

Western Ecological Research Center

Publication Brief for Resource Managers

Release:

January 2010

Contact:

Dr. Jon E. Keeley

Phone:

559-565-3170

Email and web page:

jon_keeley@usgs.gov

<http://www.werc.usgs.gov/products/personinfo.asp?PerPK=33>

Sequoia and Kings Canyon Field Station, USGS Western Ecological Research Center, 47050 Generals Highway #4, Three Rivers, CA 93271

Fuel Age and Fire Spread in Chaparral Ecosystems

In southern California, where wildfires occur predominately in shrubland ecosystems such as chaparral, there is continual debate over the relative roles of weather and fuels in fire spread. During Santa Ana wind conditions, often characterized by single-digit humidity, temperatures over 90 degrees F., and 80 mph sustained wind speeds, weather typically overwhelms the influence of fuel type. During milder conditions, fuel type becomes much more important. In a paper published in the recent issue of *Fire Management Today*, USGS scientist Jon Keeley coauthors a paper with colleagues from the California Chaparral Institute that analyzes these factors in a case study of a critical part of the 2003 Cedar Fire perimeter in San Diego County.

What drives and stops wildfires is a complicated interplay of variables that can lead to countless possible outcomes. As every wildland firefighter learns in basic training, the ability of a fire to spread is determined by three basic variables: fuel type and condition, weather, and topography. Fire suppression obviously plays a significant role in determining fire spread, so firefighter activities becomes an additional variable as well.

To examine these issues and better understand the interplay of variables that determine fire spread, the authors examined sites within the perimeter of one of the largest fires in California history and considered fuel structure, weather, and personal interviews with firefighters to reconstruct fire behavior at this critical point of fire spread.

This research showed that 3-year-old, post-fire native vegetation in a recovering chamise chaparral stand was capable of carrying a fire under moderate weather conditions and under more severe weather could generate

Management Implications:

- In chamise chaparral, 3-year-old fuels will not provide a barrier to stop wildland fires but under the right weather conditions will generate fire intensities safe enough to allow fire fighting activities.
- Under Santa Ana wind conditions, shrubland fires will readily burn through young stands of vegetation, as evident by San Diego County's 2007 firestorm where over 50,000 acres of 4-year-old recovering shrubland that had burned in 2003, reburned as the wind-driven fronts of the 2007 Poomacha, Witch, and Harris Fires pushed into previous fire scars.
- Reburning of younger vegetation has potential negative impacts on vegetation recovery because it favors the spread of non-native weedy species over recovery of the natural biota.

substantial flame lengths and spread rates. The 3-year-old fuels within the 3-year-old fire scar did, however, make it possible for firefighters to approach the area with acceptable risk to conduct fire suppression activities. Their actions coincided with a wind reversal that caused the fire to back downhill, contributing to suppression success.

Halsey, R.W., J.E. Keeley, and K. Wilson. 2009. Fuel age and fire spread: Natural conditions versus opportunities for fire suppression. Fire Management Today 69(2):22-28.

[Complete article can be downloaded from web site listed at top of previous page.]