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Steffen, UCS Congressional Briefing: *National Landmarks at Risk: How rising seas, floods, and wildfires are threatening the United States' most cherished historic sites*

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Thank you for this opportunity to speak today about the effects of forest fires across the Southwest. In the past two decades Western parks and forests have experienced wildland fires burning more frequently, in larger size, and with higher severity than we have experienced before throughout the 20th century. The UCS report details the devastating effects found at two parks, Mesa Verde National Park and Bandelier National Monument.



At Mesa Verde, in SW Colorado, four large wildfires burned more than half of the park-between 1996 and 2003. Hundreds of significant archaeological sites were directly affected by these hot fires, causing damage to prehistoric pueblos and farming terraces, and transforming places of importance to numerous Native American groups. Additional damage can be caused by firefighting itself, as with staining from the bright-red slurry dumped from aircraft to protect pueblo sites from the flames.

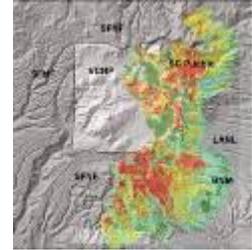


Bandelier National Monument is located in the Jemez Mountains of north-central New Mexico, next-door to where I work at the Valles Caldera National Preserve. Bandelier has burned repeatedly in the last two decades, with the 1996 Dome Fire, Cerro Grande fire in 2000, and most recently the Las Conchas Fire in 2011. More than 50% of the park has burned, impacting more than 1,000 archaeological sites, including the Ancestral Puebloan ruins, and other smaller stone fieldhouses where farmers in the 7th through 16th centuries tended their fields.

It is worth taking a moment to look more closely at the 2011 Las Conchas fire. At 156,000 acres it was, at the time, the largest fire in NM history. It started when a small tree fell on a power line and it moved so fast that nothing could have been done to slow or stop its spread. In the first 14 hours it burned 43,000 acres-- as many acres as the total in the previous



largest fire in the Jemez Mountains. The wildfire spread at an astonishing rate of one acre per 1.17 seconds; this is about the same as a football field every two seconds! The fire evacuated the town of Los Alamos, threatened the National Labs there, and burned over 3,000 archaeological sites across several agencies—Bandelier, the Santa Fe National Forest, the Valles Caldera National Preserve, and Santa Clara Pueblo.



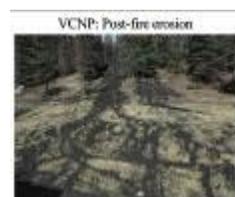
By every measure Las Conchas was the worst case scenario for fire damage to cultural resources. Damage to the landscape was unprecedented because it burned so large and so hot. Ancestral Puebloan ruins were left without protective vegetation, with building stones cracked and flaking, undermining standing walls that had withstood centuries of normal forest fires.



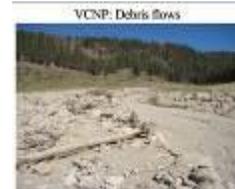
The scale and magnitude of damage to the landscape is profound. 45% of the fire burned with moderate or high severity, meaning that most or all trees were killed across large contiguous areas; impacts to the soils and the watershed functioning are so significant that regional scientists anticipate that under the current longterm drought conditions, pine forests in some parts of the burned area may never return and will be replaced instead with shrublands and juniper. The devastation of the forests means not only lost scenic recreation areas and increased risk for future flooding but also a loss of tribal plant gathering areas and damage to important springs.



In the SW, the fire season in May and June is followed by the rainy season in July and August. In fire scarred landscapes, this brings flash floods and the second phase of damage. Instead of soaking into the burned soils, these heavy rains quickly wash across surface, creating dangerous and massive flooding in the canyons. Governor Dasheno has spoken about the devastation on Santa Clara lands; in Bandelier, floods in 2011 and 2013 are the worst in its 100 year history: threatening the visitor center, washing out bridges, and closing several popular hiking trails.



On the adjacent Valles Caldera National Preserve, the erosion began with fine sediments, washing away acres and acres of buried archaeological deposits that had tolerated thousands of years of normal fires. With more rains, erosion channels formed, creating torrents of debris. Vast rock and boulder fields have formed along the base of hillslopes, and erosion gullies have enlarged into trenches up to 20 feet wide and 12 feet deep.



What is washing away or being covered forever is an archaeological record of America's prehistoric hunter-gathers as far back as 10,000 years ago. When I watch archaeological sites that remained intact for 4000 years now washing away, I cannot help but recognize that I am seeing changing climate conditions happening in real time today.

I wish I could say that the damage of the Las Conchas fire was a one-time event, never to be repeated. But just under two-years later in June of 2013, the Thompson Ridge fire ignited inside the Valles Caldera, again by a powerline, when the region was in severe drought with unusually high temperatures. This fire threatened our historic ranch headquarters, with 100-year-old cabins and cherished stands of old-growth trees over 300 years in age. Thompson Ridge fire burned over 24,000 acres, but fortunately it burned with lower overall intensities. Nonetheless, today more than 60% of the Valles Caldera National Preserve has burned in the past four years.

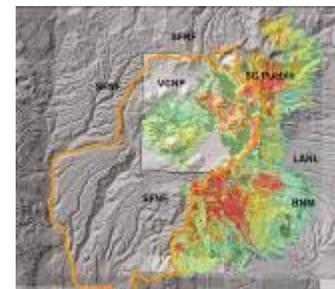


Like at Mesa Verde and Bandelier in years before, these fires cause park closures for several weeks at a time, disrupting vacations plans and damaging the economy in surrounding communities. They deflect staff from our regularly scheduled work, and they costs millions of dollars for suppression and emergency rehab work. Costs of the Las Conchas fire alone exceeded \$45,000,000. And these fires threaten the lives and safety of wildland fire fighters.

What can be done to cope with the changing face of wildfires in the SW? One thing is to develop effective strategies for protecting specific archaeological sites through removal of dense fuels before fires, and stabilization after fires. Another is to develop tools archaeologists can use to evaluate the conditions that result in the greatest damage so that they can work with fire managers to plan prescribed fires that will have the least potential for destruction. These are some of the goals of an interagency project I am a part of called "ArcBurn". It is funded by the Joint Fire Science Program which supports scientific research on wildland fires and distributes results to help policymakers and fire managers make sound science-based decisions.



Perhaps the most effective thing we can do right now is to understand the scale of this problem and work to decrease the size and severity of landscape fires. This is the goal of the Collaborative Forest Landscape Restoration Program, created by Congress in 2009 to enable landscape-scale ecosystem restoration across federal lines. Central to the program is teamwork among federal agencies to address the problem of forest fires at the large-scale they are now

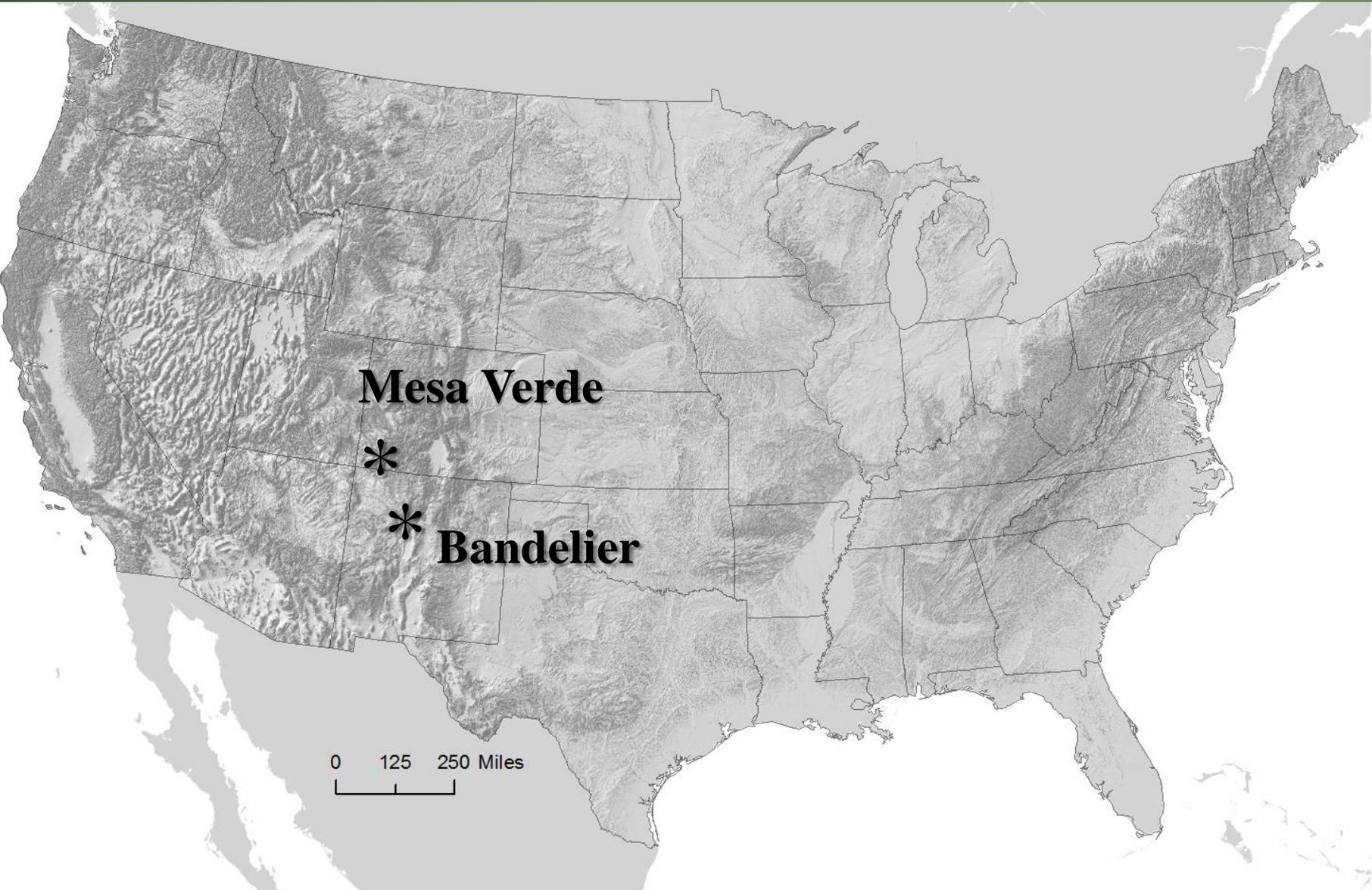


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occurring. Land managers use restoration practices like forest thinning and prescribed fire to decrease the potential for extreme fire behavior and limit the size of fires once they are underway. Projects are developed in partnership with tribal governments and non-governmental organizations such as the Nature Conservancy, and in coordination with industry to foster commercial use of the forest materials removed in order to offset restoration costs, to benefit local rural economies, and to improve forest health.

As we consider the case studies detailed in the UCS report, it is clear that these parks, forests, landmarks, and preserves are places worth protecting. Archaeological sites are non-renewable resources. They are precious to the American public, and our shared heritage gives added meaning to the natural landmarks and destinations we explore and treasure. Forest fires are a healthy part of Southwestern forests, but the large landscape scale fires that are burning now are outside the normal historic range—they are bigger, hotter, and more damaging. America’s parks, preserves and forests provide a fascinating window into the “deep time” of human occupation across this continent, and these are places where research and management will develop successful preservation strategies to respond to the growing threat of forest fires and other extreme events in a region under stress from drought, rising temperatures, and scant precipitation.

Thank you for your help as we work together to find solutions to these challenges.



Mesa Verde



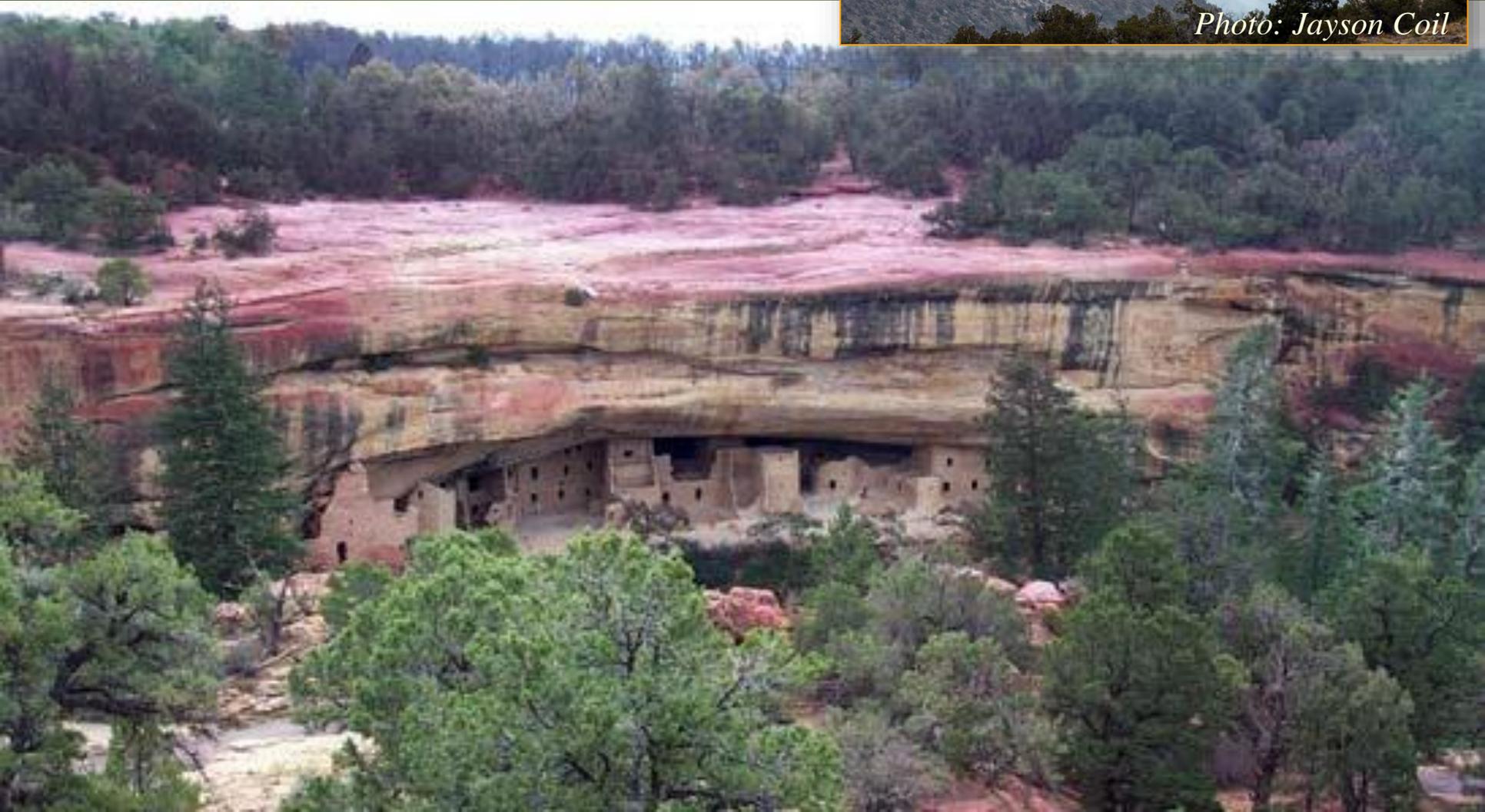
Bandelier

0 125 250 Miles

Mesa Verde: cliff dwelling



Mesa Verde: retardant staining

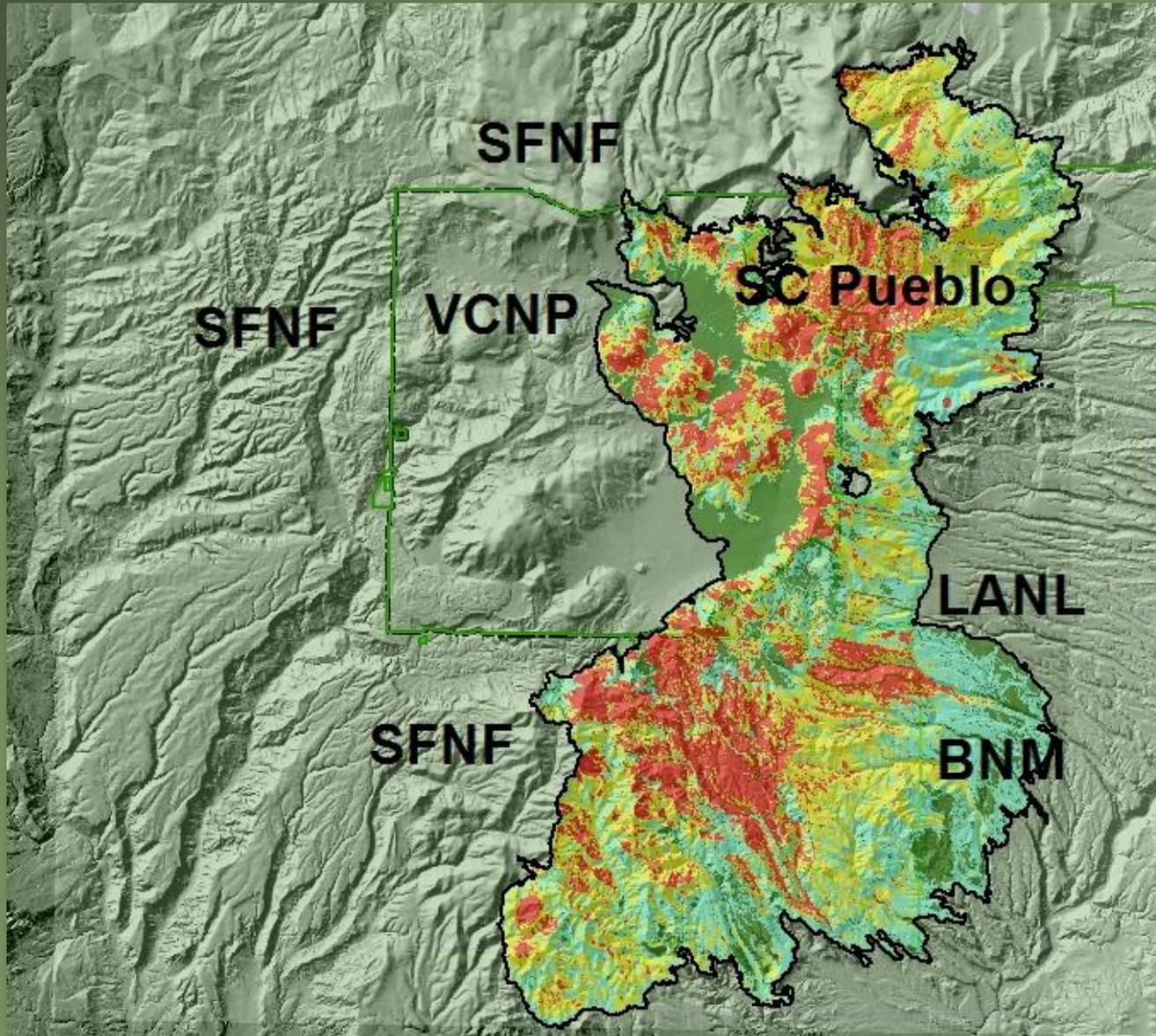


Bandelier: Las Conchas Fire



Ancestral Puebloan
stone house structure

Jemez Mountains, New Mexico



2011
Las Conchas
Fire

Burn Severity



Bandelier: Las Conchas Fire



Ancestral Puebloan
Pueblo ruin

Bandelier: Las Conchas Fire



Photo: Craig Allen

Valles Caldera: erosion trenches



2012



2013

VCNP: debris flows



VCNP: rock debris

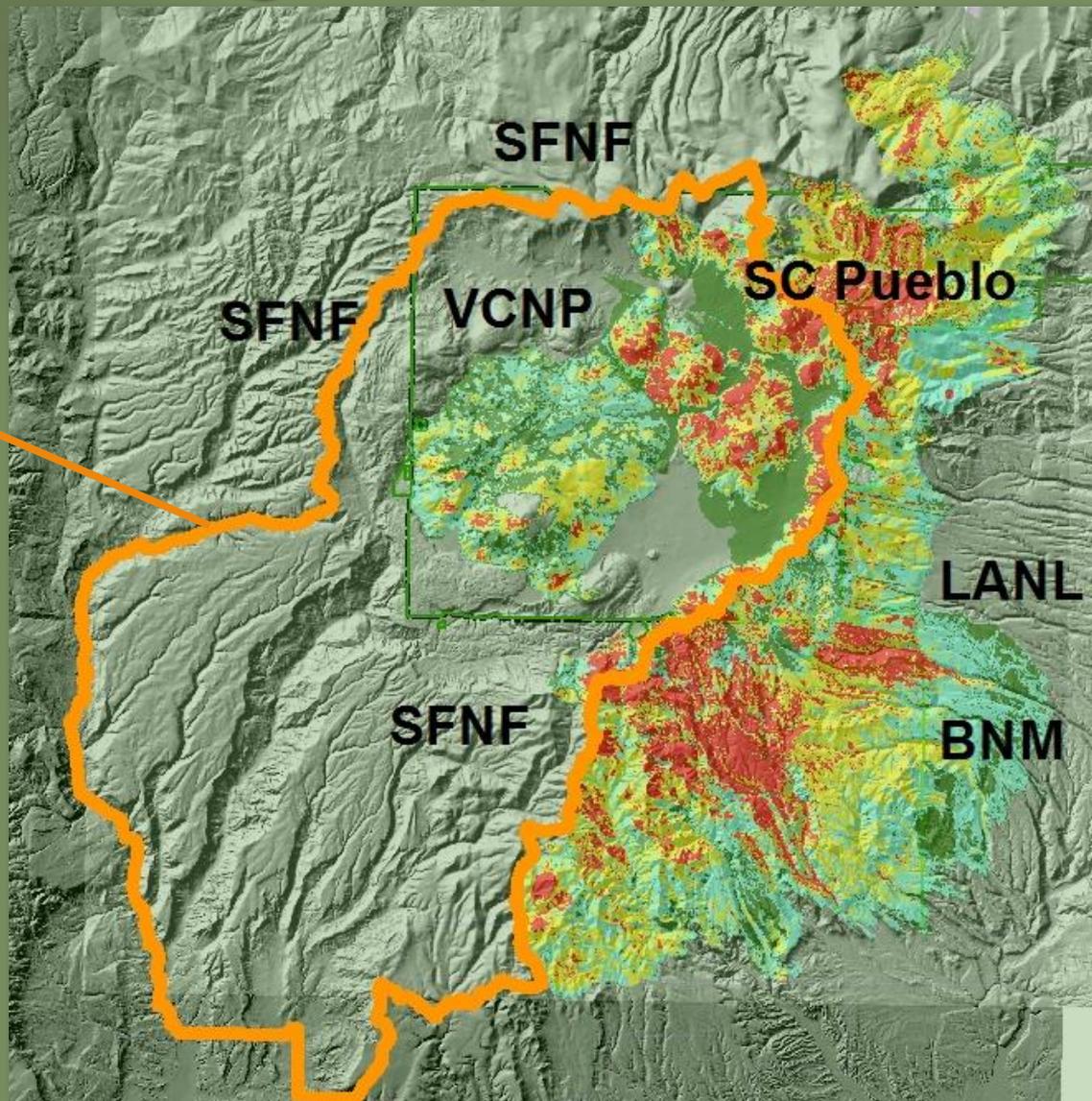


SW Jemez Collaborative Forest Landscape Restoration Program (CFLR)

SW Jemez
CFLR
restoration
project area



Burn
areas





VALLES CALDERA NATIONAL PRESERVE

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In the Jemez Mountains, resources/lands managers and scientists are working together to seek effective approaches to cope with the threat of landscape fire and post-fire erosion. Notable projects include:

SW CFLRP: Southwest Jemez Collaborative Forest Landscape Restoration project (2009 Congressional funding)

http://www.fs.fed.us/restoration/documents/cflrp/2010Proposals/Region3/SWJemezProject/R3_SantaFeNF_CFLRP_Proposal_SWJM_05142010.pdf

<http://www.vallescaldera.gov/nepa/pages/content.aspx?id=d234dfc3-0264-4b0a-899c-ada915734f54&altID=3>

<http://www.nature.org/ourinitiatives/habitats/forests/explore/new-mexico-cflr-project.xml>

<http://blog.smu.edu/research/2012/05/15/ancient-tree-ring-records-from-the-southwest-us-suggest-todays-megafires-are-atypical/>

“ArcBurn” *Linking field-based and experimental methods to quantify, predict, and manage fire effects on cultural resources* (Joint Fire Science Program funding)

<http://www.forestguild.org/ArcBurn.html>

https://www.firescience.gov/JFSP_advanced_search_results_detail.cfm?jdbid=%24%26J%2F%3FW0%20%20%0A

FHiRE: *Fire & Humans in Resilient Ecosystems Project* (NSF funding)

https://www.coe.arizona.edu/sites/default/files/fhire_scope_of_work.pdf

<http://uanews.org/story/ua-fostering-a-new-type-of-outreach>

<http://www.npr.org/2012/08/23/159373691/how-the-smokey-bear-effect-led-to-raging-wildfires>

CZO Critical Zone Observatories (NSF funding)

<http://criticalzone.org/catalina-jemez/research/>

And also studies pursued by Dr. Craig Allen, USGS, Jemez Mountain Field Station:

<https://www.fort.usgs.gov/staff-details/109>

<https://www.fort.usgs.gov/science-feature/223>