Modeling Potential Fire Behavior Changes Due to Fuel Breaks in the Monterey Ranger District, Los Padres National Forest, California

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Environmental Science and Innovative Solutions

Motivation

The Monterey Ranger District (MRD) of the Los Padres National Forest and FireScape Monterey are proposing to prepare and maintain a series of strategically placed fuel breaks around the perimeter of the Ventana Wilderness. The proposed fuel breaks will be located along ridge tops that have either been burned repeatedly by historic fires or used as anchor points for back burning operations during wildfire suppression actions, or both.

Proposed fuel break along old bulldozer line (shown in blue).

Proposed fuel break along old bulldozer line (shown in blue).

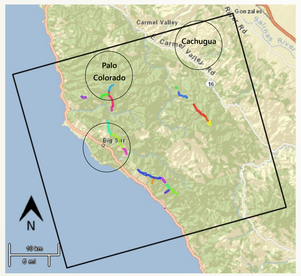
Back burning from a fuel break.

Fuel breaks are designed to help protect communities at risk in the wildland-urban interface (WUI) by helping to contain wildfires before they expand into urban areas. The fuel breaks will be used by fire suppression forces to mitigate fire movement across the landscape. Fuel breaks will be prepared as naturally and unobtrusively as possible. Grass and forb ground cover will be maintained but brush and heavy fuels will be removed.

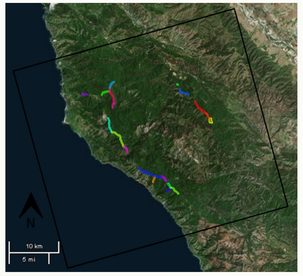
The fuel breaks are designed to

1. Increase wildland fire suppression efficiency near surrounding communities
2. Reduce wildfire risk to life and property near the Monterey District and surrounding communities
3. Reduce wildfire suppression costs to the Monterey District
4. Reduce adverse fire suppression impacts on the landscape

19 Proposed Fuel Breaks to Be Re-Established and Maintained Along Ridge Tops



Street map showing proposed fuel breaks (colored lines) near the communities of Big Sur, Palo Colorado, and Cachugua. Also shown are the major roadways that surround the Ventana Wilderness.

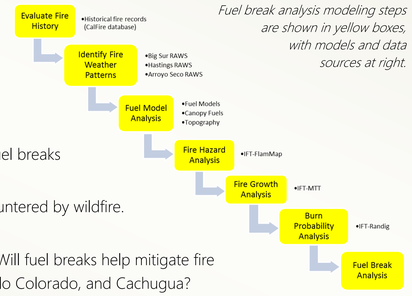


Satellite image showing proposed fuel breaks (colored lines). The rugged topography of deeply dissected canyons and steep slopes does not support many on-the-ground direct fire suppression strategies. Fuel breaks are designed to support indirect fire suppression tactics.

Methods and Modeling Steps

We used IFTDSS (Interagency Fuels Treatment Decision Support System), the web-based fire behavior and fire effects software and data integration platform, to model fire behavior potentials with and without the proposed fuels treatments to identify

- The potential for large fires to occur within the Ventana Wilderness and surrounding WUI communities. Are the fuel breaks strategically located?
- The likelihood that the proposed fuel breaks will be encountered by wildfire. Will the fuel breaks aid fire suppression activities?
- The potential for fuel breaks to suppress fire movement. Will fuel breaks help mitigate fire movement out of the Ventana Wilderness into Big Sur, Palo Colorado, and Cachugua?

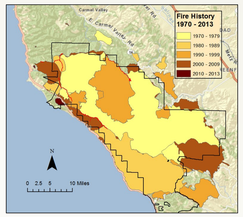


Fuel break analysis modeling steps are shown in yellow boxes, with models and data sources at right.

Fire History Results

Fire History: 1970–2013

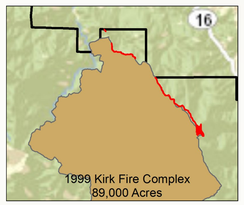
- 31 fires in CAL FIRE record
- 595,057 total acres burned
- 6 fires bigger than 9,000 acres; 90% of acreage reported burned
- 2 fires bigger that 160,000 acres; 60% of total acres burned
- 1 large fire per decade



Are the fuel breaks strategically located?

In every decade since 1970, the proposed fuel breaks have intersected the perimeter of large fires and/or have been overrun by the fire.

In the example at right, the 1999 Kirk Fire Complex intersects the northeast fuel breaks (red line), indicating that the fuel breaks were used for fire suppression operations, as suggested in MRD firefighter interviews.

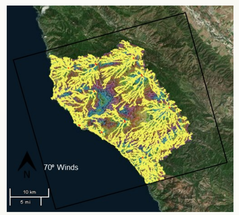


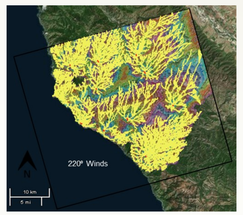
Fire Growth Modeling Results

Big Sur – high potential to burn under head fire conditions with 70º winds and very dry moisture scenarios.

Palo Colorado – high potential to burn under head fire conditions with 220º winds under dry and very dry conditions.

Cachugua – high potential to burn under head fire conditions with 220º winds under dry and very dry conditions.

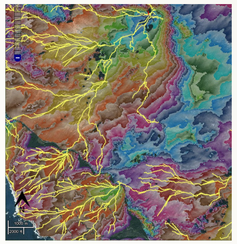




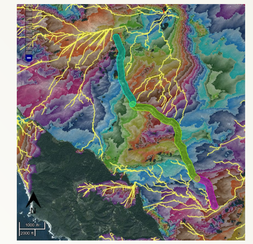
Yellow lines represent the modeled paths that fire is most likely to take.

Assessing Potential Fire Suppression Strategies

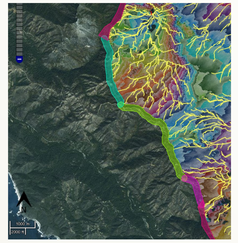
Fine-scale image of three sections of proposed fuel breaks, showing deeply dissected topography and steep slopes.



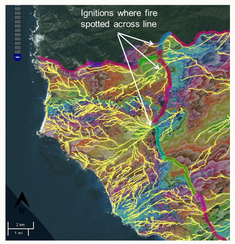
Fire growth simulation showing potential fire movement across the landscape without prepared fuel breaks.



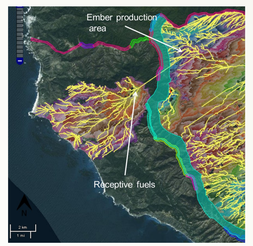
Fire growth simulated with modeled fuel breaks in place that force the fire to find alternative paths.



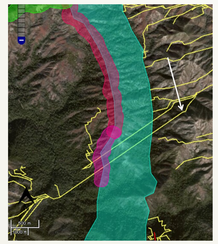
Existing fuel breaks can be anchor points for additional fuel breaks, which may deter fire movement.



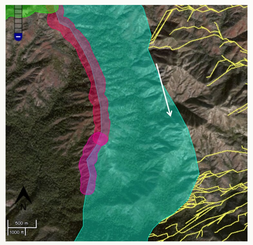
Simulating fire growth with the potential for spotting across fuel breaks shows that fuel breaks alone may not stop fire movement.



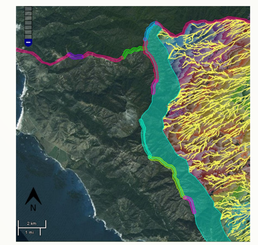
Simulating back burning from fuel breaks can mitigate spotting across the lines and identify potential problem areas.



Repeated simulations indicate that this ridge (white arrow) has high potential to produce embers and loft them over the fuel breaks into highly receptive fuels.



Simulating burn out of additional area or application of fire retardant to the ridge illustrates that proposed fuel breaks can support alternative fire suppression strategies.



Fuel breaks are not designed to be stand-lone actions; they can support alternative fire suppression tactics, including back burning.

Acknowledgments

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We also thank Jeff Kwasny and FireScape Monterey (firescape.ning.com) for data, helpful comments, and suggestions.

For more information

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Poster presented by Stacy A. Drury (sdrury@sonomatech.com) at the Northern California Prescribed Fire Council Meeting, A Future with Fire: Exploring Opportunities for a More Resilient California, Sacramento, CA, December 2-3, 2014 (STI-6136).