Chaparral Fire Science Debate Continues

By Josh McDaniel
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During the past three or four days destructive fires have been raging in San Bernadino, Orange and San Diego… It is a year of disaster, wide-spread destruction of life and property—and, well, a year of horrors.

No, this isn't a headline from this past-November's new round of fires in southern California. This was taken from an article in a September, 1889 issue of The Daily Courier, San Bernadino. Jon Keeley, a research ecologist with USGS, and Paul Zedler, a plant ecologist with the University of Wisconsin, use the historical quote at the beginning of their recent paper in Ecological Applications to highlight their finding that large, high-intensity wildfires are a natural part of the southern California landscape. The paper titled, Large, high-intensity fire events in southern California shrublands: Debunking the fine-grain age patch model, is the latest in an ongoing scientific debate as to whether the massive Southern California fires 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.

In the recent paper, Keeley and Zedler argue that large, high-intensity wildfires were common before the advent of modern fire suppression policy. Based on historical documents, the researchers conclude that the 1889 Santiago Canyon Fire in Orange County is the largest fire recorded in California and likely exceeded 300,000 acres.

Keeley and Zedler also reported that over the last 125 years there has been no significant change in the incidence of large fires greater than 25,000 ac, consistent with the conclusion that fire suppression activities are not the cause of these fire events.

The researchers found that the biggest fires are actually connected to periods of drought. Eight extremely large "megafires" (> 150,000 ac) have occurred since the 19th century, and all were preceded by unusually long droughts, from 1–4 years. It is hypothesized that these droughts have led to increased dead fuels, and modeling shows that this promotes the incidence of firebrands and spot fires. Since dead fuels persist for many years, the potential for severe fires may continue long after droughts end.

For decades, land-management policy in the region has been 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.

Santa Anna wind-driven fires and smoke on Oct. 26, 2003. Note the apparent lack of Santa Ana winds on the fire further south near Santo Tomás (ST arrow at bottom of panel) due to effects of the Gulf of California and San Pedro Mártir.

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

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. Moritz has shown that fuel age doesn't 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 in 2003.

This debate will likely continue given the high profile nature of fire in southern California. While the area is, in many ways, very different from much of the rest of the country in terms of its fire regime, the dramatic intersection of a large and growing population and a fire-prone landscape makes it the epitome of the challenges facing fire and public lands managers, as well as policy-makers. Solutions to the continual cycles of fire and destruction in southern California will necessarily involve some combination of fire suppression and fuels management, and this scientific debate is helping to tease out the advantages

and drawback of each approach. But, the Keeley research shows that these questions are not new, and that until individuals and policy-makers face up to the realities of placing lives and ignitable homes and businesses in the path of fire, the evacuations and the destruction will continue.

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