Wildland Fire Lessons Learned Center
Advances in Fire Practice

The 2007 Southern California Fires: Science and the Chaparral

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The October fires in southern California brought national media attention to many of the issues that are front and center in wildland fire research. It was heartening to see newspapers across the country move stories about the growing growing wildland-urban interface onto the front page, hear Max Moritz on NPR talking about inadequacy of fuel modification in stopping Santa Anna driven fires, and listen to excellent, detailed stories on the need for fire resistant building codes in fire-prone areas. There was also a detailed examination of the potential and limitations of the shelter-in-place program in Rancho Santa Fe.

But, given the complex nature of wildland fire, the reporting did not always get it completely right.

Satellite Imagery showing smoke from 2007 San Diego fires. Photo: NASA

Almost all reports on the fires contained references to the links between climate change and the southern California fires. As overstatements and misperceptions mounted, Anthony Westerling, Thomas Swetnam, and Greg Garfinn, some of the most well-known researchers on wildfire and climate links, issued a statement attempting to explain the nuances involved in attempting to link individual fires to as broad of a process as climate change.

There were also the familiar outcries against the Forest Service's history of fire suppression and the need for more logging, despite the fact that both of these issues were not relevant in the context of chaparral fires.

Nonetheless, media attention always brings the opportunity for highlighting wildland fire issues and improving public education. And in that spirit, we are going to take the opportunity to highlight some of the research issues connected to the Southern California fires. There are a number of interesting scientific debates related to fires in southern California. First, the role of fire suppression in either constraining or increasing the frequency and size of the fires in southern California has been hotly debated in scientific circles. And in a related issue, researchers are looking at the impacts of fuel modification programs in promoting invasive weeds and grasses that ultimately shift landscapes towards more fire-prone systems.

And, given that these fires occurred in one of the most dense human populations in the country there are a number of policy issues related to limiting growth and development and building homes designed for withstanding these fires that will likely receive increased attention.

Does Southern California 'Need-to-Burn'?

For the few decades there has been an ongoing scientific debate as to whether the massive southern California fires like we witnessed this past October are natural and infrequent events in the chaparral ecosystem or are the result of a fire suppression policy that has allowed an unnatural accumulation of fuels. The fire suppression theory has guided land management policy in the region for decades based on the idea that landscape level fuel management can ultimately limit the size of these massive fires. A growing body of research has called that paradigm into question, and the results have big implications for land and fire management.

Back in 1983 Richard Minnich published a paper in Science arguing that the chapparral's natural fire regime was frequent, relatively small fires. The argument was based on analysis Minnich conducted using satellite imagery to compare fires that had occurred in chaparral systems between 1972 and 1980 on the Mexican and California side of the border. On the Mexican side where fire suppression was minimal, the pattern appeared to be lots of small fires. On the California side where fire suppression was supposedly high, far more acres had burned in seemingly large chunks. Minnich proposed the theory that frequent small fires on the Mexican side created a mosaic of different aged stands with a large proportion of younger, moister stands that kept fires small and less intense. So the argument went, if we would only allow more fires to burn, or use more prescribed fire to mimic that patterns found on the Mexican side, we could bring the large devastating fires under control.

The trouble was that Minnich had included two large fires in California that had occurred before 1972 – massive fires from 1932 and 1970, and once these were removed the differences between the two areas is much less striking.

Chaparral being type-converted to weedy, non-native grassland. Go to Chaparral Institute webpage for full explanation. Photo: California Chaparral Institute

Since the early 1990s, a number of researchers including Jon Keeley, Max Moritz, Scott Mensing and C. J. Fotheringham have been publishing research that counters some of the basic propositions of the Baja fuel mosaic model. Keeley and his colleagues have shown that despite heroic efforts fire suppression has been far from successful in southern California since the late 1800s. The number of fires per decade has increased and there has been no significant decline in area burned. The researchers link the increasing number of fires and area burned to the expanding population density, not accumulating fuels.

In addition, one of the basic tenets of the Baja mosaic model is that smaller fire size becomes the norm in the absence of fire suppression, and that with suppression fire size increases. Keeley's research found just the opposite - that there has been no increase in the average size of wildfires. Indeed, said Keeley, the average wildfire size has significantly declined since record keeping began in the late 1800s.

The argument that younger fuels constrain the growth of large fires has also been questioned. Max Moritz has shown that fuel age does not affect the probability of burning – the large, wind-driven Santa Anna fire burn through young and old stands alike. In fact, much of the recent fire burned through stands that had burned during the 2003 fires.

Perhaps most importantly, research is also showing that prescribed burns and other fuel modification efforts may ultimately exacerbate the fire problem by introducing invasive plant species to the chaparral that can ultimately push out native species and increase the probability of burning. In fact, the increased frequency of burns is already converting large portions of the chaparral and creating a negative cycle of invasion by highly flammable exotic grasses which in turn leads to increased fire frequency.

Like most complex questions, solutions do not come easy, but most researchers agree that it starts with the built environment – focusing effort and resources on building future developments with fire-risk firmly in mind, and developing strategies for protecting existing developments with a strategic fuel treatment programs aimed at creating defensible space around communities. That will be the subject for the next installment of Advances in Fire Practice's look at the San Diego fires.

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