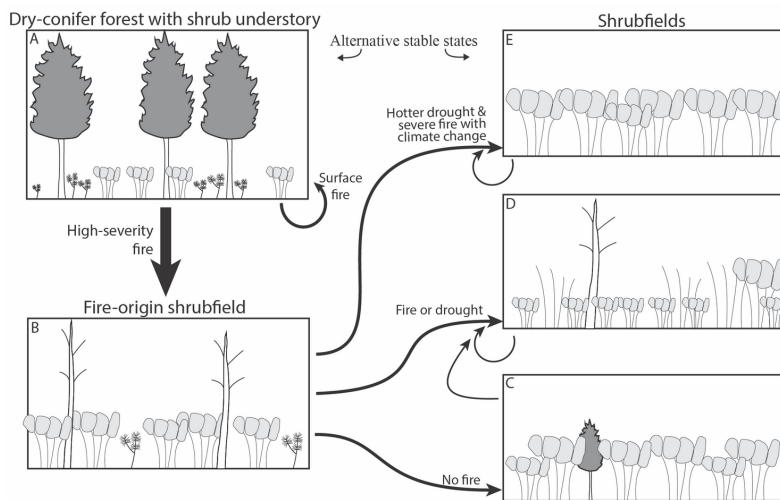
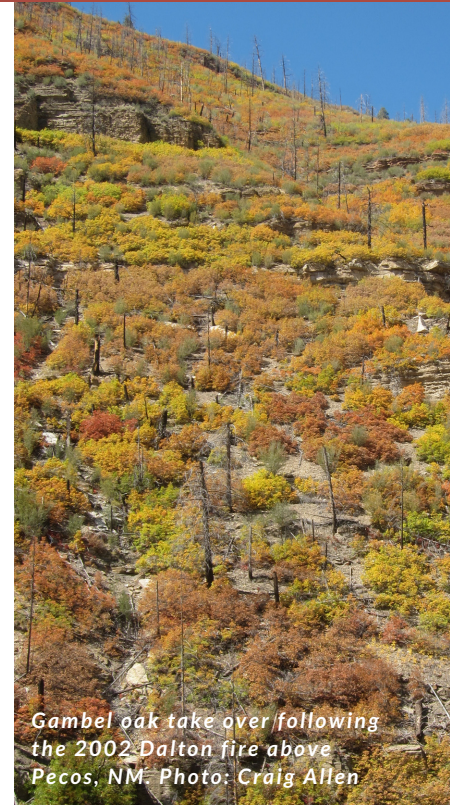


Figure: Guiterman, C., Margolis, E., Allen, C., Falk, D., Swetnam, T., 2018. Long-Term Persistence and Fire Resilience of Oak Shrubfields in Dry Conifer Forests of Northern New Mexico. *Ecosystems*. 21:943-959.

persist for centuries if not longer. Climate change, heat stress, and drought may further favor grasslands or shrubfields over forests. Researchers are studying post-fire forest to shrubfield conversions by looking at the past, using tree-ring reconstructions to assess their timing and scale.



PINE-OAK FOREST TO OAK SHRUBFIELD

Gambel oak is fairly common to ponderosa pine-dominated forests in New Mexico and other parts of the Southwest, especially along the Colorado border. In pine-oak stands, the oak are either suppressed by shade from conifers or isolated to small canopy gaps. Now, after high-severity fires, Gambel oak rapidly resprouts along with other fire-tolerant species like New Mexico locust to form dense shrubfields. The dense cover of shrubs suppresses conifer regeneration, and during drought episodes, Gambel oaks are more tolerant than many conifers.

This may signal bad news for ponderosa pine forests, especially where Gambel oak is common in the understory. As our landscapes experience significant changes in size and severity of fire regimes through human land use and climate change, the dry conifer forests dominated by ponderosa pine can rapidly convert into non-forested shrubfields. As we lose these large trees and forests, we lose the important social and ecological functions they produce.

- The ecological processes that form Gambel oak shrubfields in the Jemez Mountains have either changed or dramatically intensified.
- Up through the late twentieth century, shrubfields made up approximately 4.75% of the Jemez dry conifer landscape. The Las Conchas fire, in combination with several previous burns probably doubled the amount of Gambel oak-dominated shrubfield in the Jemez Mountains.
- Several post-Las Conchas shrubfields are almost 30 times larger than the most extensive pre-1900 shrubfield in the Jemez Mountains
- Most of these patches are in areas affected by high severity fire.
- The Las Conchas Fire led to the transition of 86% of the forested area to a different vegetative type. 38% transitioned to oak shrubfield.

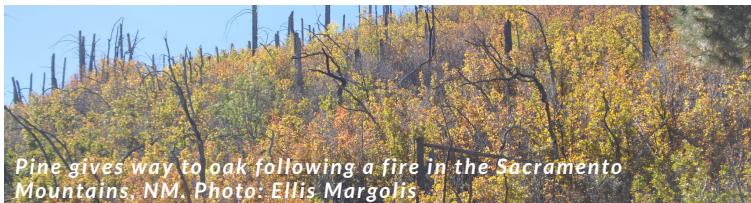
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LESSONS FROM LAS CONCHAS

In 2011, the Las Conchas fire burned areas of the forest that had not been exposed to fire for over 100 years. Historically, this area experienced frequent, widespread, and low-severity surface fires. These natural fires were replaced by intensive livestock grazing in the area, which was facilitated by the development of the transcontinental railroad. Grazing, and later fire suppression efforts excluded fire from forests over most of the 20th century.

The Las Conchas fire burned over several areas that previously burned at a range of severities since 1977. Researchers assessed the degree to which these prior burns imparted resistance to the extreme fire behavior and conditions of the Las Conchas Fire. They found that tree survival was highest in sites that had experienced both prescribed fire and prior wildfire (i.e. 2 prior fires in 30 years). Sites that had experienced only prescribed or only prior wildfire moderately retained its forested characteristics.

However, sites that had not burned at all experienced far more high severity fire effects. These sites were overwhelmingly converted into grassland, oak scrub, and weedy fields, leading to extensive losses of ponderosa pine and mixed conifer forests.



This briefing paper was developed based on research by Christopher H. Guiterman [1,2], Ellis Q. Margolis [3], Craig D. Allen [3], Donald A. Falk [2], and Thomas W. Swetnam [1], and was produced by the Forest Stewards Guild.

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WHY DOES THIS MATTER?

Once established, shrubfields have the ability to persist for a long time, which could have some profound consequences. Gambel oak, in particular, may be better adapted to our future climate than ponderosa pine, and it appears to be



Chris Guiterman inspects a pre-1900 shrubfield in the Jemez Mountains, NM, prior to tree-ring sampling. Photo: Ellis Margolis

exceptionally competitive, even under favorable conditions to ponderosa pine regeneration. Furthermore, contrary to some belief, it was found that Gambel oak shrubfields could sustain the same fire frequencies as ponderosa pine forests, and therefore are not necessarily blocks to fire spread.

Climate change is projected to further exacerbate these interactions. Hotter temperatures, drought, and fire seasons that are longer and drier decrease the potential of tree regeneration and increase the probability of repeated severe wildfire.

Preventing forests from converting to shrubfield is important for maintaining the biodiversity, wildlife habitat, and our values that depend on the ponderosa pine ecosystem. Given the increases in risk due to a changing climate, the reintroduction of fire to these forests prior to high severity wildfire is an important step into increasing their resiliency as well as resistance to type conversion.

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www.santafefireshed.org

The Greater Santa Fe Fireshed Coalition is a partnership of agencies, private organizations, and concerned citizens who are working to build resilient ecosystems, protect watersheds, and reduce wildfire risk to the forests and communities in and around Santa Fe.

