The Baja-Southern California Fire Model

It is a common perception that wildlands are unnaturally overgrown with a half-century's worth of highly combustible brush and small trees because of successful firefighting efforts since the 1950s. In addition, environmental groups and government regulations are often blamed for preventing thinning and prescribed burns to help alleviate this buildup because of misguided priorities. Such oversimplifications of a very complex problem are not helpful in finding solutions. They also have nothing to do with California's most characteristic wildland, the chaparral.

It does appear that some, but not all, of our nation's forests are unnaturally overgrown, a consequence of past logging and grazing practices as well as fire suppression efforts. However, without understanding the dramatic differences between forests and the chaparral-covered hillsides in California, some are promoting a single solution to deal with the threat of wildfire everywhere. This will not only lead to inappropriate use of scarce resources, but will do little to prevent the kind of firestorm southern California experienced in 2003.

The notion of performing controlled burns to alternate patches of backcountry chaparral as a way to prevent wildfires is the basic tenet of the Baja-Southern California Fire Model first suggested by R. Minnich in 1983. This model is based on the hypothesis that the size of wildfires north of the Mexican-Californian border are larger than those in Baja because of dramatically different fire management strategies.

According to this theory, a century of fire suppression in Southern California has caused an "unnatural" accumulation of brush that has consequently led to large, destructive chaparral fires. A map showing small fire perimeters south of the border and large ones to the north is often used as supporting evidence.

The map is convincing and the logic appears reasonable. However, after being tested by a diversified group of scientists over the past ten years, the Baja-Southern California Fire Model fails for a simple reason. It ignores a significant number of important variables.

Scientifically, the comparison between southern California and Baja is problematic because of variations between the two regions as well as how the data was collected. Baja is much drier, has different soil types, and is not subject to the same Santa Ana wind conditions as Southern California. In addition, the Baja landscape has been heavily damaged by ranchers who consistently burn back natural vegetation in order to increase grasslands. It is difficult to find an area south of the border that does not show signs of grazing activity.

The other important factor to consider in the Baja comparison is how fire perimeters were determined. In California, fire size is recorded and mapped by state agencies. Such detailed records do not exist in Baja. Instead, fire perimeters in Baja have to be estimated by LANDSTAT satellite images and subjective, on the ground measurements. These create two completely different data sets which are consequently difficult to use for any comparative analysis. In addition, smaller fires that were extinguished by firefighters in California before they became large ones were left out of Baja/California comparisons.

Extensive research by J.E. Keeley and C.J. Fotheringham has shown that burn patterns have not changed significantly in Southern California since 1878. The California Statewide Fire History Database clearly indicates that since 1910, the mean size of fires in San Luis Obispo, Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside and San Diego counties has remained constant. The timing of fires is equally consistent, with most igniting June through November with September representing the most flammable period (**reference #1:** http://www.werc.usgs.gov/fire/science2.pdf).

In a study by S.A. Mensing and others, seabed charcoal deposits off the coast of Santa Barbara County have shown that the frequency of large, Santa Ana driven fires has not changed over the past 500 years (**see reference #2**). Similar results are produced even when comparing years before and after 1950 when advanced fire suppression technology was developed and utilized on a massive scale. The only important change revealed by these studies has been an increase in fire frequency during modern times, not a decrease.

Fire in chaparral is a natural, unpreventable event. Despite all our efforts to control them, large chaparral fires have continued unabated since our arrival in California. The assumption that old stands with an "unnatural accumulation of old brush" encourage fires to spread and become more dangerous is inaccurate. Studies by M. Moritz and others have shown that fuel age does not significantly affect the probability of burning. These findings analyzed some of the same data used in the Baja Model (**reference #3:** http://www.werc.usgs.gov/seki/pdfs/Link4106.pdf).

P. Zedler examined the same question through mathematical modeling and arrived at the same conclusion. Under Santa Ana conditions, fire rapidly sweeps through all chaparral stands, regardless of age. Once the flames start, everything burns (**see reference #4**).

Years of fire suppression have not been successful in excluding fire in chaparral landscapes. Relying on non-strategic prescribed burning in the backcountry in order to create mosaics of "mixed-aged stands" will likely prove to be equally frustrating (**reference #5:** http://www.werc.usgs.gov/seki/pdfs/envmgt2002.pdf)

What is the solution then?

The first task is to objectively examine the research. Unfortunately, fire management has become increasingly politicized. Instead of scientifically analyzing the data, some have the tendency to personalize the discussion and assign names or labels to particular positions. This is not only counterproductive, but confuses the public about how science is supposed to work. There are no positions. There are only collections of observations and facts with conclusions being derived from such data. By looking at the methods, the scientific design, and underlying assumptions, it becomes relatively easy to determine whether or not ignored variables or biases have influenced the results.

Another challenge is to implement fire-safe community planning and long term education programs to help maintain the public's fire vigilance. Unfortunately, developers will continue to be allowed to push farther into the backcountry as the population continues to grow. Homeowners will become complacent again as time goes on and allow fire-prone vegetation to slowly accumulate next to their homes.

The best way to reduce the damage of wildfires is to allocate scarce fire management resources at the urban interface between development and chaparral and develop strict building codes reducing wildfire risk. This includes new regulations requiring the removal of fire dangers present now such as wood shake roofing and volatile pine and Eucalyptus trees near homes, designing fire-safe vents for attics, and carefully performing strategic vegetation management directly around communities.

Leave the rest of the landscape alone.

You will need Adobe Acrobat to read the referenced papers below. You can go here to download if you don't have it: http://www.adobe.com/products/acrobat/readstep2.html

#1 Keeley, J.E., Fotheringham, C.J., Morais, M. 1999. Reexamining fire suppression impacts on brushland fire regimes. Science Vol. 284. Pg. 1829-1832. www.werc.usgs.gov/fire/science2.pdf

#2 Mensing, S.A., Michaelsen, J., Byrne. A 560 year record of Santa Ana fires reconstructed from charcoal deposited in the Santa Barbara Basin, California. Quaternary Research. Vol. 51:295-305.

#3 Moritz, M.A., J.E. Keeley, E.A. Johnson, and A.A. Schaffner. 2004. Testing a basic assumption of shrubland fire management: Does the hazard of burning increase with the age of fuels? Frontiers in Ecology and the Enviroment. 2:67-72. http://www.werc.usgs.gov/seki/pdfs/Link4106.pdf

#4 Zedler, P.H., Seiger, L.A. 2000. Age Mosaics and Fire Size in Chaparral: A Simulation Study. In 2nd Interface Between Ecology and Land Development in California. USGS Open-File Report 00-02, pp. 9-18.

#5 Keeley, J.E. 2002. Fire management of California shrubland landscapes. Environmental Management 29: 395-408. http://www.werc.usgs.gov/seki/pdfs/envmgt2002.pdf

Here's a full set of references in our bibliography:

http://www.californiachaparral.com/pages/11/index.htm