

Special Session: “The 2003 Southern California Fires: Science Insights Into the Fire Event and Recovery.” Jon E. Keeley Organizer

WEATHER, FUELS, AND SUPPRESSION DURING THE CEDAR FIRE: WHICH VARIABLES MADE THE CRITICAL DIFFERENCE?

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Introduction

There is often controversy surrounding the relative role of individual variables affecting spread and extinguishment of wildfires. The 2003 Cedar fire in San Diego County, California, provides an excellent opportunity to examine these variables because it covered such a large area and involved numerous environmental conditions and suppression strategies. This study is a comprehensive analysis of the variables involved that determined the final fire perimeter and fire behavior at various points within the fire perimeter. Through both on-site investigations and extensive interviews, this study utilizes a rich data set that is frequently ignored in many fire research projects, namely the on-site experiences of firefighting professionals.

Methods

The Cedar fire burned 110,664 ha (273,246 acres) with an approximate final perimeter of 110 km (178 miles). The fire perimeter was examined regarding fuel type, presence of roads and development, time and weather conditions when the fire was extinguished, and firefighting resources deployed. Data were collected from nearby RAWS facilities, post-fire field observations, and firefighter interviews. Specific sites were selected for more detailed examinations based on their potential for having been important fire transition points, and if an adequate amount of data were available. Sites selected for particular focus were: 1) San Clemente Canyon western terminus, 2) West Sycamore Canyon, 3) Tragedy Springs prescribed burn site, 4) Sweetwater River canyon overlook, and 5) Volcan Mountain extension.

Results and Discussion

What drives and stops fires is a complicated interplay of variables that can create thousands of possible outcomes. In order to better understand these variables it is helpful to group them into main categories: **fuel type and condition, weather, topography, and fire suppression activities**. Expanding the temporal range of examination, **decision** variables such as past land planning decisions, firefighter experience levels, relationships between agencies, pre-fire activities, plus **climate** variables including past weather conditions, and changes in climatic patterns play significant roles as well. Although this

study is primarily focused on the conditions present during the actual time of the fire, from October 25 to November 4, 2003, understanding the background matrix in which the fire occurred is valuable and was examined as well.

Preliminary results estimate that of the approximate 110 km of perimeter line, 30% formed after making direct contact with heavily developed communities, 11% was created by bulldozer activity, 8% terminated at or near the boundary of the one-year-old Pines fire scar (nearly half of which also bordered county highway S1), and 3% aligned with backcountry roads. The remaining half formed due to the interplay of numerous factors including non-dozer suppression activity, topography, changes in fuel, and favorable weather changes, with strong winds and low humidity often being the most influential. Although saving lives and structure protection rather than perimeter control was the primary objective for firefighters during the first 24 hours of the fire, there were some remarkable firefighting actions taken that prevented the fire from spreading further. These will be detailed in this study's forthcoming, final publication.

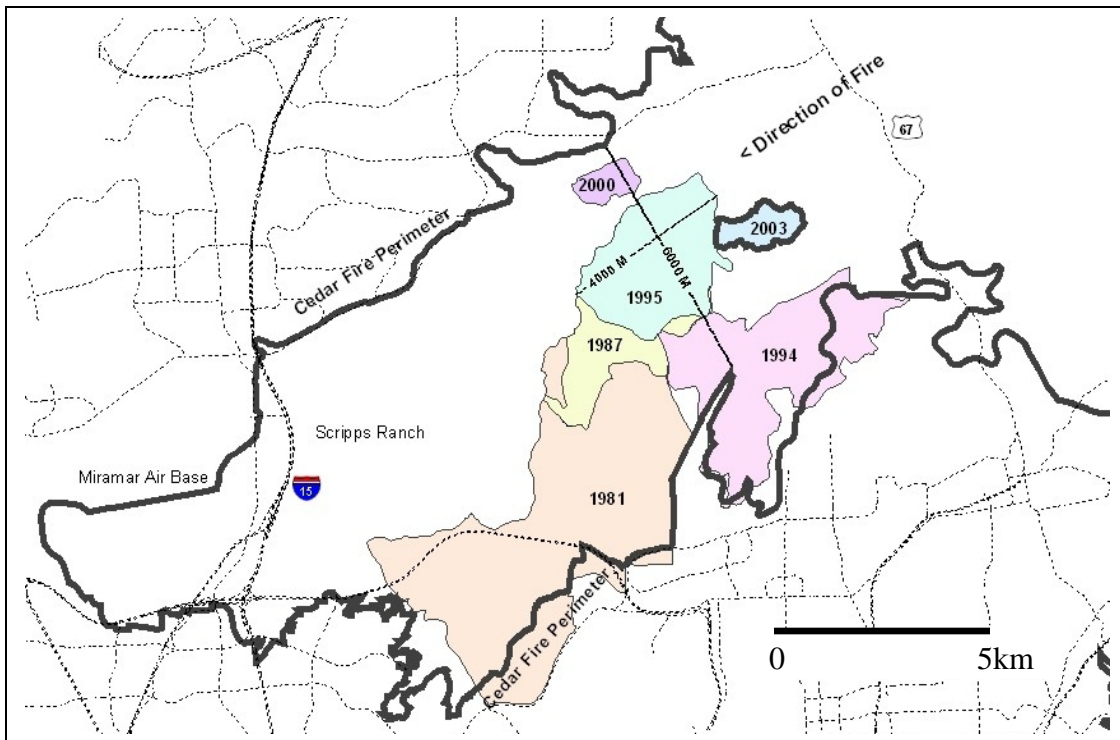


Fig. 1. Previous fire scars at western terminus of the Cedar fire. Three fire scars color-coded by year burned (1994, 1995, 2000) straddled the area east of the heavily impacted Scripps Ranch community. Fire was carried by strong winds and was not impeded by the younger fuels. Cedar fire perimeter is shown as a bold, black line.

Sample Focused Study Site: West Sycamore Canyon

After jumping State Highway 67 at approximately 5:30AM Sunday, October 26, the fire was heading rapidly southwestward toward the community of Scripps Ranch.

Approximately four miles after the highway jump the flames made contact with several previously burned areas (1994, 1995, and 2000) spanning nearly the entire width of the final fire front at that location (Fig. 1). The chamise dominated, younger-aged fuels (9, 8, and 3 years old) in these burn scars were unusually sparse due to the extended drought conditions in previous years. Maximum dimension of the previously burned area was approximately 6 km (3.72 miles) in width by 4 km (2.48 miles) in depth. The fire front moved almost precisely with the developing wind front with gusts up to 42.6 km/h. The wind/fire front crossed 67 about 5:30AM, made contact with the previous fire scars in question about 7AM, and hit the first home in Scripps Ranch around 8:30AM.

Summary and Conclusions

Multiple variables determine how a wildfire spreads and ends. This is nothing new to wildland firefighters. However, when attempting to deal with wildland fire risk there has been a tendency for some government entities to focus on single variables (such as fuel reduction) while minimizing others (SDCBOS 2003). Others have taken a more comprehensive approach (CFRO 2006). While lower fuel loads definitely facilitated suppression efforts of the Cedar fire in some areas, it failed to do so in others because other variables, especially wind, were much more influential. If a fuel modification project had been placed to protect the Scripps Ranch community from an eastern wind-driven fire event, the West Sycamore Canyon focused study site would have been a reasonable location (Fig. 1). However, the fire failed to stop there due to extreme weather conditions despite the lighter fuels.

Wildfires represent a finite slice in time, but many variables that can influence a wildfire's ignition, spread, and damage are established years before. For example, it is likely that the Cedar fire would have never occurred if the Cleveland National Forest had been closed to recreational use due to fire risk, as had been tried in 2002. A lost hunter was responsible for setting the blaze. However, due to extreme political pressure (it was deer hunting season) the USFS didn't repeat their closure attempts. San Diego County Board of Supervisor's decisions allowing development in vulnerable areas and failure to fund a countywide fire department influenced the fire's spread into the wildland/urban interface. "Why do fires behave and stop where they do?" is not a one answer question. Efforts and policies intended to reduce wildfire risk should consider this fact as well as the total, long-term economic and resource costs involved.

References

CFRO. 2006. Fire Information Tool Kit. <http://firecenter.berkeley.edu/toolkit/>

SDCBOS. 2003. Mitigation strategies for reducing wildland fire risks. San Diego County Wildland Fire Task Force Findings and Recommendations. San Diego Board of Supervisors. August 13, 2003.