

Bald Mountain Fire

Eagle Cap Wilderness Area, Wallowa-Whitman National Forest

FARSITE Analysis

Introduction

While the Near Term Fire Behavior analysis option in WFDSS is similar to FARSITE, the advantage of using FARSITE lies in the ability to use gridded winds which produces more reliable fire behavior results in complex terrain. A couple of FARSITE simulations were completed to evaluate fire growth and fire behavior in relation to the values, notably Red's Horse Ranch and the Minam Lodge.

Methods

Fuels Data

The same edits as used in the last round of WFDSS Near Term analyses were used for the FARSITE simulations. The landscape file (LCP) is produced from the Refresh 2008 version of LANDFIRE data with a 30 m resolution. The landscape edits included:

1. Convert fuel model 102 to 181 above 1700 m
2. Areas $\geq 30^\circ$ slope and ≥ 1800 m were changed to fuel model 99 (rock)
3. Tripled canopy bulk density in fuel model 165

These edits were based on multiple calibration runs in WFDSS to align predicted with observed fire behavior and growth.

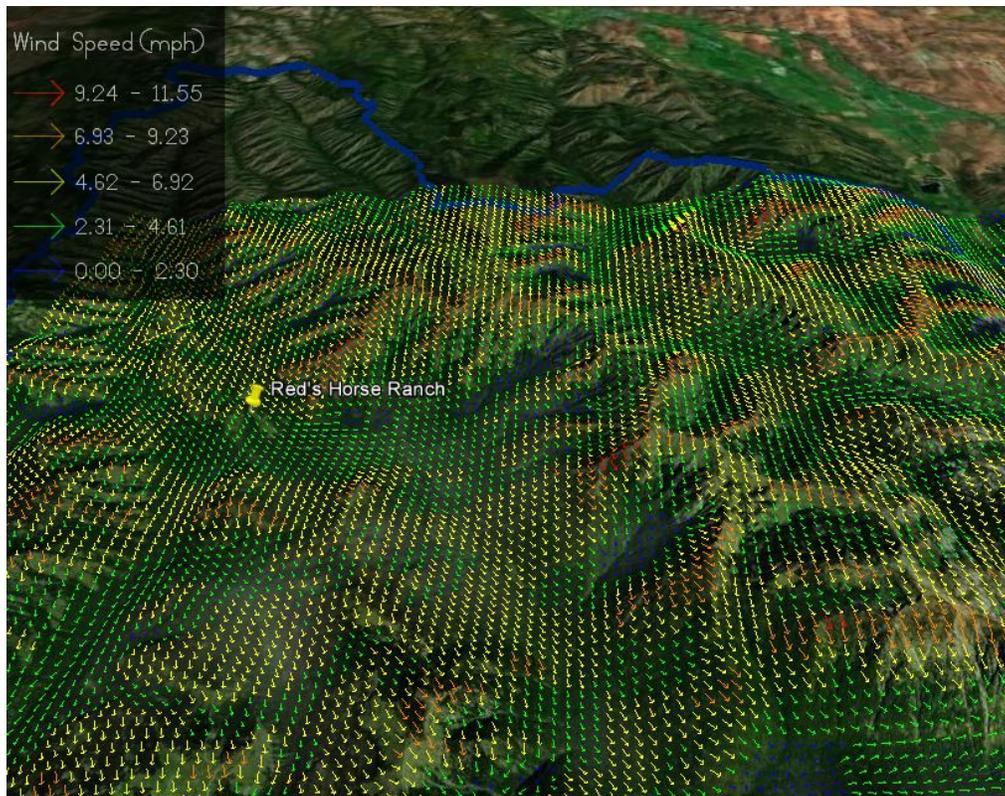
Weather and Wind

Digital forecast data (NDFD) was obtained from Pendleton NWS based on a coordinate in the current fire area for seven days covering the period from 9/24 through 9/30; this weather (WTR) file is necessary for FARSITE simulations. WindNinja was used to produce gridded winds based on the footprint of the landscape file. Wind speed and direction changes due to topographical influence in WindNinja. These scenarios were mostly evaluating potential fire growth over a 3-day period using two days of low winds from the north/northwest (Figure 1a) with one day of winds commonly associated with a cold front (Figure 1b). To use gridded winds in FARSITE, an atmosphere (ATM) file must be created; this is a text file that calls up the angle (direction), velocity (speed), and cloud cover files. The winds used during the conditioning period are merely placeholders so the days in the ATM match the WTR file. Cloud cover was estimated for most days to be about 20 or 30%, mostly due to drift smoke from Washington. Cloud cover of 0% was used for 9/19 and 9/22 as these were the days with the most active fire behavior; in addition, no cloud cover was used for 9/28 as this was the day with simulated cold front winds. Precipitation occurred on 9/23, so a cloud cover of 90% was selected.

Fuel Moistures

A 7 day conditioning period was used to modify dead fuel moistures over the landscape based on cloud cover, canopy cover, and topography. Live herbaceous moisture was set to 40% and live woody fuel moisture of 70% was used assuming there has been a killing frost and live fuels would be mostly cured.

a)



b)

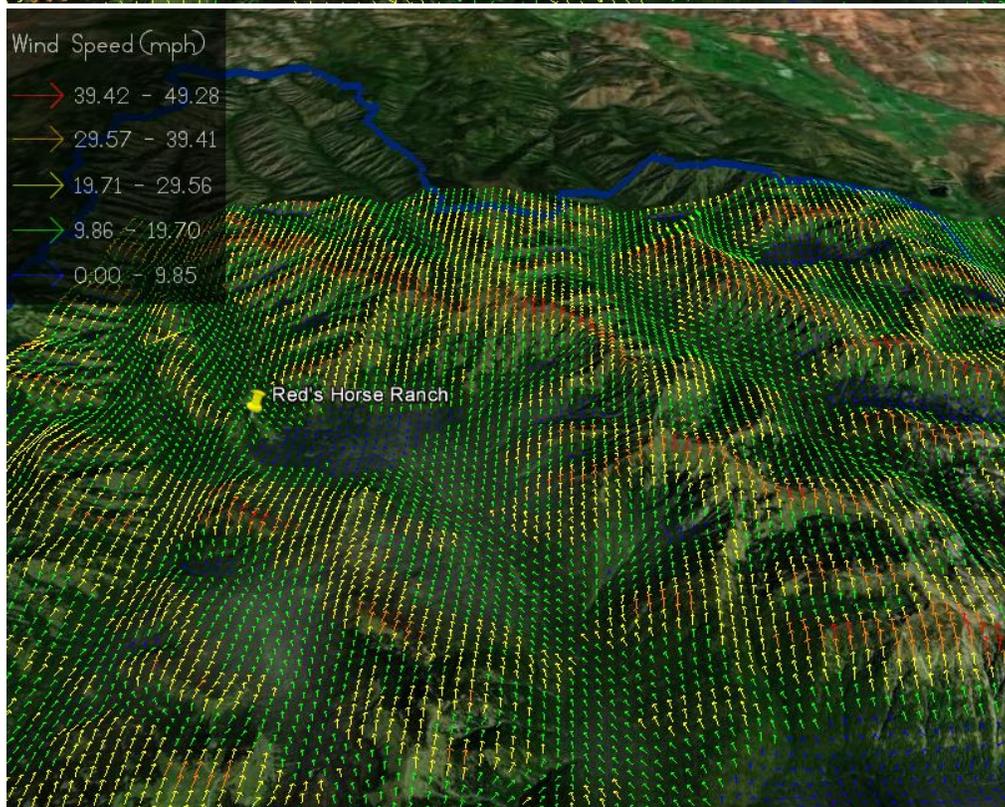


Figure 1. WindNinja gridded winds for a) common NNW wind with low wind speed and b) south wind common during a cold front. Note the changes in wind direction due to topography and difference in the wind speed range (refer to legend)

Fire Behavior Settings

Spotting species of concern include subalpine fir at higher elevations and white fir throughout a broad elevation range. In the canopy characteristics in FARSITE, subalpine fir was selected as the spotting species with a DBH of 8 inches (white fir is not a selectable option) and foliar moisture content of 90%. The Finney crown fire method was selected in addition to embers from spotting trees. A spotting probability of 2% was used. FARSITE launches 16 embers from every vertex in a pixel that experiences either passive or active crown fire. Ramping up the spotting probability will produce numerous potential spot fires.

Results

To analyze fire growth towards Red's Horse Ranch and the Minam Lodge, predicted growth from a spot fire in the base of Threemile Creek towards the Minam River was evaluated with two burning periods of NNW wind and one burning period with cold front winds (refer to Figures 1a and 1b). It appears highly unlikely that the fire could reach Red's Horse Ranch and the Minam Lodge under the conditions analyzed (Figure 2).

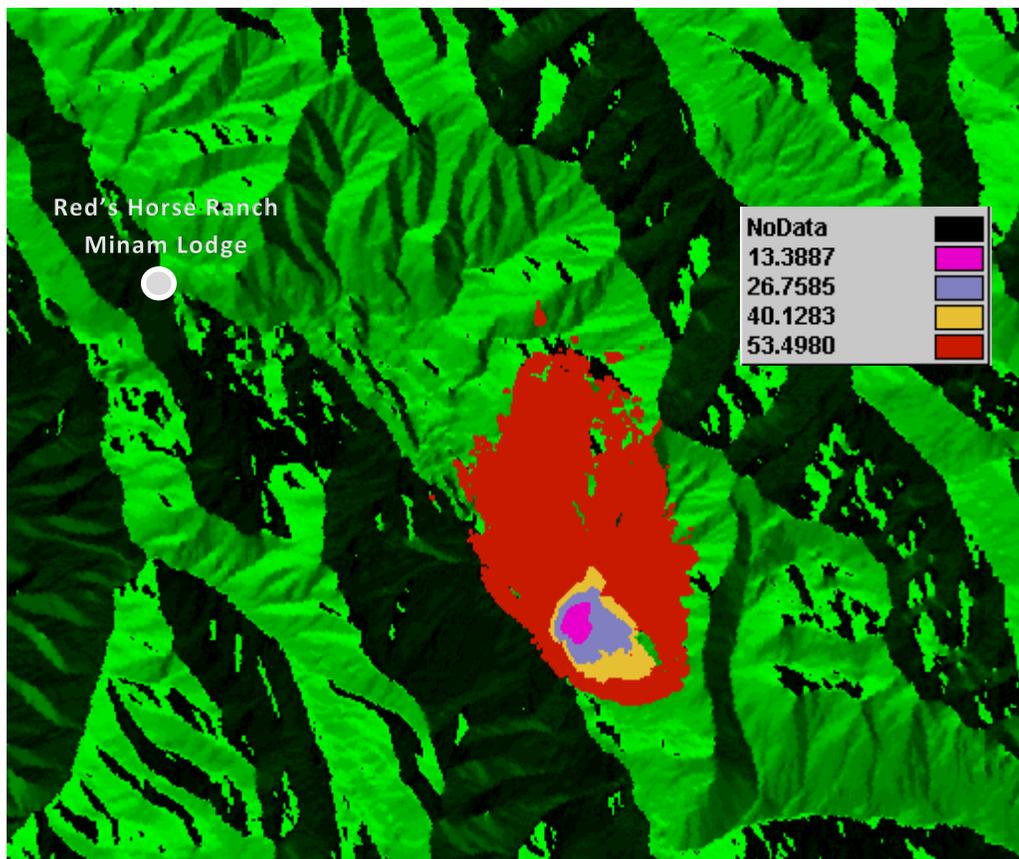


Figure 2. Time of arrival (hours, refer to legend) for a 3 day analysis

Much of the predicted fire burned as a torching fire, which is consistent with observed fire behavior (Figure 3).

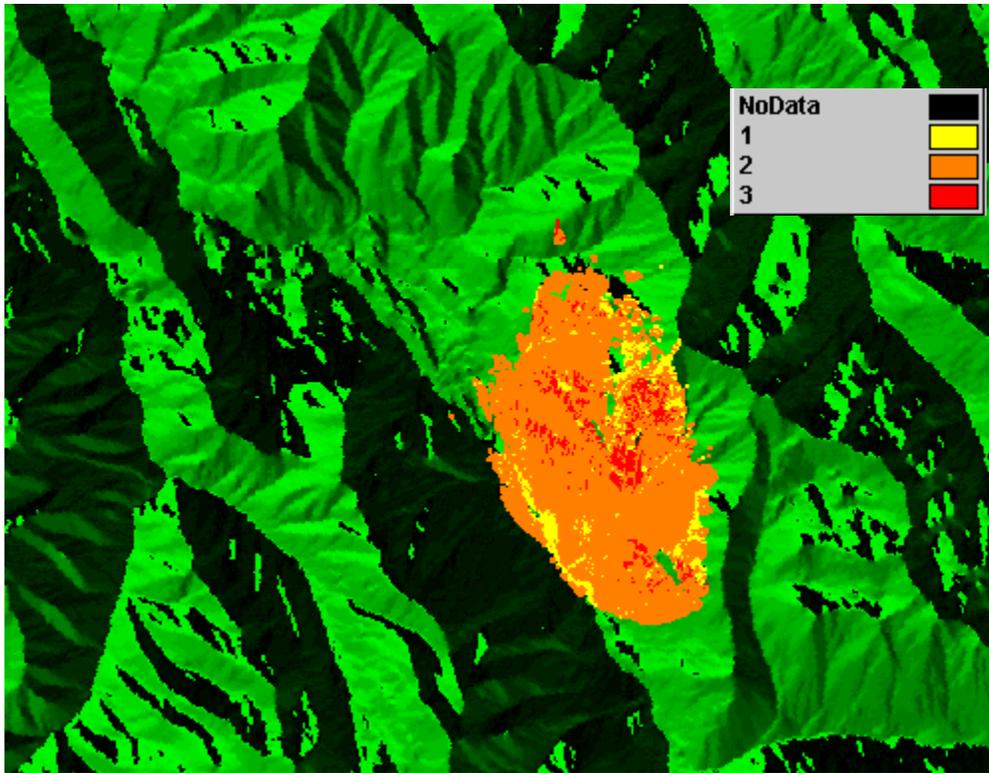


Figure 3. Crown fire activity classified as (1) surface fire, (2) torching, and (3) crown fire

Conclusion

An additional FARSITE analysis was completed using the cold front wind scenario for one burning period assuming the same spot fire near the mouth of Threemile Creek. Not a lot of growth was predicted, indicating that a larger run would be more feasible if the spots have a chance to become established in size before being impacted by high winds from the south that would push the fire towards values.

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