



New Mexico
FIRE AND WATER

Impacts and Lessons Learned from the Las Conchas Fire

**BACKGROUND
REPORT**

- Summit participants urged to read this report before the event.
- Summit details: June 5-6, 2012, Hyatt Regency, Albuquerque, NM

CONVENER

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FORWARD

Purpose of the Event

The ***Town Hall on New Mexico Fire and Water*** will explore the impact of the largest wildfire in New Mexico's history and develop recommendations that can help mitigate the impact of such a fire in the future.

Last summer's Las Conchas Fire in Northern New Mexico – as well as the multiple other forest and range fires throughout the state – impacted economic development, ecological systems, recreational interests, community health, and municipal water supplies around the state. Learning from this devastating fire can help all New Mexicans protect our valuable natural resources.

Convener

The New Mexico Experimental Program to Stimulate Competitive Research (NM EPSCoR) is funded by the National Science Foundation (NSF) to improve the ability of the state's academic institutions to carry out cutting-edge science and engineering research in areas of importance to New Mexico. The current five-year award focuses on building capacity to conduct research into the impacts of climate change on New Mexico's mountain water sources. With offices located at the University of New Mexico, NM EPSCoR fosters research efforts at UNM, New Mexico State University, New Mexico Tech, and New Mexico Highlands University and educational programs at institutions statewide. NM EPSCoR is committed to developing a stronger, more diverse STEM (science, technology, engineering, and math) workforce and citizenry informed about climate change and its impact on natural resources and economic development. This multi-disciplinary, multi-scale effort aims to provide the tools required for quantitative, science-driven discussion of difficult water policy options facing New Mexico in the 21st Century.

Sponsor

This material was funded in part by the National Science Foundation award EPS-0814449. Any opinions, findings, conclusions, or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

Facilitator

New Mexico First engages people in important issues facing their state or community. Established in 1986, the public policy organization offers unique town halls and forums that bring together people from all walks of life to develop their best ideas for policymakers and the public. New Mexico First also produces nonpartisan public policy reports on critical issues facing the state. These reports – on topics like water, education, healthcare, the economy, and energy – are available at nmfirst.org.

Our state's two U.S. Senators – Jeff Bingaman and Tom Udall – serve as New Mexico First's honorary co-chairs. The organization was co-founded in 1986 by Senators Jeff Bingaman and Pete Domenici (retired).

Report Authors

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INTRODUCTION

On June 26, 2011, high winds toppled an aspen tree into a power line near Las Conchas, New Mexico in the Valles Caldera National Preserve and near Bandelier National Monument. Extremely dry conditions, a result of less than one inch of precipitation for the year, provided fuel to the spark from the power line. Thus began a fire that would burn for five weeks and become New Mexico's largest forest fire in recorded history.¹

During the first 14 hours, high winds moved the fire eastward and more than 43,000 acres were consumed. This amount is only about 5,000 acres less than the total burned during the entire Cerro Grande fire in 2000.²

"The speed of the fire's spread was astonishing – averaging an acre of forest burned every 1.17 seconds (that's equivalent to burning a forested area the size of a football field in less than two seconds)," wrote Bob Parmenter, Valles Caldera National Preserve.³

The Las Conchas fire continued to grow over the next five weeks, but was eventually contained August 1. By that time over 1,200 fire fighting crews from around the country had battled the blaze⁴; the entire town of Los Alamos was evacuated for a week; and parts of Cochiti Lake, the Santa Clara Pueblo, the Valles Caldera National Preserve and Bandelier National Monument were burned. A total of 156,593 acres (245 square miles) burned.⁵

Landscapes, lives, livelihoods, and communities were impacted. Over 100 buildings, including 63 homes, were destroyed. Fifteen injuries were reported, but fortunately no fatalities.

The subsequent summer monsoons were a blessing and a curse. While they brought much needed moisture to portions of the state, they also brought flash floods and landslides to burn-scarred areas.

The 2011 Fire Season

(National Interagency Fire Center)

- Wallow fire (AZ) 538,049 acres
- Rock House fire (TX) 314,444 acres
- Honey Prairie fire (GA) 309,200 acres
- Horseshoe 2 fire (AZ) 222,954 acres
- Deaton Cole fire (TX) 175,000 acres
- Cooper Mtn. Ranch fire (TX) 162,625 acres
- Wildcat fire (TX) 159,308 acres
- Las Conchas fire (NM) 156,593 acres
- Swenson fire (TX) 126,593 acres

¹ (Parmenter)

² (Parmenter)

³ (Parmenter)

⁴ (NOAA)

⁵ (National Interagency Fire Center)

To many New Mexico residents, the Las Conchas fire brought back memories of the 2000 Cerro Grande fire. Indeed, some of the same areas and residents were impacted. But the fires also brought questions about preparedness.

- What can we learn from the Las Conchas Fire?
- How can we reduce the probability of severe wildfire?
- How can we best cope with the aftermath?
- How can we manage recovery after a fire to achieve healthy, sustainable ecosystems?
- How can New Mexico better prepare for the future?

Wildfires will not be eliminated, nor as most experts agree, should they be. But we may be able to reduce their severity and economic or cultural impacts. This report offers background information on the Las Conchas fire, including affects on individuals and communities as well as land and water resources.

Personal Stories

There are as many stories of the Las Conchas fire as there are people, families, businesses, and communities affected. Families lost their homes and their livelihoods. Communities lost their land, resources, and their history. The Dixon Apple Orchard and the Santa Clara Pueblo provide two examples.

DIXON APPLE ORCHARD

The Dixon Apple Orchard website describes 2011 as “The year that was.”⁶ Late frosts hurt the apple crop. Anyone who grows fruits or vegetables knows that frosts happen and you find a way to keep producing crops. The late frost, however, was only the first event to impact the long standing orchard.

Fred and Faye Dixon and their two children came to Rancho de la Cañada (a Spanish land grant) in 1944 and started an apple orchard, which became a New Mexico tradition. The orchard became a generational endeavor when Becky, the Dixon’s granddaughter, began working with Fred Dixon after the death of his wife. In 1996, Fred handed the orchards over to Becky and her husband, Jim Mullane.⁷ The Mullanes and their children have continued the tradition. To many New Mexicans it is not fall without a trip to Dixon’s. Weddings, birthdays and anniversaries have been celebrated in the orchard’s beauty or by the basalt wall that grew from clearing the land for the orchard.

On June 27, the Las Conchas fire engulfed Cochiti Canyon and Dixon’s Apple Orchard. “It sounded like a jet coming over the mountain,” said Jim Mullane.⁸ While the fire spared about 90 percent of the 3,000 trees in the orchards as well as the packing and machine sheds, it destroyed the Mullane’s home, as well as that of their foreman and the housing for the workers who harvest the apples.

The Mullanes hoped to harvest the apples that had not been devastated by either frost or fire in the fall, but weeks after the fire swept through the canyon and the orchards, the monsoons brought heavy rains to the area. Floods in the third week of August decimated the orchards, uprooting trees and depositing thick ash-filled black

⁶ (Dixon's Apple Orchard)

⁷ (Dixon's Apple Orchard)

⁸ (Roesler)

mud over parts of the orchards.⁹ While the area will likely not burn again in the foreseeable future, the floods may continue for years.

This New Mexico tradition, which withstood freezes, droughts, and hard economic times, could not withstand the Las Conchas fire. In April 2012, Becky Mullane announced that after almost 70 years, the orchard would close.¹⁰ Due to disagreements over the terms of the long-term lease the Mullanes have with the New Mexico State Land Commission, it is not apparent at this time whether the orchard will be brought back to life by others.¹¹

SANTA CLARA PUEBLO

In the last 14 years, Santa Clara Pueblo has suffered four raging wild fires and the subsequent flooding: starting with the the 1998 Oso Complex fire, and continuing to the 2000 Cerro Grande fire, the 2010 South Fork fire, and the 2011 Las Conchas fire. Las Conchas burned and otherwise affected 17,000 acres.¹² The fires ripped through the Santa Clara Canyon, destroying cultural sites, forest resources, wildlife habitat, plants, animals and watersheds that the people of Santa Clara depend upon for their livelihood and culture.¹³ The Pueblo's treasured homeland and spiritual sanctuary was nearly destroyed.¹⁴ These fires turned 30% of the reservation, 45% of the Pueblo's watershed and 80% of its forest to ash and char, opening the way to water quality degradation and potentially dangerous flash floods.¹⁵ Thousands of acres of traditional lands, cultural sites, and resources outside of the current boundaries of the Pueblo were also destroyed.

The Santa Clara Creek watershed was stripped of vegetation and its soil was baked, rendering it hydrophobic. (Hydrophobic soil repels water, causing it to pool on surface – and cause run-off – rather than seep in to the ground.) “The hydrology for Santa Clara Pueblo lands completely changed once burned by the Las Conchas Fire. Damage that would be expected during a 500-year flood will now happen during a 10-year¹⁶ event,” noted Ron Kneebone, U.S. Army Corp of Engineers.¹⁷

This destabilized landscape contributed to substantial flood damage at the Pueblo last summer. The monsoons that following the Las Conchas fire flooded Santa Clara Creek, which became blocked by mud from erosion of the surrounding area.¹⁸ Water control facilities along the creek that are used for recreation, irrigation storage, consumption, and wildlife were filled with silt and debris, rendering them inadequate.¹⁹ The earthen dam of one reservoir came within six-inches of being topped. Failure of the dam was alleviated by removal of bridges

⁹ (S. Matlock)

¹⁰ (Garcia)

¹¹ (Garcia)

¹² (Chavarria)

¹³ (Incident Information System)

¹⁴ (W. E. Dasheno)

¹⁵ (W. E. Dasheno)

¹⁶ A 500-year flood is one in which the associated level of flood water has a 1% chance of being exceeded in any single year.

¹⁷ (Skopeck)

¹⁸ (Grimm)

¹⁹ (Chavarria)

and allowing water to flow through an emergency drain. If the dam had failed, the community of Santa Clara would have been severely damaged by the ensuing flood.²⁰

Roads were covered with mud making them impassable and over 20 miles of road are now in need of repair. Culverts were clogged, damaged, or destroyed by streams during the floods.²¹ Crews performing various maintenance tasks were stranded by the floods, but were safely evacuated.²²

The erosion caused by last year's floods cut the creek channel closer to Pueblo buildings and homes, putting the community at risk from future flooding.²³

Santa Clara was already working with federal agencies to manage the forests and reduce fire risk. For example, fire breaks developed as a U.S. Forest Service project helped save the back portion of Cochiti Canyon.

The importance of fire breaks is obvious. Restoration efforts by the Pueblo after the 2000 Cerro Grande fire included the development of a program to restore Rio Grande Cutthroat Trout to Santa Clara Creek and planted nearly 1.5 million trees. Most of the new trees were destroyed in 2011 because the planned fire breaks were not completed.

Prior to the fire, the Pueblo was working with agencies to develop a long-term forest management plan that might have prevented the devastation seen in the Las Conchas. But, as Governor Dasheno said, "...we ran out of time."²⁴

Santa Clara continues its long-term effort to restore its forests and watersheds. The program requires substantial participation by the federal government. The Pueblo has been working with a wide range of agencies, including the U.S. Bureau of Indian Affairs, U.S. Army Corps of Engineers, U.S. Forest Service, U.S. Department of Agriculture, Federal Emergency Management Agency, Natural Resources Conservation Service and others. The goal is to establish flood mitigation measures, fire suppression resources for the remaining 20% of its forests, as well as maintenance and restoration programs for its forests and for those that surround Pueblo lands. The Pueblo is working with hydrologists and soil scientists to project increased runoff and flood potential.

Working with federal agencies, each abiding by federal laws and regulations presents challenges. For example, because the 2000 Cerro Grande fire was attributed to the actions of a federal agency, the federal government played a major role in remediation. The Las Conchas fire was not attributed to a federal agency, so the response was substantially different.²⁵

In testimony before the Senate Committee on Indian Affairs, Governor Dasheno offered a number of recommendations to streamline the response time for disaster assistance for Indian Tribes. One of his recommendations is to allow tribe to request a Federal Disaster Declaration directly from the President.

²⁰ (W. E. Dasheno)

²¹ (Chavarria)

²² (InciWeb), (Chavarria)

²³ (Tailman)

²⁴ (W. E. Dasheno)

²⁵ (W. E. Dasheno)

Currently, only a state can request the designation. Governor Dasheno also recommended that the federal government establish a standing interagency task force to address emergencies on tribal lands.²⁶

Specific to the Las Conchas fire, Governor Dasheno recommended allocation of resources to Santa Clara Pueblo for hazard mitigation, watershed restoration, and a Burned Area Emergency Rehabilitation (BAER) plan implementation.

President Obama made an official presidential disaster declaration on November 23, 2011 for New Mexico communities impacted by the floods – including the Santa Clara Pueblo.²⁷ In addition, U.S. Senators Tom Udall and Jeff Bingaman and Congressman Ben Ray Luján are urging allocation of federal resources to prevent flooding during the 2012 monsoon season. In part, their letter reads, “The Santa Clara Pueblo has a long road ahead, but with your support, the lives and property of the people can be protected, while the mission of restoring the canyon and forest can go on.”²⁸

Surrounding communities are also reaching out to help. The New Mexico Community Foundation has established the Santa Clara Pueblo Fund to provide flexible resources for recovery. An award-winning documentary, *Aftermath of the Las Conchas Fire in Santa Clara Canyon*, showed the impact of wildfire and flood and raised public awareness.²⁹ *Parade Magazine* also ran a story about the fire in their annual giving issue.

DONALDSON FIRE³⁰

Most of this report focuses on the Las Conchas fire, but Summer 2012 brought multiple fires to the New Mexico landscape. One of them, the “Donaldson Fire,” ignited in late June near Hondo, NM. It offers the perspective of the private landowner. Started by a lightning strike, the grassfire burned several days and destroyed considerable ranch land owned by Sam Donaldson’s family as well as other Hondo ranchers.

Landowners in that area experience fires every few years, and therefore know how to put them out. In most cases, Donaldson said, ranchers and volunteer firefighters take care of grassfires with “flappers” (rubber mats on long sticks), followed by firebreaks created with bulldozers. In this case, the ranch crew and volunteers extinguished the fire on Donaldson’s land several times. According to the long-time newsman and rancher, different firefighting crews would come along behind the rancher’s bulldozers and relight fires. (The fire manager believed the fire needed to burn in a certain direction.) The fire management strategy was to protect structures, not grasslands, so fire fighters would “back light” new fires to move the blaze away from structures or in the desired direction.

²⁶ (W. E. Dasheno)

²⁷ (New Mexico Business Weekly)

²⁸ (Bingaman J.)

²⁹ (Lindblom)

³⁰ (Donaldson)

The policy also prohibited fire fighters from putting out fires they were not authorized to suppress. As a result, one crew reportedly watched a series of high line poles burn (costing local utilities the expense of replacing them) because the poles were not considered an “endangered structure.”

“By the time the fire was out, nature burned a third of our grass,” said Donaldson. “And the feds burned another third.” Ultimately, the family was forced to sell over 400 head of cattle, or four-fifths of the herd.

The rancher noted that similar fire management strategies were employed in a 2008 Hondo fire that also destroyed considerable amounts of ranchland. That year’s fire manager, who was not from the local community, was heard to say, “We just wanted to clean up the grass,” – a comment that dismayed area ranchers.

For landowners in the Hondo area, the incident renewed concerns about fire suppression policies, pros and cons of “back lighting” new fires, private authority of landowners, and the perception that federally hired fire managers may be unfamiliar with the local priorities of the areas where they are sent to fight fires.

IMPACTS

While the Las Conchas fire devastated public and private land alike, the majority of the affected property was owned or administered by government agencies. (See *Table 1.*) More than 30,000 acres burned on the Valles Caldera National Preserve and over 20,000 acres burned on the Bandelier National Monument.

The severity of the impact of a fire depends on the groundcover and condition of the land prior to the burn, the intensity of the fire (that is the consumption of the above ground fuel), and the depth of the burn (how charred the plant material is).³²

The Las Conchas fire burned through Piñon-Juniper woodland, mixed Conifer forests, Ponderosa pine forests, Aspen forests, grassland, and meadows.³³ Of data analyzed, about 20% of the area burned at high severity, while almost 30% was a moderate severity and more than 40% at low severity.³⁴ The resulting impacts are somewhat site specific, as will be seen in the following sections.

TABLE 1: LAND OWNERSHIP OF BURNED AREAS³¹

| Owner or Administrator | Percent |
|----------------------------------|---------|
| Bureau of Indian Affairs | 13% |
| County (Las Alamos) | <1% |
| DOE | <1% |
| National Park Service | 14% |
| Private | 3% |
| US Forest Service | 51% |
| Valles Caldera National Preserve | 19% |

Fire and Plants

The probability of a plant being killed in a fire depends on the amount of heat received by the plant, which depends on the temperature reached and the duration of exposure to the heat. While high temperature can result in plant death in a short period of time, lower temperatures will require a longer time period.³⁵ Plant characteristics can also impact survival. For example, trees that “self-prune” lower branches are less likely to carry a fire to their crown.³⁶

Because of the variation in the severity of burn as well as the variety of forests, woodlands, and grasslands burned, a general discussion of the impact of the fire on plants is difficult. The areas that burned “lightly” (low severity or unchanged) will see little impact, while in some severely burned areas all Ponderosa pines burned, leaving no live trees for seeds.³⁷ In some areas, as Craig Allen (U.S. Geological Survey biologist) said in a newspaper interview, “We’re not sure what’s going to come back...because even the most resilient life forms are not doing well.”³⁸

³¹ (Incident Information System)

³² (Neary, Ryan and DeBano)

³³ (Bird and Menke)

³⁴ (Bird and Menke)

³⁵ (Miller)

³⁶ (Miller)

³⁷ (Fleck, Las Conchas Fire Recovery a Daunting Task)

³⁸ (Fleck, Las Conchas Fire Recovery a Daunting Task)

The Valles Caldera Nature Preserve can serve as an example of the impact of the fire on plants. Almost one-fifth of the burned area is on the preserve. While about 15,000 of the 30,000 acres burned were deemed “low severity,” the remainder was moderate to high severity.³⁹

In the low severity burn areas, there were few trees and shrubs killed and re-growth of grasses and wildflowers began quickly. The plants contained higher levels of nutrients and quickly attracted grazing wildlife and livestock.⁴⁰

Much of the moderate and high severity burned areas were in the forests. In the moderate-severity burned areas, smaller plants and dead brush were consumed. Trees were killed either because they burned through a “Roman Candle” effect, or in some cases, the heat on the ground resulted in the roots of the tree being cooked.⁴¹

The high severity burned areas corresponded to areas with high-density tree areas (1,500 to 2,000 trees per acre). Forest floor litter added fuel and in these areas, all trees were killed.⁴²

Wildlife

The impact of fire on animals depends on the fire season, the intensity, severity, rate of spread, and size of the fire, as well as the species of animal in question.⁴³ Impacts can include injury, death, immigration, or migration. Injury and death are generally immediate impacts of a fire, while immigration or migration may occur in the weeks, months, or years after a fire.

Dan Williams, New Mexico’s Game and Fish Department, said during the Las Conchas fire: “Generally speaking, the animals who get away – the deer, elk, and some birds – can get out of harms way. Where they will go, I don’t know. The animals that stand to suffer the most will be small mammals who don’t have the ability to escape.”⁴⁴ Similarly, songbirds have poor nocturnal vision and do not fly well or far at night. This leaves them vulnerable to fire during the night, according to Steve Fettig, Bandelier National Monument.⁴⁵

Again, there is not a general result for the animal populations affected by the Las Conchas fire. The impact of animals in the Valles Caldera Nature Preserve provides some examples.

Large wildlife species fared well on the preserve. Elk, deer, bear, cougar, and coyotes moved of the way of the fire. For example, 28 radio-tagged elk calves and their mothers all survived.⁴⁶ In non-preserve areas, such as

Fire Severity

- **Low:** Less than 30% mortality in trees; minor impacts to forest succession
- **Moderate:** 30-70% mortality in trees; moderate impacts to succession and function
- **High:** Greater than 70% tree mortality; significant long-term

³⁹ (Parmenter)

⁴⁰ (Parmenter)

⁴¹ (Parmenter)

⁴² (Parmenter)

⁴³ (Forest Encyclopedia Network)

⁴⁴ (Griswold)

⁴⁵ (Parmenter)

⁴⁶ (Parmenter)

Bandelier National Monument where the speed and magnitude of the fire was greater, escape may not have been as possible.

Many small, burrowing mammals survived in the low and moderate burn areas, but tree-dwelling squirrels would have perished, as would songbirds with nestlings.⁴⁷ Amphibians in the preserve's riparian zones and ponds most likely survived the fire, as it did not advance through these more moist areas. Lizards and snakes could survive by going underground or by moving to areas with low fuel content.

With all of these animals, the habitat in which they live may be radically different than the one prior to the fire. Some animals will find smaller range areas. Others will migrate out of the area, while some may migrate in. A telling sign at least for some species was noted by John Fleck, Albuquerque Journal reporter and self-avowed birdwatcher. In early May 2012, while touring one of the worst parts of the area burned in the Las Conchas fire, he noted that the most striking thing was that there were no birds.⁴⁸

The aquatic ecosystem fared well during the fire. The areas were too moist to burn, and little ash or debris fell into the streams. The immediate impact from the fires on the fisheries and aquatic invertebrates was almost nonexistent.⁴⁹ The impact of reduced water quality from the monsoons was more severe.

Water Quality

The magnitude of the impact of fire on water quality in streams, rivers, or lakes depends again on the severity of the fire, as well as the condition of the watershed at the time of the fire.⁵⁰ Stream flow discharges can increase – especially suspended and bed load sediments.⁵¹ In the case of fire, scientists may pay attention to sediment concentrations spikes, the turbidity (cloudy or hazy water with lots of particles) of the water, and declines in pH levels.⁵² Soil erosion contributes through the transport and deposition of sediment into the water.⁵³

The summer monsoons mobilized soil, ash, and charcoal from burned sites. Intense storms, coupled with little vegetative cover in severely burned areas, deposited the material into streams through runoff. The impacts in water quality are site specific and, again, streams within the Valles Caldera National Preserve provide examples.

The initial monsoon storms began in late July on the preserve. While only about a third of the Indios Creek watershed burned in the fire, it was a high severity burn removing vegetation and leaving little ability for the soil to hold moisture. The first storm was intense with more than a half an inch of rain and hail in a few minutes.⁵⁴ The impact was impressive with sheet-flows (a thin continuous film of water moving downslope) of water depositing ash, soil, rocks and debris into the creek.⁵⁵

⁴⁷ (Parmenter)

⁴⁸ (Fleck, The most striking thing in the Las Conchas fire zone? There were no birds)

⁴⁹ (Parmenter)

⁵⁰ (Neary, D.G.; Landsberg, J.D.; Tiedmann, A.R.; Follitt, P.F.)

⁵¹ Suspended sediments are particulate organic and inorganic matter suspended in the water. Bed load sediment is particles carried by the natural flow of a stream on or immediately above the stream bed.

⁵² (Parmenter)

⁵³ (Neary, D.G.; Landsberg, J.D.; Tiedmann, A.R.; Follitt, P.F.)

⁵⁴ (Parmenter)

⁵⁵ (Parmenter)

These changes to the water, coupled with fine ash that clogged fish' gills, resulted in massive trout die-off in Indios Creek and the Rio San Antonio. Preserve biologists sampled Indios Creek the day after the big thunderstorm using electro-fishing equipment, and failed to find any trout at all. The fishery was wiped out.

Monsoon rains over the next several weeks generated ash-laden flash floods on several creeks in the preserve. Massive ash and mud flows crossed the open valleys, slamming into the Rio San Antonio in the Valle Toledo, as well as the East Fork Jemez River in the Valle Grande.

Despite the flash floods and changes in water quality, aquatic insects were not wiped out. They are important for future support of fish populations.⁵⁶ And, not all watersheds were burned or were flooded. The upper third of Indios Creek was not affected and thus supported fish and invertebrates (such as snails or insects).⁵⁷ In Rio San Antonio, good populations of the native, non-game fish (Long-nose dace, Rio Grande sucker, and the Rio Grande chub) survived, but the trout population was mostly decimated.



This flash flood in Indios Creek occurred July 29th, 2011, on the north rim of the Valles Caldera. This stream, normally less than one meter wide expanded to 25 meters wide, and pulled in tree trunks, rocks, ash, soil, and debris.

Land Use and Activities

Both the Valles Caldera Preserve and the Bandelier National Monument are favorite recreation areas. The impact of the fire on recreational activities is long-term and the opportunities once available may not be there, or may not be the same, for many years to come.

Within hours of the start of the fire, Bandelier park visitors, employees, and residents were evacuated. While the visitor center and main archeological sights were minimally impacted, the majority of the canyon burned – and much of it was high severity.⁵⁸

Concerns about the fires quickly became concerns about floods. Preparations minimized the damage and protected the visitor center. Heavy rains brought floods and considerable damage to trails. There is now no access to the Rio Grande, because the trail that led to it was destroyed.

While sections of the monument reopened to the public last July, there was less parking and access. For the 2012 visitor season, the only access to Bandelier's Frijoles Canyon will be shuttle bus. The Park Service must consider the possibility of more flooding this summer, and make its decisions about public access accordingly.

⁵⁶ (Parmenter)

⁵⁷ (Parmenter)

⁵⁸ (National Park Service)

Decisions about recreation in the Valles Caldera National Preserve were similar to those at Bandelier. Almost all activities and recreation were curtailed during July 2011.⁵⁹ Plans to expand visitor opportunities were modified due to the fire and floods. Recreation was severely impacted in 2011 and visits to the Preserve may decline in future years. Fisheries impacted by the floods may not draw anglers as in pre-fire years.⁶⁰

Downstream Impacts

The impact from the floods extends far beyond the burn zone. Measurements immediately after the forest fire documented seriously degraded water quality in regional streams and rivers. Reduced oxygen levels in the water (with negative affects on animal and plant life) were detected down the Rio Grande over distances of at least 100 kilometers.

Runoff in the mountains above Los Alamos raised concerns about contamination in Santa Fe's water supply. Much of the city's water comes from the Buckman Direct Diversion (which processes water from the Rio Grande). However, monitoring did not find high levels of contaminants in the water.⁶¹ The larger problem was the effect of the high ash content in the water at the Buckman Direct Diversion. Concerns over the plant's filtration system being able to remove the ash resulted in the facility's shutdown for several days in July 2011.⁶² The ash problem persisted, curtailing diversions more than a half-dozen times between July and October.

The Albuquerque Bernalillo Water Utility Authority also diverts from the Rio Grande to supply water to the city and county. The authority had to curtail diversions in July 2011 to reduce the level of ash entering its treatment facility. Ongoing high ash content, coupled with low river flows, prompted the authority to stop all diversions in September and October.⁶³ While the treatment plant is capable of handling the ash, the additional chemicals and energy required made it too expensive to continue to use water from the river. This decision caused the authority to rely solely on groundwater for those months.

It is possible that these closures are not single year phenomenon. Depending on the upcoming monsoons, either or both of these communities could find the need to reduce use of water from the Rio Grande.



ASH FLOW: The leading wave of a rising flood on the Rio San Antonio in the Valles Caldera National Preserve carried burned tree branches, charcoal, and ash downstream. Overbank flows eventually exceeded 100 meters in width, compared to a normal stream width of 2-3 meters. (July 29th, 2011)

⁵⁹ (Valles Caldera Trust)

⁶⁰ (Valles Caldera Trust)

⁶¹ (S. Matlock)

⁶² (Albuquerque Journal)

⁶³ (Associated Press)

Economic Impacts

The economic impacts of the Las Conchas fire have not been tabulated and will not be known for some time – if ever. But the expense is substantial. From the costs to fight the fire, to the cost to rebuild homes that were lost, to the additional costs incurred due to removing ash from drinking water – none are trivial.

Often economic impacts reported are incomplete. For example, the 2000 Cerro Grande fire is estimated to have caused more than \$1 billion in documented direct economic impacts; only \$33.5 million of this was for fire suppression.⁶⁴

The potential costs for the Las Conchas fire are staggering. The suppression costs alone are over \$48 million.⁶⁵ The cost of testing water from the Buckman Direct Diversion is estimated at over \$250,000 and will be paid by the federal government.⁶⁶ Additional costs include: expenses to reclaim and revitalize the land burned, and to mitigate the damage of floods; the lost workdays and productivity; the permanent loss of Dixon’s Apple Orchard and the livelihoods of people who worked there; revenue loss associated with reductions in recreation and tourism; land-use loss to ranchers or other private land owners; and the enormous economic costs to Santa Clara Pueblo. In addition, there are non-market values of lost cultural sites, lost habitat, lost recreational opportunities, and lost ecosystem services.

Longer Term Impacts

The long-term impacts of the fire will vary. The floods that spread ash and sediment across the valley bottoms and riparian zones served as a natural fertilization event. Ash-derived minerals, nutrients and charcoal are important soil components, so plant life will benefit from the soil’s flood-driven enrichment. This enhanced plant growth will be attractive to wildlife, supporting a wide range of herbivores and pollinators. Stream channels that were not severely scoured by last summer’s floodwaters are healing and beginning to reveal a more productive and diverse ecosystem. However, deeply scoured stream channels will take much longer to recover.

Renewal will depend upon the severity of the burn, which is related to the condition of the area prior to burning. As mentioned before, some wildlife fared well in the initial fire, while others did not. At Bandelier, the story is mixed. Turkey vultures and coyotes have returned but other species, like black bears, will take longer and others, like the Goat Peak Pika, may not ever return. Forests that took over a century to grow will not return overnight. And, as discussed previously, flooding remains an ongoing concern.

Beyond issues of water quality and flooding, the long-term production of water by watersheds is impacted by fire. Fire affects both vegetation and soil characteristics that influence how snow and rain are taken up by the system through evaporation, plant use, groundwater recharge, and runoff. The timing of water delivery to the ecosystem (rapidly in a flood event or slowly by infiltration) affects stream system changes as well as the amount of water delivered downstream to farmers and communities. These downstream affects will be felt for years.

⁶⁴ (Morton, Rossing and Camp)

⁶⁵ (National Interagency Fire Center)

⁶⁶ (S. Matlock)

POLICY

Some people believe that the recent massive wildfires in the west are due, in part, to the forest management practices of the last 100 years. Arguing about past practices, however, will not solve the challenges of today. Going forward, a few of the main policy choices facing New Mexico include:

- Prevention practices (such as forest thinning, controlled burns)
- Fire suppression policies (when to let a fire burn, when to put it out, and the economic consequences of letting land burn)
- Government coordination (collaboration across state agencies, between state and federal agencies, and with Tribal Nations)
- Public information and safety (during a crises and pre-crisis emergency preparedness by families and communities)
- Post-fire environmental responses (water quality monitoring, forest rehabilitation, wildlife support)
- Post-fire economic responses (what to rebuild, pay for, lost wages)
- Flood policies (prevention policies, dams/diversions, and how to pay for needed structures)

Some of these areas are expanded in the remainder of this report.

Prevention and Management

The most extensive and serious problem related to the health of our national forests is the over-accumulation of vegetation, which has caused an increasing number of large, intense, and uncontrollable wildfires. Historically, fire was part of the natural ecosystem process, providing nutrients to the soil and encouraging growth. A goal of forest management during much of the 20th century was to protect timber resources and communities. The trade-off of this policy is that forests that often (naturally) burned every five to 20 years did not. Vegetation increased and the density of small diameter trees often became the norm.⁶⁷

New Mexico and forests across the west face important options: thinning, prescribed burns, logging (some say log more; others say log less), grazing (again, some say graze more; others say less), reducing use of the lands, or creating buffers between communities or homes and forests. All these ideas are advocated by one group or another, and all have pros and cons.

BURN OR THIN?

Every solution has costs. Thinning a forest costs about \$1,000 per acre; controlled burning costs about \$100 per acre.⁶⁸ However, the public is loath to endorse controlled burns. Said Bill Armstrong, Santa Fe National Forest, “When we light fires we’re sons of bitches. When we put out fires, we’re heroes.”⁶⁹ What are the trade-offs between thinning and prescribed burns that may burn out of control? What levels of risk are New Mexicans willing to accept?

⁶⁷ (Berry)

⁶⁸ (Abbott)

⁶⁹ (Abbott)

FEDERAL FIRE PREVENTION LEGISLATION

In April 2012, U.S. Congressman Ben Ray Luján (D-NM) introduced bipartisan legislation to help protect national forests and thereby water systems from wildfires. Co-sponsored by Congressman Paul Gosar (R-AZ), the Forest Stewardship and Fire Fuels Reduction Act of 2012 would provide a 10-year reauthorization of a federal program that funds removal of overgrown vegetation in forests – and thus reduces the potential devastation of wildfires.⁷⁰ The bill is currently in committee.

Fire Suppression

Wildfire suppression (putting out existing fires) has been the norm for most of the 20th century and into the 21st, and the policy was greatly influenced by catastrophic fires in the U.S. that resulted in massive loss of life. Prior to the 1960's, complete suppression was the policy and objective of forest fighting in the U.S. In the 1960's this changed from fire control to fire management and, in some cases, fires were allowed to burn until they threatened populated areas. Historically, a forest burning every five to 20 years is not uncommon.⁷¹

Practically speaking, however, a decision to let a fire burn makes people uncomfortable and – in some cases – those decisions lead to property damage, larger fires, or out-of-control burns.

Government Coordination

When preparing this report, authors repeatedly heard concerns about inter-agency, inter-government, or inter-department coordination related to fire prevention and management. Just within state government, at least half a dozen entities must coordinate.⁷² There are also multiple federal agencies (each with their regulations and policies). Furthermore, New Mexico has 23 sovereign governments representing tribes and pueblos.⁷³

Despite the challenges, from all accounts, the efforts of those who worked the Las Conchas fire were superb.⁷⁴ Maria T. Garcia, the Santa Fe National Forest Supervisor summed it up: “The successful containment of the Las Conchas Fire is the result of the tremendous involvement and coordination of many people, from many agencies, and jurisdictions.”⁷⁵ However, coordination may be improved on prevention, watershed management, and post-fire reconstruction operations.

WHAT'S BEEN DONE?

There are several policy documents in place, including (but not limited to) the following.

- New Mexico's *Resource Mobilization Plan* for wildfire and urban interfaces, which provides coordination guidelines between ENMRD, Forestry Division, and local governments (updated in 2011).⁷⁶

⁷⁰ (Democracy for New Mexico)

⁷¹ (Abbott)

⁷² At minimum, coordination must occur between the NM Energy, Minerals, and Natural Resources Department, NM Environment Department, NM Game and Fish Department, and many divisions (especially the State Forestry Division) housed within those agencies.

⁷³ (National Conference of State Legislatures)

⁷⁴ (Valles Caldera Trust)

⁷⁵ (USACE)

⁷⁶ (New Mexico Resource Mobilization Plan: Mobilization Guide for Utilizing NM Fire Department on Wildland-Fire Incidents)

- The federal *Cohesive Wildfire Management Strategy*, partnering the Departments of Agriculture, Interior, and Homeland Security (formed in 2010).
- The *New Mexico State Water Plan*, which includes goals for management of wilderness watersheds.⁷⁷

EFFECTIVE COORDINATION

A difficulty in any fire is the dissemination of information. For example, during the Cerro Grande fire in 2000, people were concerned that legacy contaminants from Los Alamos National Laboratories would wash into surface water, impacting water quality. An “Interagency Flood Risk Assessment Team” was developed to monitor and study environmental impacts. An IFRAT was also formed during the Las Conchas fire to coordinate environmental monitoring and storm water runoff. The team including LANL, New Mexico Environment Department, and the New Mexico Department of Health. While LANL and NMED were mainly responsible for collection and analysis, DOH disseminated the information to the public. Tom Skibitski, New Mexico Environment Department, described the coordination between agencies as effective, noting that it could be replicated.⁷⁸

COORDINATION WITH TRIBAL GOVERNMENTS

This report previously summarized Santa Clara Pueblo’s 2011 fire impacts. Later that year, Santa Clara Pueblo Governor Walter Dasheno, testified before the U.S. Senate Committee on Indian Affairs. He called for improved coordination among key agencies (including Interior, Energy, Agriculture, Army Corps of Engineers, Homeland Security, Housing and Urban Development, and Commerce) to establish an inter-agency standing taskforce to address Indian Country emergencies.

In his 2012 testimony before the Indian and Alaska Native Affairs Subcommittee of the House, Natural Resources Committee Governor Dasheno spoke with gratitude for the federal support the Pueblo received for flood mitigation and forest restoration, but raised the issue of excessive or duplicative federal laws and regulations which conflict with each other and with the laws, regulations and customs of the Pueblo. The lack of coordination among these law, regulations and customs cause delay that can be ill afforded when disaster strikes and recovery needs to move forward.

Flood Policies

As noted previously, floods often follow wildfire. In the case of the Las Conchas fire, the floods resulted in a Presidential Disaster Declaration for the area. This allows federal disaster aid to help reduce the impact. U.S. Senators Jeff Bingaman and Tom Udall and Representative Ben Ray Lujan are seeking federal funds for structures and plans that would reduce the threat of flooding on the Santa Clara Pueblo in the coming months. These actions would not only help reduce the impact of floods in the next year, but would also provide assistance in develop long-term planning for future fires and floods. (Funds are being sought from the Department of the Interior, Federal Emergency Management Agency, and the U.S. Army Corps of Engineers.

⁷⁷ (New Mexico Office of the State Engineer)

⁷⁸ (Skibitski)

CONCLUSION

To a large extent, the Las Conchas fire was a perfect storm – substantial fuel, extremely dry conditions, New Mexico’s second worst drought on record, high winds, and a power line spark. While some elements may change, another perfect storm could easily occur this fire season, or the next. While we have focused primarily on the Las Conchas fire, it was certainly not the only wildfire in New Mexico during 2011 – it was simply the largest. While we cannot rewrite history, we can learn, assess, take action, and try to change the future. Toward these ends, we reiterate the five questions with which we began:

- What can we learn from the Las Conchas?
- How can we reduce the probability of severe wildfire?
- How can we best cope with the aftermath?
- How can we manage recovery after a fire to achieve healthy, sustainable ecosystems?
- How can New Mexico be better prepared for the future?

These are but a few of the questions that could be considered – and may not be the most important ones. But what we do know is that the only way we change future outcomes from fires is to begin a long-term process now that provides direction and sustainable actions.

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