Defusing Time Bombs

On a warm spring day in June 1971 I was a high school kid pumping gas at the village grocery and gas station in Jemez Springs, New Mexico when I looked up to the mesa and saw a mushroom cloud. I felt a Cold War chill, and thought: This is it! The Russians have nuked Los Alamos! I quickly realized that the cloud wasn't in the right direction. Then I knew -- it was a forest fire. At that moment, my father, a Forest Service District Ranger, was pulling his fire fighters out of harms way as the wildfire exploded across the ponderosa pine forests on Cebollita Mesa. That 5,000-acre burn was my initiation to the catastrophe of crown fires in ponderosa pine forests.

Six years later, as I was walking across the campus of the University of New Mexico in Albuquerque, I caught sight of another mushroom cloud over the Jemez. This time the direction was precisely in line with Los Alamos, but I knew immediately that it wasn't a preemptive Russian strike. The 15,000-acre La Mesa wildfire raged on for days and very nearly blew through Los Alamos. La Mesa wasn't the first close call. In the extremely dry year of 1954 a big fire burned toward the town, but was stopped short by hundreds of National Laboratory workers who grabbed shovels and dug fire line. Then again in 1996 and in 1998 the people of Los Alamos watched nervously as enormous infernos approached – and they wondered: Is this it? Is this *the big one*? The deadly symmetry was all too obvious. The birthplace of the ultimate, human-created firebomb was gripped by fear of another kind of firebomb, one created by both humans and nature.

Now, *the big one* – the Cerro Grande fire – has consumed hundreds of Los Alamos homes and countless trees in the surrounding 47,000 acres. The tragedy of this event extends across many levels. The personal and public property losses are heartbreaking. The pain is also acute for those of us who knew the beautiful forests and streams of the Jemez that are now blackened and ash covered. Soil erosion, floods, and debris flows may soon cause further havoc in Los Alamos and create permanent scars on the landscape. These calamities are bad enough, but I fear that more fire-generated tragedies are in our future if we focus entirely on recent mistakes, and ignore more deeply rooted problems in forest and fire management.

Mistakes have indeed been made, but they did not begin with a decision on May 4th to start a prescribed burn on Cerro Grande. The mistakes began more than a century ago when too many sheep and cows were brought into the grasslands and forests of the Southwest. Heavy livestock grazing interfered with ancient patterns of burning because grass was the essential fuel that carried low intensity fires extensively through the forest understory. This type of fire cleanses the forest floor of branches and pine needles that accumulate in our dry climate. The mistakes continued when government foresters decided that all fires were the "scourge of the forest" and must be extinguished regardless of intensity and ecological benefits. The mistakes continued when we built our places of work and homes in the middle of forests that *must and will* burn -- sooner or later. The mistakes were compounded on May 4th as managers at Bandelier National Monument miscalculated the risks of prescribed burning following a La Niña winter.

We all share responsibility for these mistakes. Before I explain this *mea culpa*, here is some necessary background: For years my colleagues and I have studied the history of forest fires and climatic changes in the Jemez Mountains and the Southwest. My specialty is the use of tree rings to reconstruct the patterns of past fires over periods of centuries and millennia. It is clear from these tree-ring histories that, until the late 19th century when sheep and cattle grazing dramatically increased, the understory of ponderosa pine forests burned with low intensity surface fires at least once or twice per decade. Despite the hype of newspaper headlines, Cerro Grande was not "the largest fire in the history of New Mexico". In fact, before the 20th century, fires swept over millions of acres in the Southwest. Some of these big fires are mentioned in 19th century newspapers, and they are also recorded in our tree-ring chronologies. Massive fires, for

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example, burned in many Southwestern mountain ranges during the dry years of 1748, 1851, 1861, and 1879. The important differences between pre-20th century surface fires and the conflagrations of today are in the amounts of heat generated and the numbers of trees killed. As far as we can tell, the big "stand-replacing" crown fires that blow thousand-acre holes in pure ponderosa pine forests are primarily a modern artifact of a century of fire exclusion and the resulting unnaturally dense stands.

To return surface fire to its historic and essential ecological role in the forest, my repeated advice to managers has been "Use prescribed fire frequently and extensively". My drumbeat on this score is far from solitary. A great bulk of scientific weight from throughout the country has been solidly behind this push, as well as the strong encouragement of some politicians, such as Secretary of Interior Bruce Babbitt. The prime motivation behind prescribed burning is not just to restore fire for ecological reasons, but also to avoid future catastrophes like Cebollita, La Mesa and, ironically, Cerro Grande.

So, it is only natural that the managers of Bandelier and elsewhere have felt scientific and political pressure to burn more acres. In doing so, they have taken chances on weather conditions because in some places, such as at 10,000 feet elevation on Cerro Grande, relatively dry conditions are needed for fire to consume the accumulated fuels and thin the overly dense forest. The managers know this is a risky business, but they have come to trust their models and decision-making procedures because, most of the time the planning is done well, the weather cooperates, and the burns are carried out safely. "Most of the time", however, is not good enough when the exceptions cost millions of dollars, human suffering, and permanent ecological damage. And lest we forget, here is another painful reminder of the dangers involved: In 1993 a prescribed fire on the opposite side of the Jemez Mountains claimed the life of a Forest Service firefighter from Jemez Pueblo. In hindsight, these were mistakes of emphasis, overconfidence, and hubris.

The long-term history of fire and climate in the Southwest offers some lessons that might help us avoid repeating some of these mistakes in the future. One of these lessons is that year-toyear climate and fire hazard is highly variable in the Southwest, but somewhat predictable during certain years. For example, during dry La Niña winters and springs fires often erupt in the accumulated, dry fuels with extraordinary intensity in many different places in the Southwest. Note that most of the big Jemez fires since the 1970s, including the Cerro Grande burn of 2000, occurred during dry La Niña conditions that followed, within a few years, an El Niño event. The tree rings tell us that similar El Niño/La Niña cycles and related extensive fires have occurred repeatedly in the Southwest for at least three centuries. This is what the historian Stephen Pyne calls the "two-cycle engine" of Southwestern fire regimes: fuel intake on the wet El Niño upstroke; fuel compression on the dry La Niña down stroke. All that's needed is the spark. Recent improvements in our understanding of seasonal climate patterns during El Niño and La Niña years have given us tools to forecast winter and spring precipitation in the Southwest more than three months in advance. Forecasts for a continued dry winter and spring were available to managers by January. These forecasts have considerable uncertainty and are most relevant to seasonal and regional patterns, but given the general consistency of La Niña-fire patterns, wouldn't it be prudent and sensible at the regional level to curtail prescribed burning during the dry spring months of La Niña years while also preparing to fight multiple large, severe fires?

Even without the historical perspectives of three hundred years and modern climate forecasting tools, the importance of dry winters in leading to bad fire seasons is common knowledge among some "old-timers" in the Southwest. The old timers know that during springs like this one a hot dry wind is apt to suddenly blow in off the parched desert, and a tame surface fire can become a raging monster in a flash. Such knowledge does not hinge upon computer models and their assumptions that only short-term weather and local fuel moisture conditions are important. It also does not depend upon multi-step decision procedures and subjective rating scales to determine the "complexity" of a planned prescribed burn. What is needed is the wisdom and caution of experienced fire managers (many of whom are rapidly retiring from service) who recognize that there are many things we do not know or understand about fire behavior. We also need decision makers at the regional and national levels who grasp the "big picture" that extends beyond the limited spatial boundaries of a particular National Monument or Forest, or limited temporal conditions of weather and fuels over a period of days or weeks.

Based on the Cerro Grande investigation reports, it is evident that mistakes were made. The investigative panels generally concluded that if the managers at Bandelier had correctly followed the planning procedures that were in place, the Cerro Grande wildfire would not have occurred. They might be right. On the other hand, assumptions that all would have been fine if procedures were followed could well be just another bit of dangerous hubris. The investigative reports have little to say about responsibility at management levels above Bandelier, yet it is important to note that regional Forest Service managers had already suspended prescribed burning on Southwestern National Forest lands by May 4th because they recognized the danger of the dry weather and the threats across the region as a whole. The Forest Service regional moratorium on prescribed burning, however, may also have been a bit slow in coming. In late April a prescribed fire just north of Tucson got away from Forest Service managers, but luckily they controlled it before it roared through the town of Oracle. Another Park Service prescribed fire on the north rim of the Grand Canyon escaped control at about the same time as Cerro Grande. Were these also just mistakes by local managers?

At this point, it would be wise to step back and ask some other questions: Do we adequately understand all of the climate, weather, and fuel processes that lead to crown fire disasters? Are we using all of the science available to plan and schedule prescribed burns across the west over the short and long term to ensure reduction of fuels while minimizing risk? The Cerro Grande investigation reports may reassure some in the agencies that the planning process as it stands is mostly OK, but in an era of changing climate and altered ecosystems, I am not so sure.

We need to learn from past mistakes, but we also must not lose sight of the fact that we still have ticking time bombs in our forests. When the bombs exploded near Los Alamos on at least four other occasions, the city was spared – mostly by luck. Any one of these other big fires over the past 46 years could have torched the city, and fire managers started none of them. It is beyond tragic that the Cerro Grande bomb exploded over Los Alamos while fire managers were trying to defuse it. Bombs are still ticking in many other forests of the Southwest, and lightning or humans *will* eventually set them off, unless we successfully defuse them first. It is my hope that the Cerro Grande tragedy will not be compounded by focusing entirely on recent errors in judgment by a few managers at Bandelier. A broader acceptance of the collective responsibility for past mistakes and future solutions is called for, especially from regional land managers, fire scientists, local community leaders, and homeowners who live within flammable forests. It is time for all of us to learn a lesson in humility about what we know and don't know, and what we can and cannot predict about climate, weather, and fire behavior.

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