UNIONVILLE / HELENA

FIRE SPREAD AND SPOTTING POTENTIAL

SIMULATION

DEVELOPED BY:
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& ROCKY INFANGER, Chief, Wolf Cr./Craig FSA
January 2007 Modified August 2009

Photography courtesy of:

Bureau of Land Management
Dept. of Natural Resources and Conservation
Pat McKelvey: Lewis and Clark County Fire Mitigation Officer
Everett M. “Sonny” Stiger: Fuels & Fire Manag. Consultant

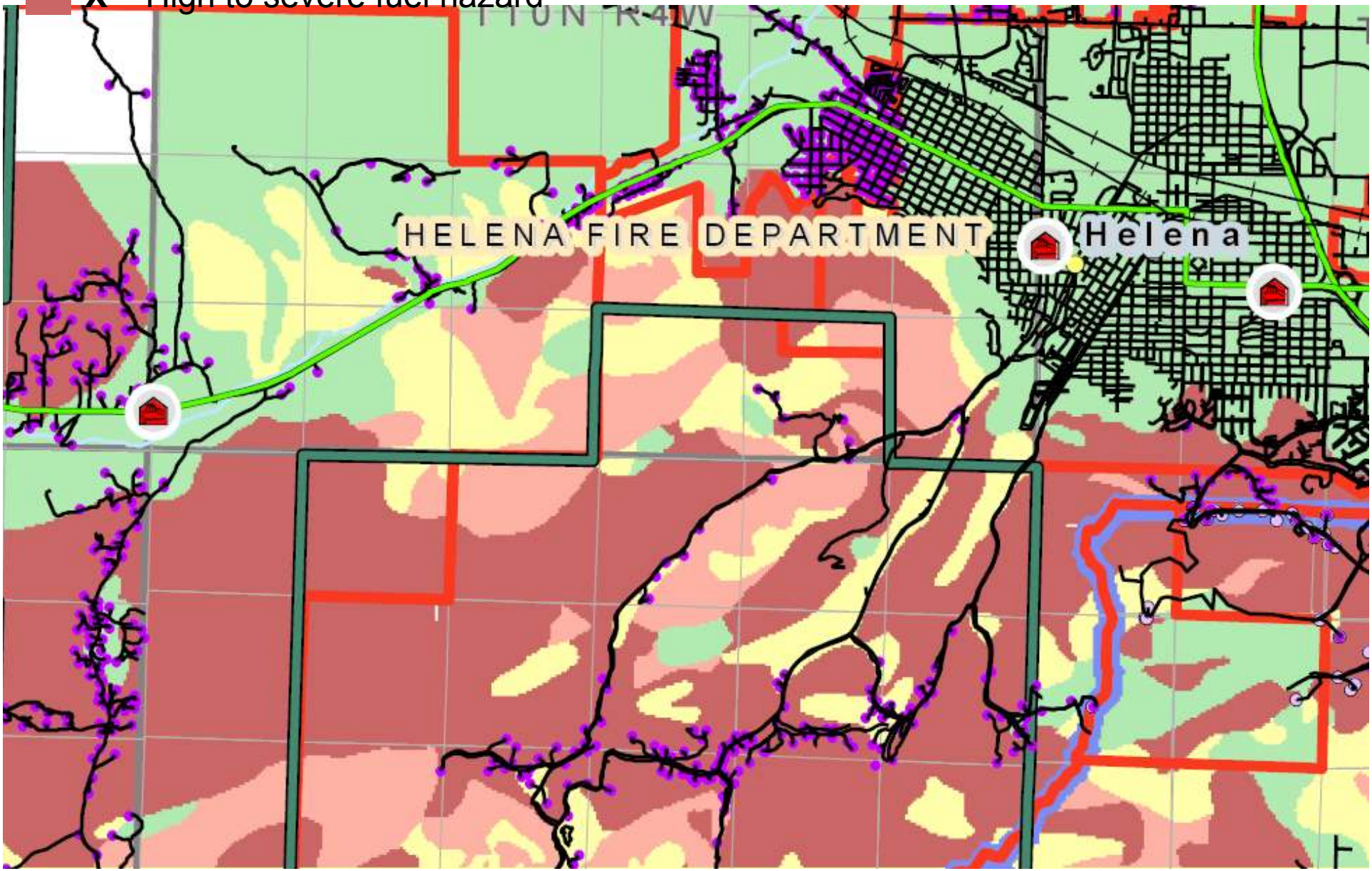
Computer Programs Utilized:

MAPTECH Terrain Navigator Pro.

BEHAVE Fire Behavior Prediction and Fuel Modeling System. USDA Forest Service.

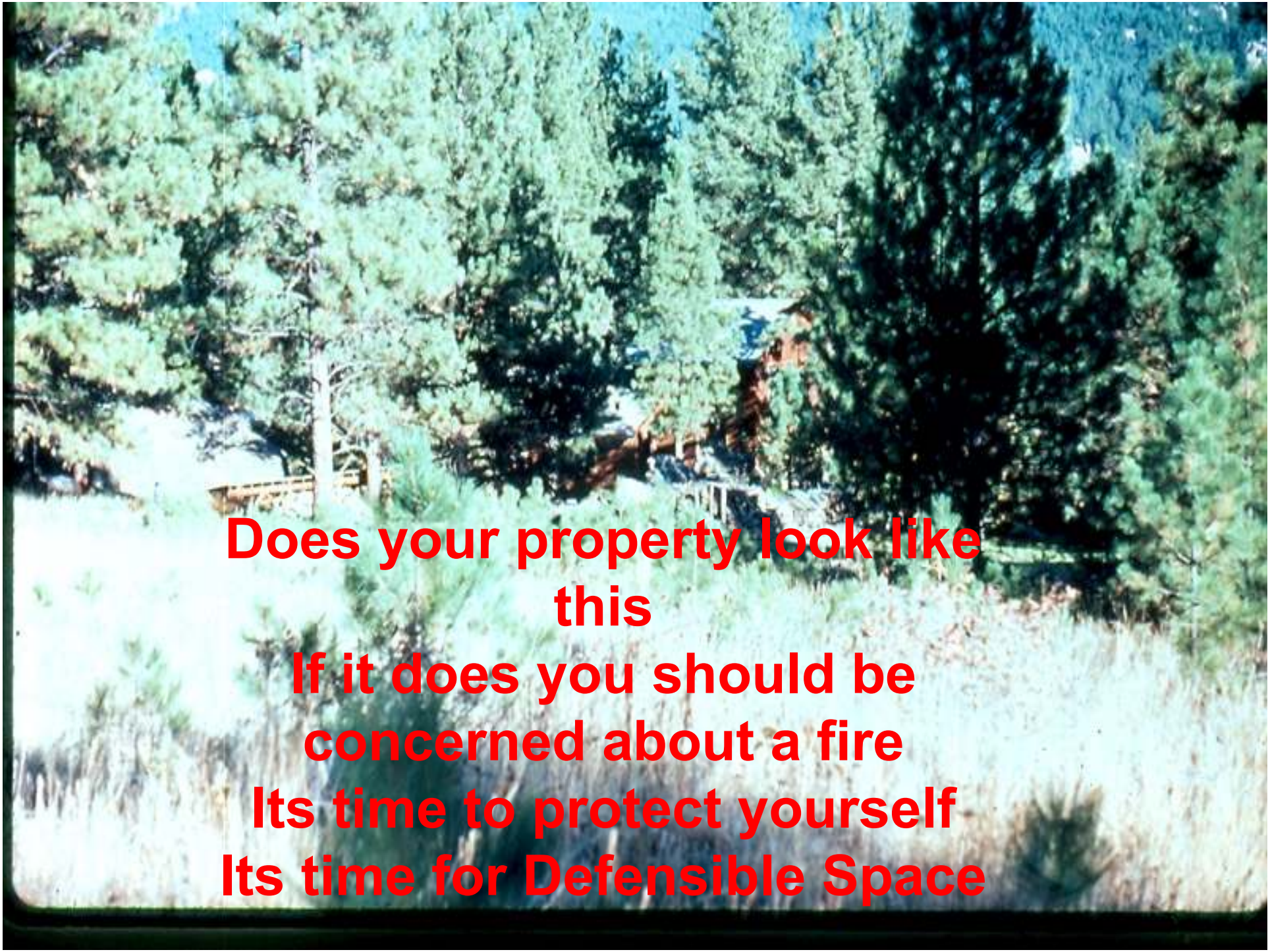
A – Low fuel hazard.
B – Medium fuel hazard.
C - High risk fuel hazard
X – High to severe fuel hazard

TRI-COUNTY FIRESAFE WORKING GROUP
FUEL HAZARD MAP
(AREA OF SIMULATION)



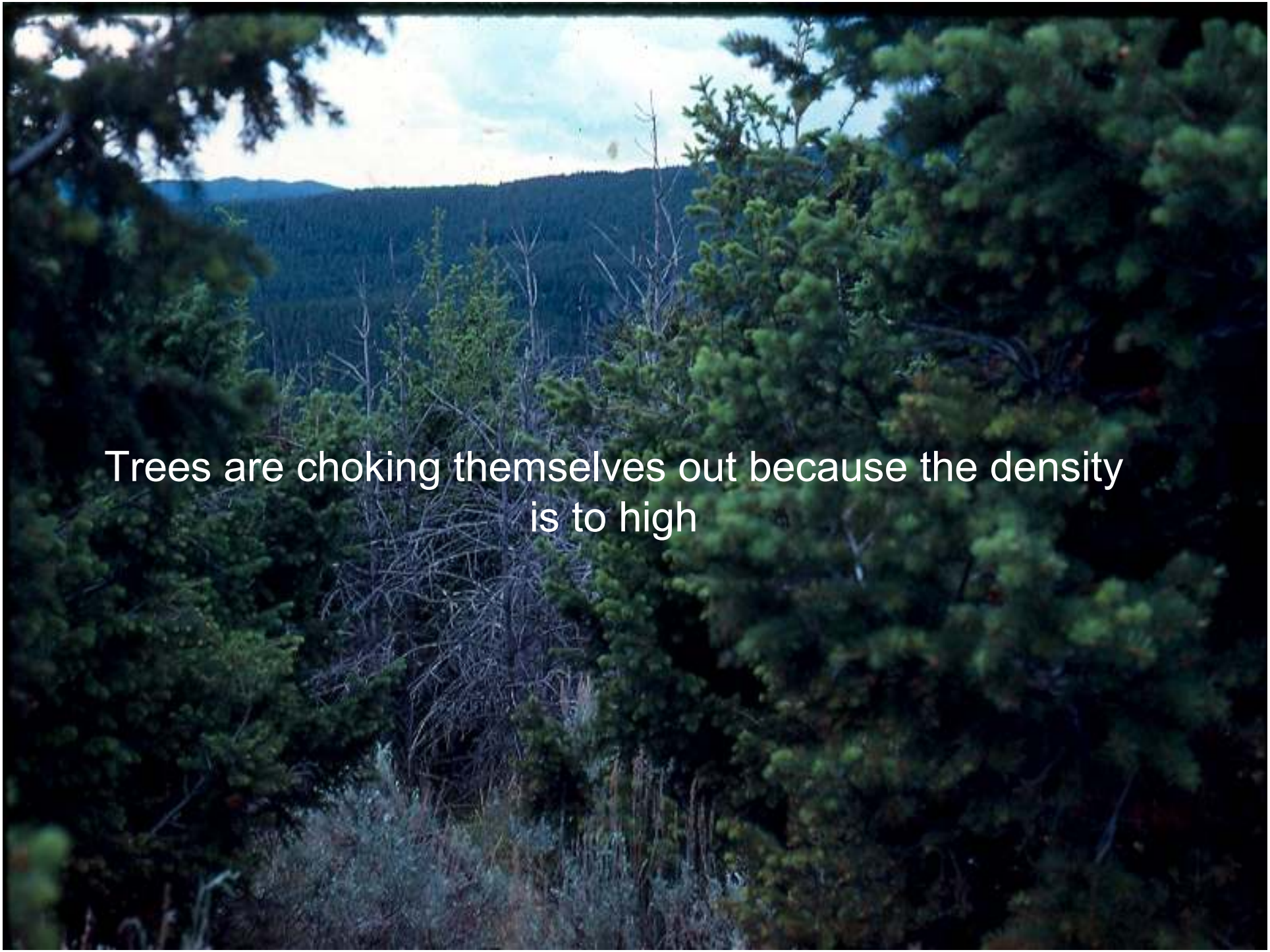

This is what the forest looked like before active fire suppression


Before active fire suppression small
ground fires would get rid of the small
dense growth of trees

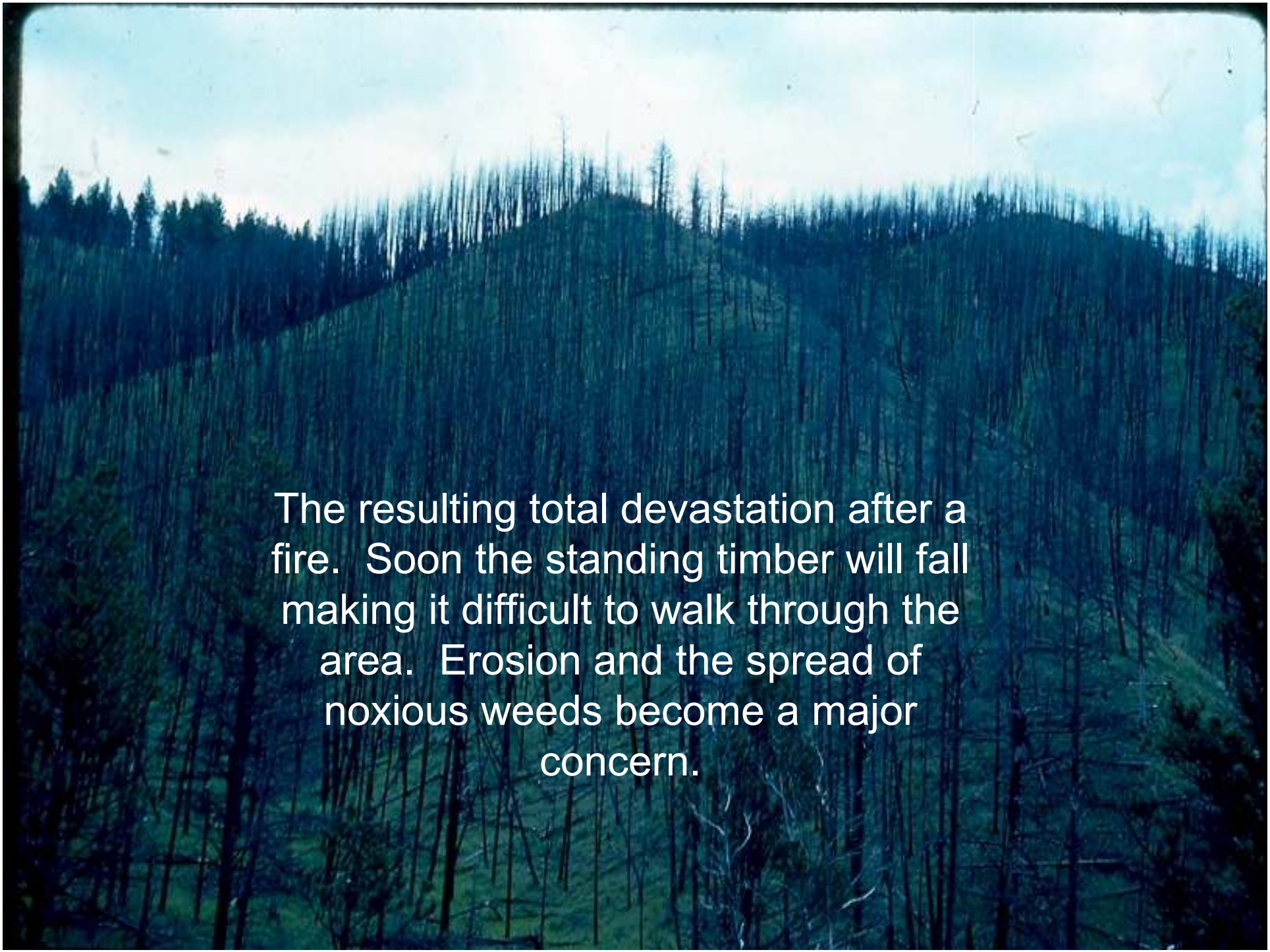

Does your property look like this
If it does you should be concerned about a fire
Its time to protect yourself
Its time for Defensible Space


Tight growths of trees cause a fire to increase in speed and intensity


Dense forests make for dangerous
fire conditions and unhealthy
forests


Trees are choking themselves out because the density is to high


Soon after dying the trees will begin to fall.
The forest then becomes uninhabitable for many animals that once lived there.
In our climate these fallen trees may take a hundred years to completely decompose.


The resulting total devastation after a fire. Soon the standing timber will fall making it difficult to walk through the area. Erosion and the spread of noxious weeds become a major concern.

FIRE BEHAVIOR POTENTIAL

USING THE FOLLOWING ACTUAL FORECASTS, ACTUAL WEATHER, & ACTUAL FUEL MOISTURE READINGS FROM THE HELENA FIRE WEATHER STATION – THE FOLLOWING FIRE BEHAVIOR POTENTIAL IS CALCULATED.

NWS
FIRE WEATHER FORECAST

AUGUST 8, 2006

Temp. : 88° - 97°

R/H : 15 – 23%

WIND :

Lower elev.: S 5 – 15 mph

Ridge Top: SW 10 -15 mph

RED FLAG WARNING

DRY T-STORMS WITH GUSTY SW WINDS SHIFTING MORE NORTHERLY, DUE TO APPROACHING COLD FRONT.

GUSTS CAN EXCEED 20 mph NEAR T-STORMS.

AUGUST 29, 2006

Temp. : 85° - 94°

R/H : 11 – 17%

WIND :

Lower elev.: S 5 – 15 mph

Increasing to SW 15 – 25 mph

Ridge Top: SW 20 - 30 mph

RED FLAG WARNING

DRY T-STORMS WITH GUSTY SOUTH WINDS SHIFTING TO THE WEST DUE TO APPROACHING COLD FRONT.

NWS OBSERVATIONS
ACTUAL HELENA WEATHER

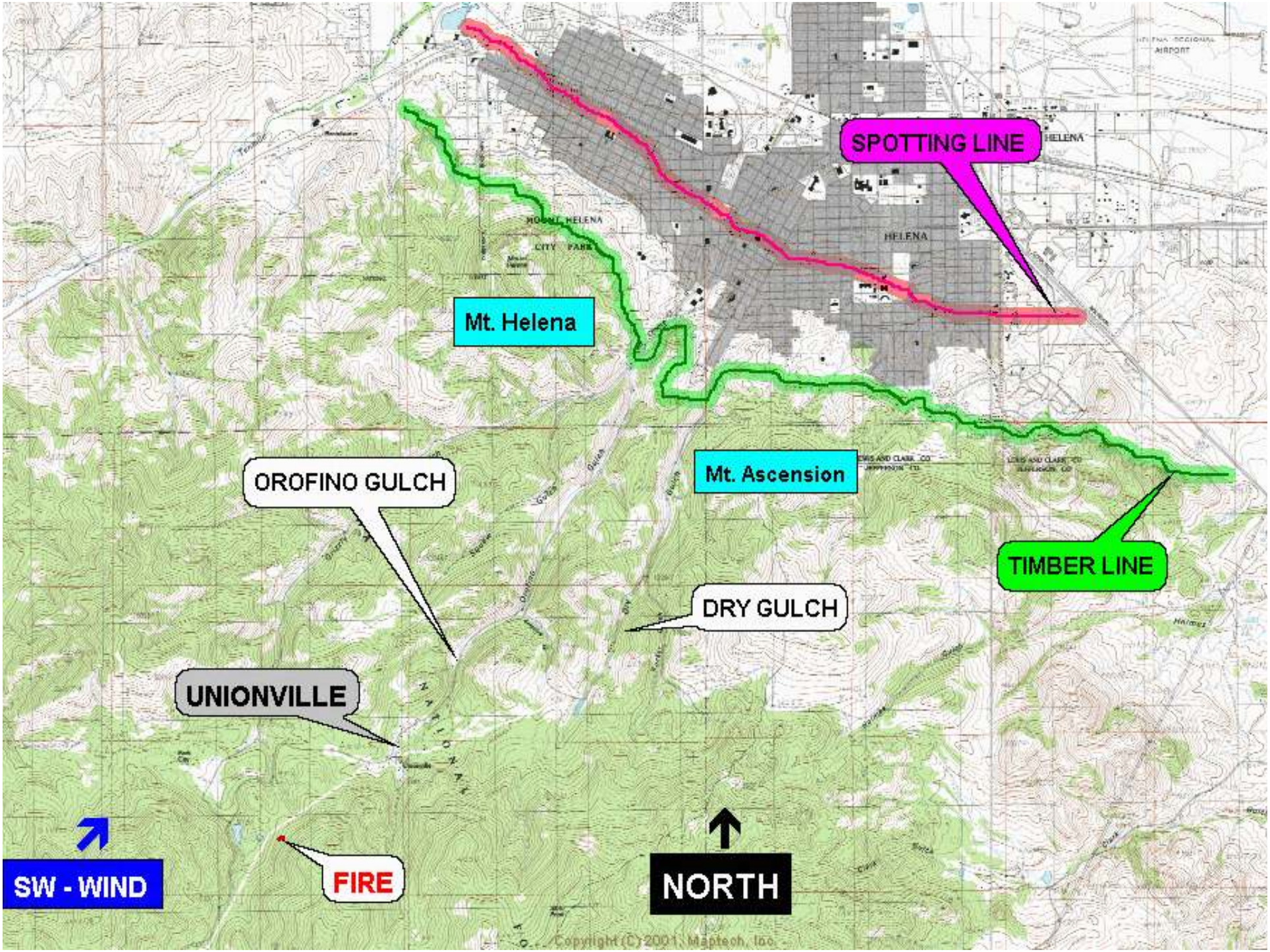
AUGUST 8, 2006

- Max. Temp. = 91°
- Min. R/H = 9%
- WIND 10 TO 28 mph from 2pm to 6pm
- Gusts to 49 mph

AUGUST 29, 2006

- Max. Temp. = 94°
- Min. R/H = 9%
- WIND 21 TO 23 mph from 2pm to 5pm
- Gusts to 37 mph

Based on this information a model fire has been created to show the behavior of a fire starting at a point just South West of Unionville at 12 pm.


SPOTTING LINE
Mt. Helena
Mt. Ascension
TIMBER LINE
OROFINO GULCH
DRY GULCH
UNIONVILLE
SW - WIND
FIRE
NORTH
HELENA
MOUNT HELENA CITY PARK
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The fire started in fuels and terrain just like this

FUEL DECRIPTI0NS HAVE BEEN MODIFIED TO ADDRESS THE MOUNTAIN PINE BEETLE EPIDEMIC

- The following table compares the key elements of the fire behavior calculations between green live trees and red/dead trees using the same weather.

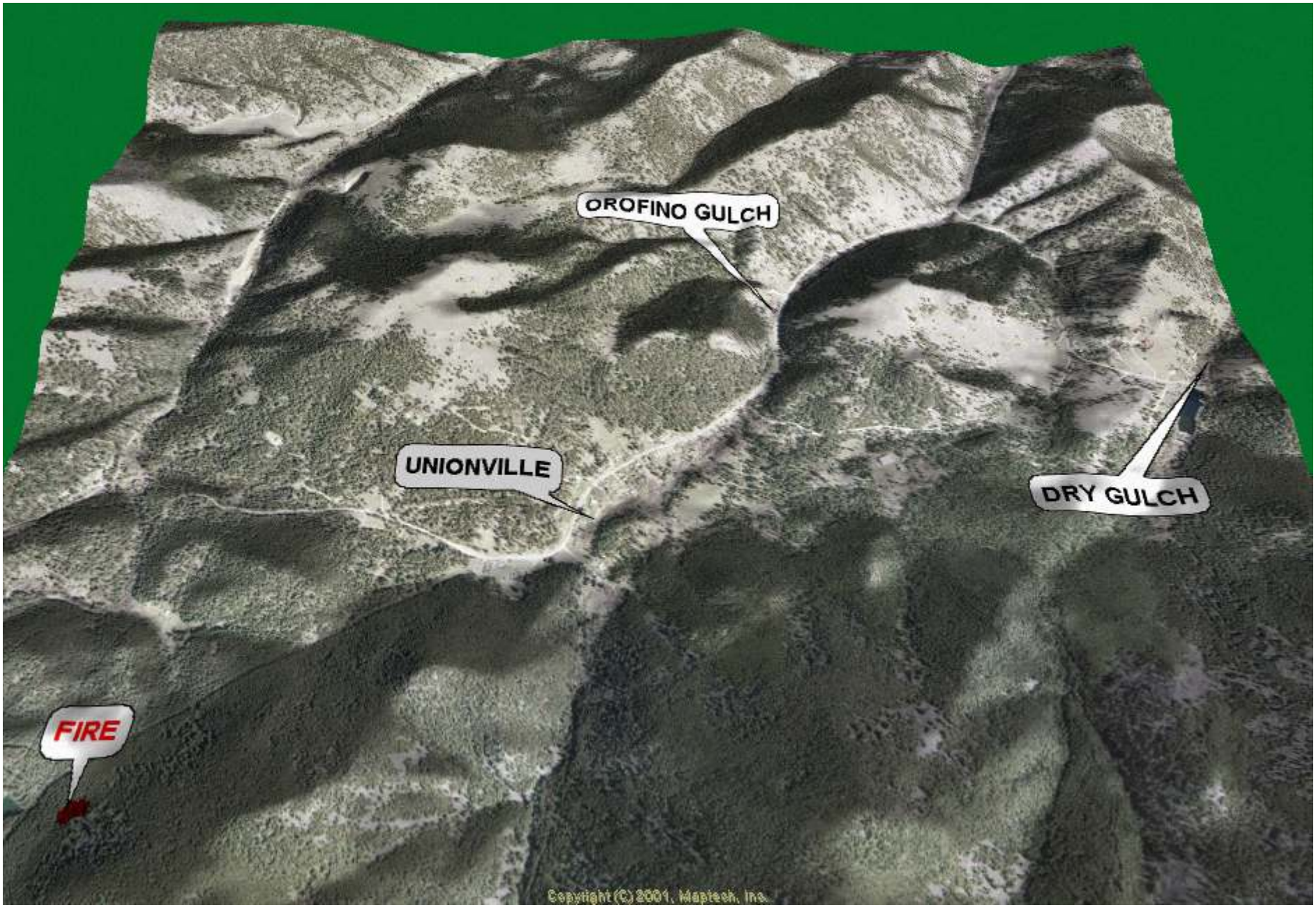
	SURFACE FIRE		CROWN FIRE	
	ROS	Flame length	ROS	Flame length
Green/Live	20 ch/h	9 ft.	100 ch/h	130 ft.
Red/Dead	25 ch/h	10 ft.	124 ch/h	140 ft.

Both live and dead transition to a crown fire under these weather conditions and remain an active crown fire with a 20 mph 20 foot wind.

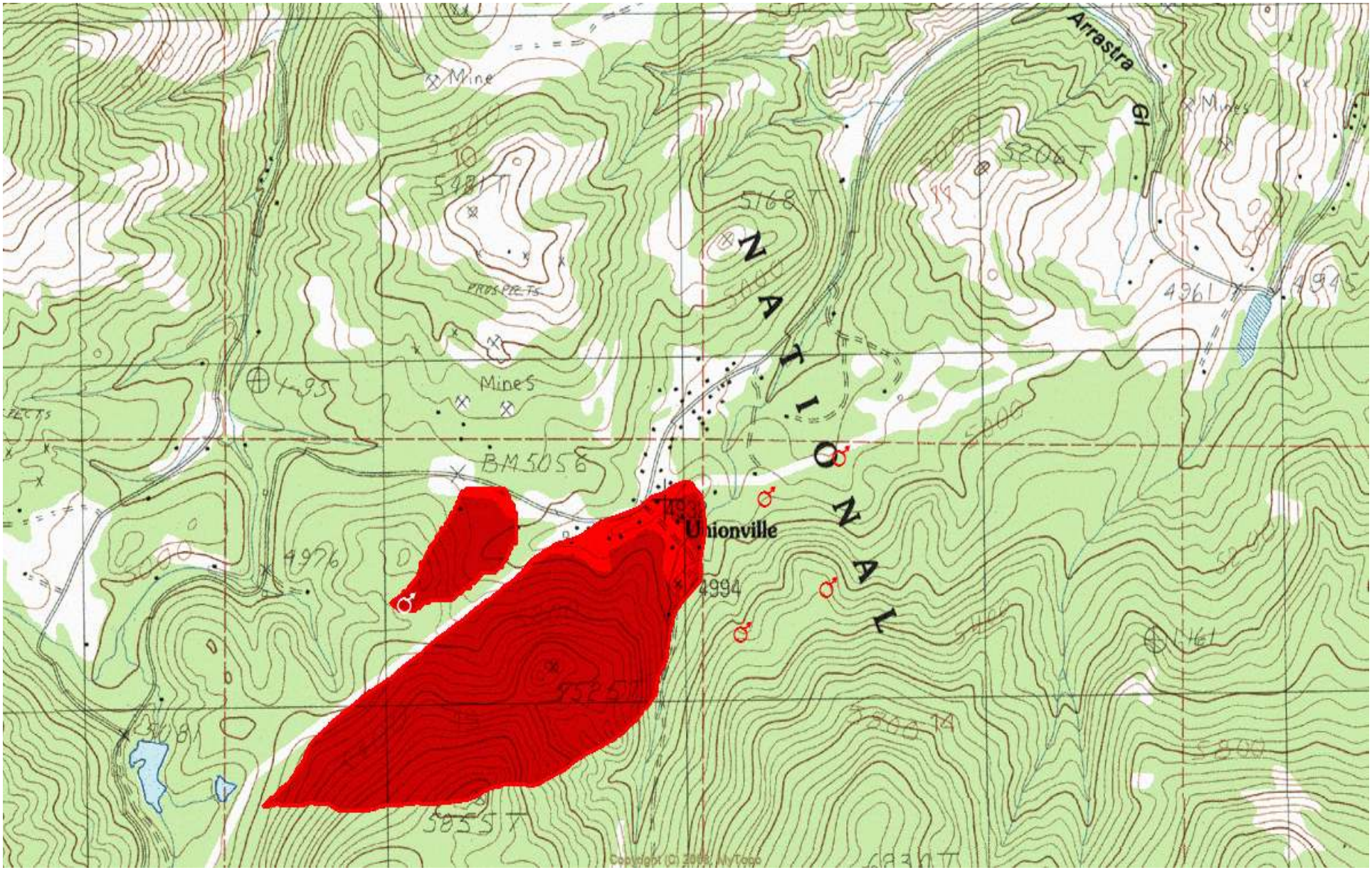
FIRE SUPPRESSION INTERPRETATIONS

- Crown fires can be extremely dangerous and unpredictable.
- The safety of ***firefighters and civilians*** in the vicinity of a crown fire can be compromised.
- Most fire suppression activity in the event of a crown fire involves evacuation with very little effective fire suppression.

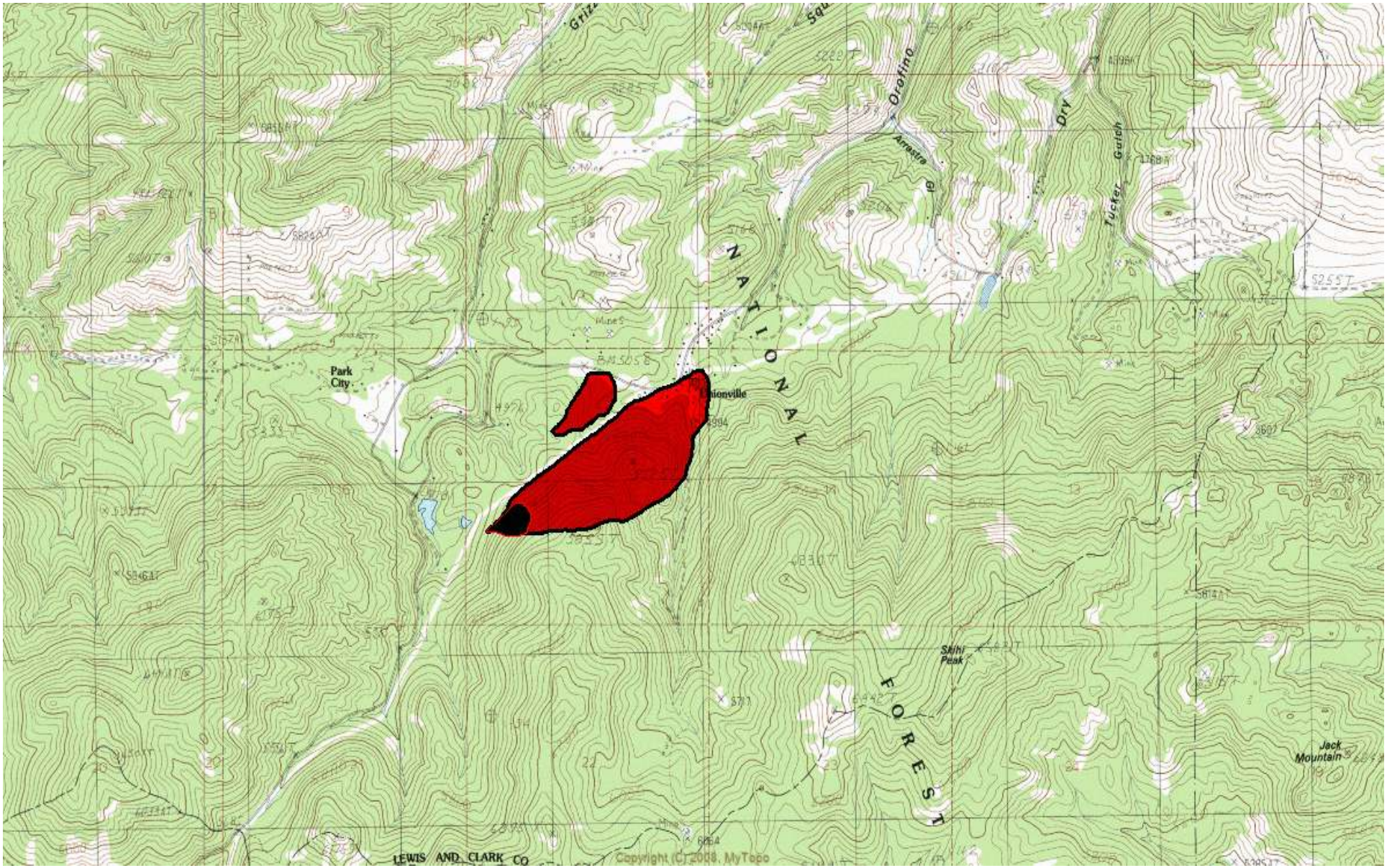
FIRST HOUR 12:00 P.M. – 1:00 P.M.



First Hour 12:00 – 1:00pm
+/- 180 acres



Black Indicates Pre-Epidemic Fire Perimeter in One Hour +/- 8 acres

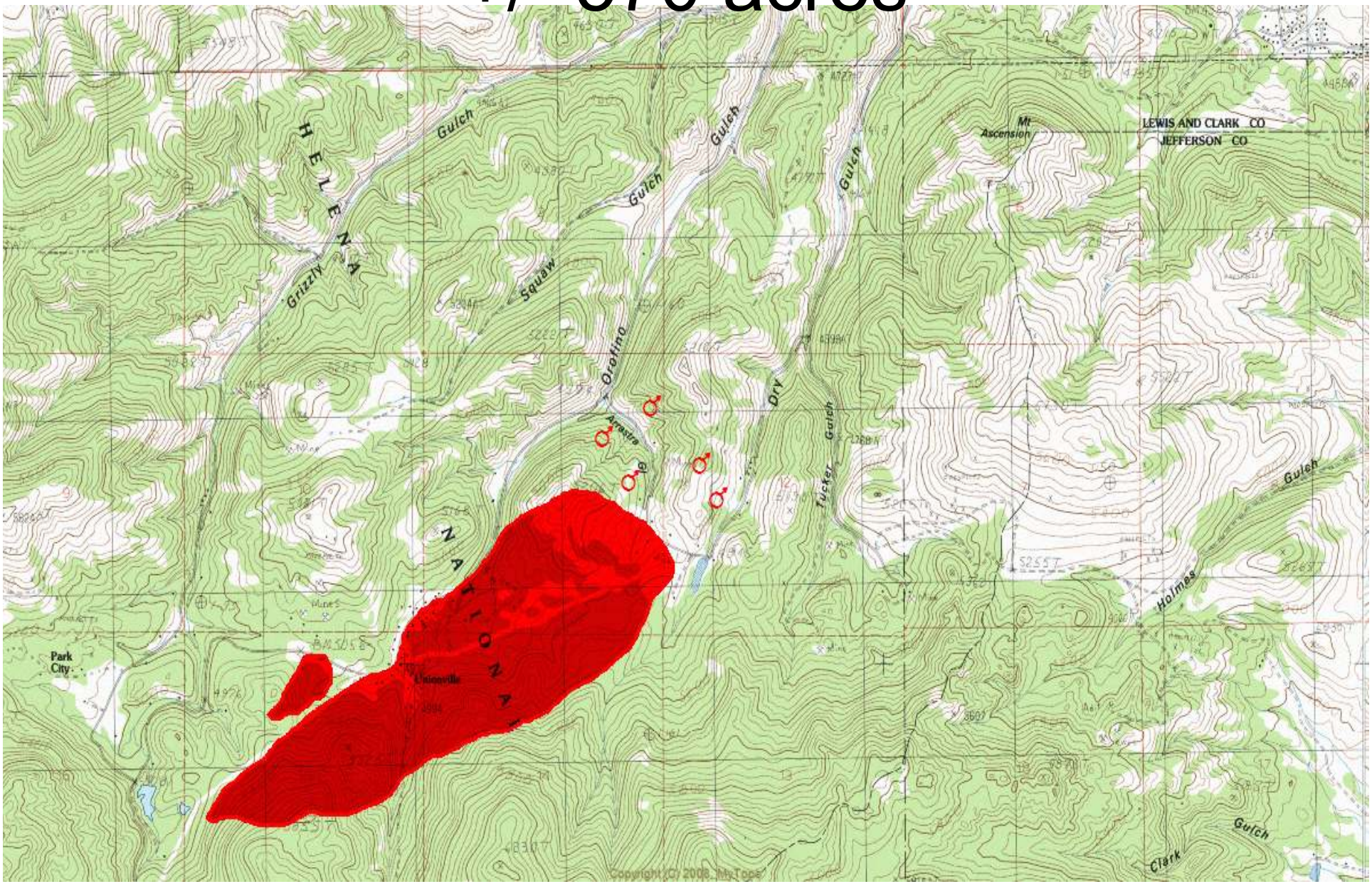


The fire would make a rapid crowning run up the steep slope from it's origin.

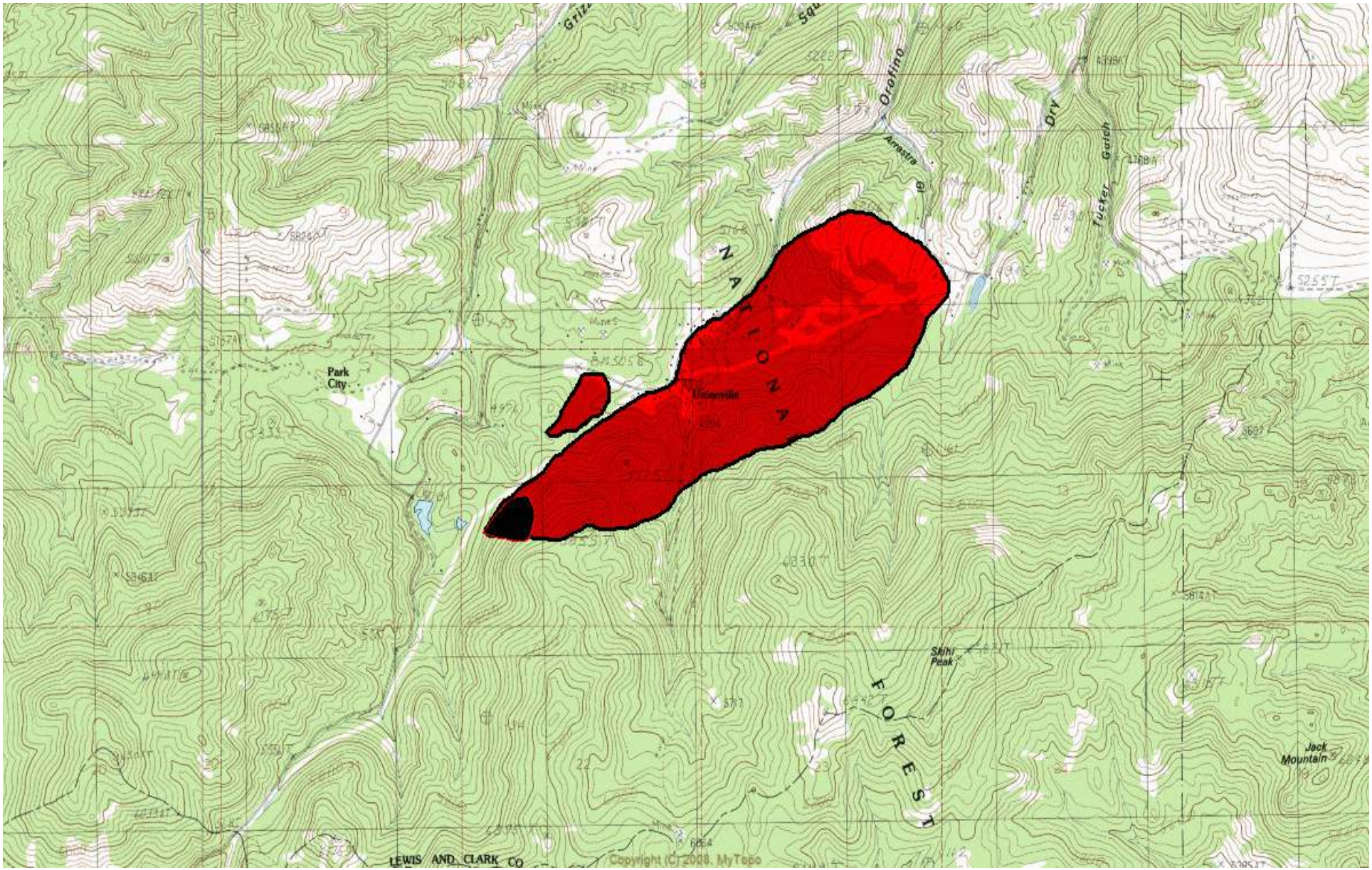
Catching the full force of the wind at the ridge top would drive the fire rapidly to the northeast.

Fire would move to the northeast with advancing fire front and spotting

Second Hour 1:00 – 2:00pm
+/- 570 acres

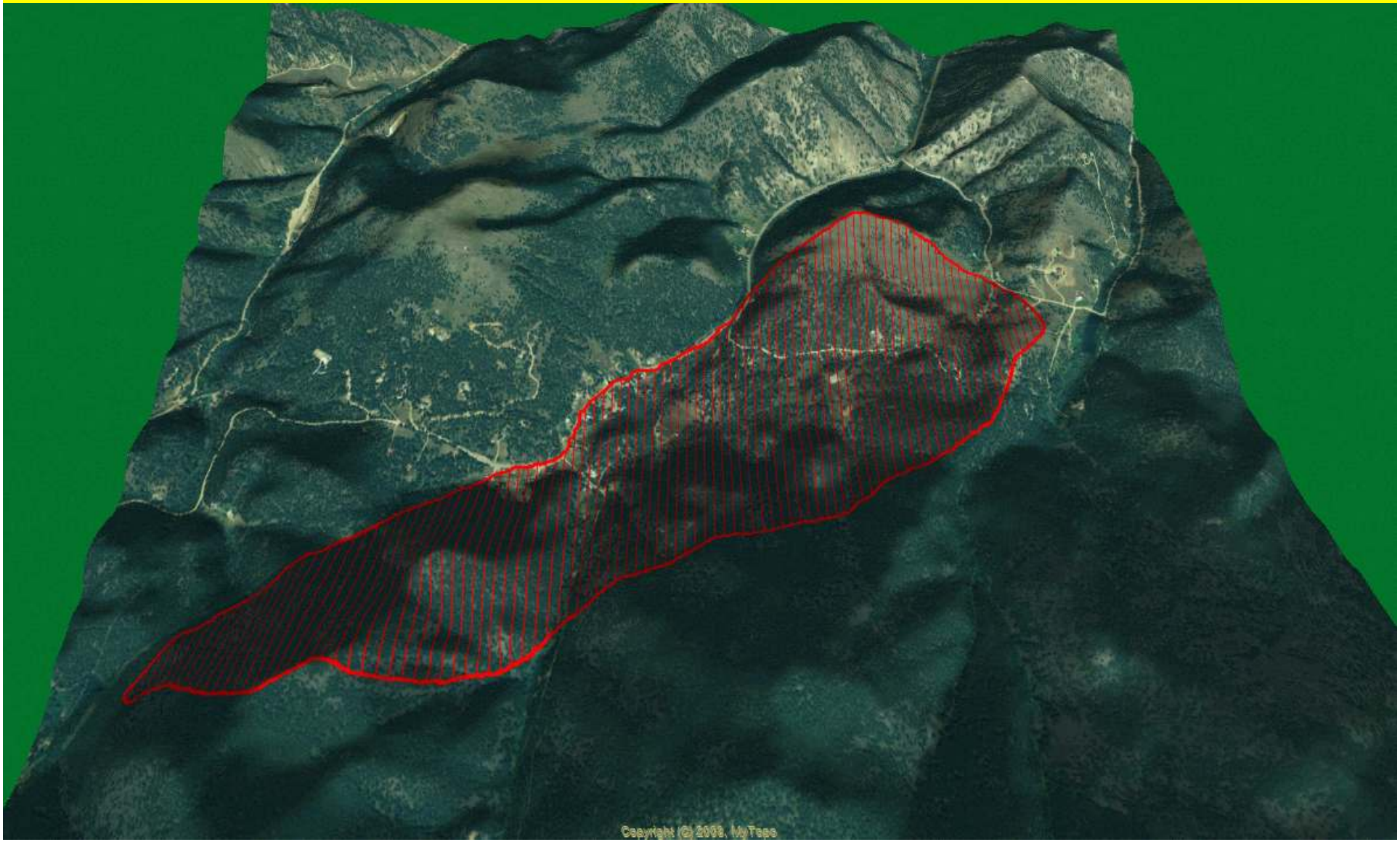


Black Indicates Pre-Epidemic Fire Perimeter in Two Hours +/- 14 acres



- The fire spread ***assumes*** fire fighting crews would hold the fire south and east of the Orofino Gulch road near the small town of Unionville maintaining an escape route for local residents.

The Fire has consumed most of the Unionville Area




UNIONVILLE

FIRE BEHAVIOR CALCULATION

2:00 P.M. TO 5:00 P.M.

- **ACTIVE CROWN FIRE MOVING AT AN AVERAGE OF 1.6 MPH.**

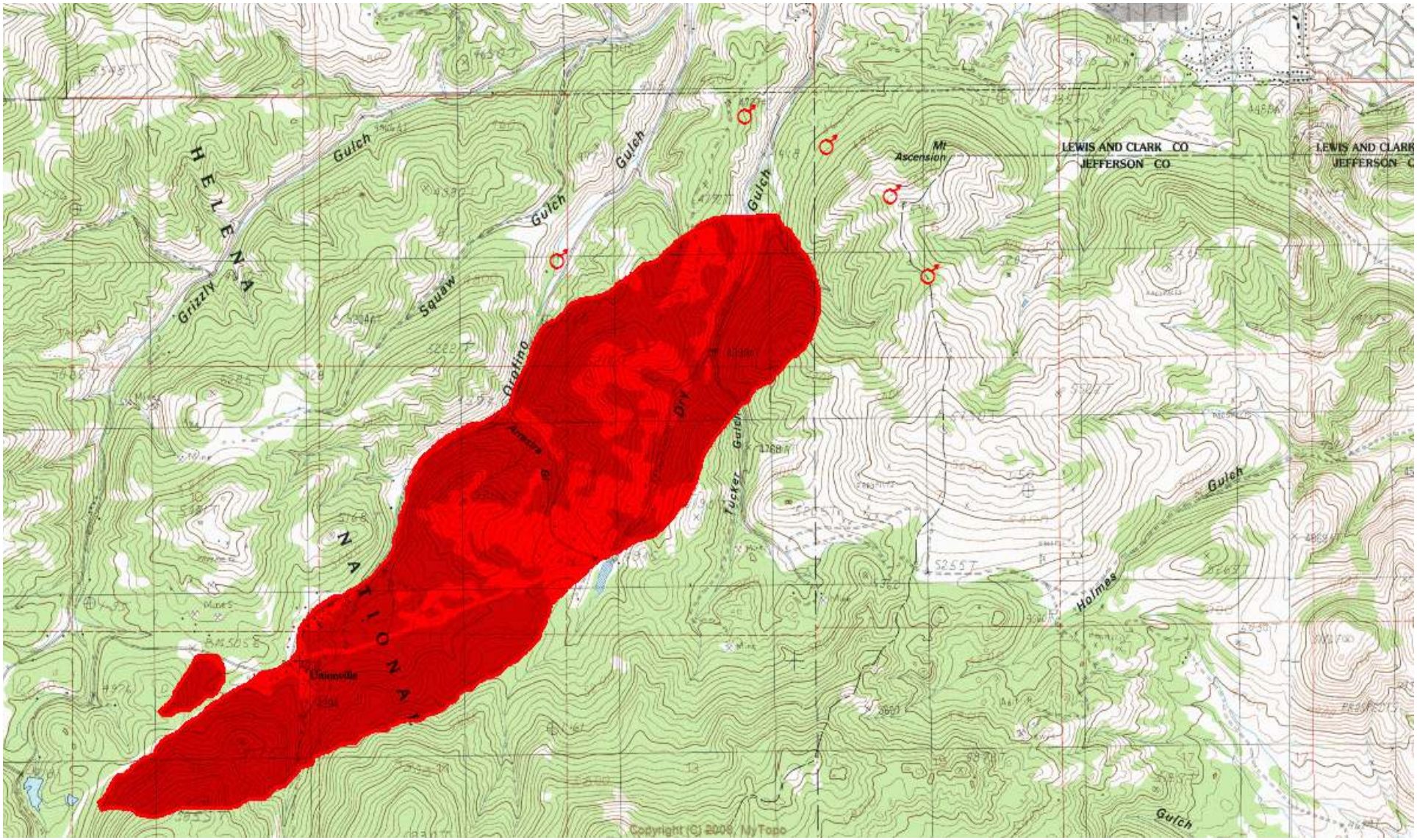
  Fire would reach the Helena City Limits in 2 more Hours (by 4pm).

- **SPOTTING UP TO .5 MILE AHEAD OF THE MAIN FIRE.**

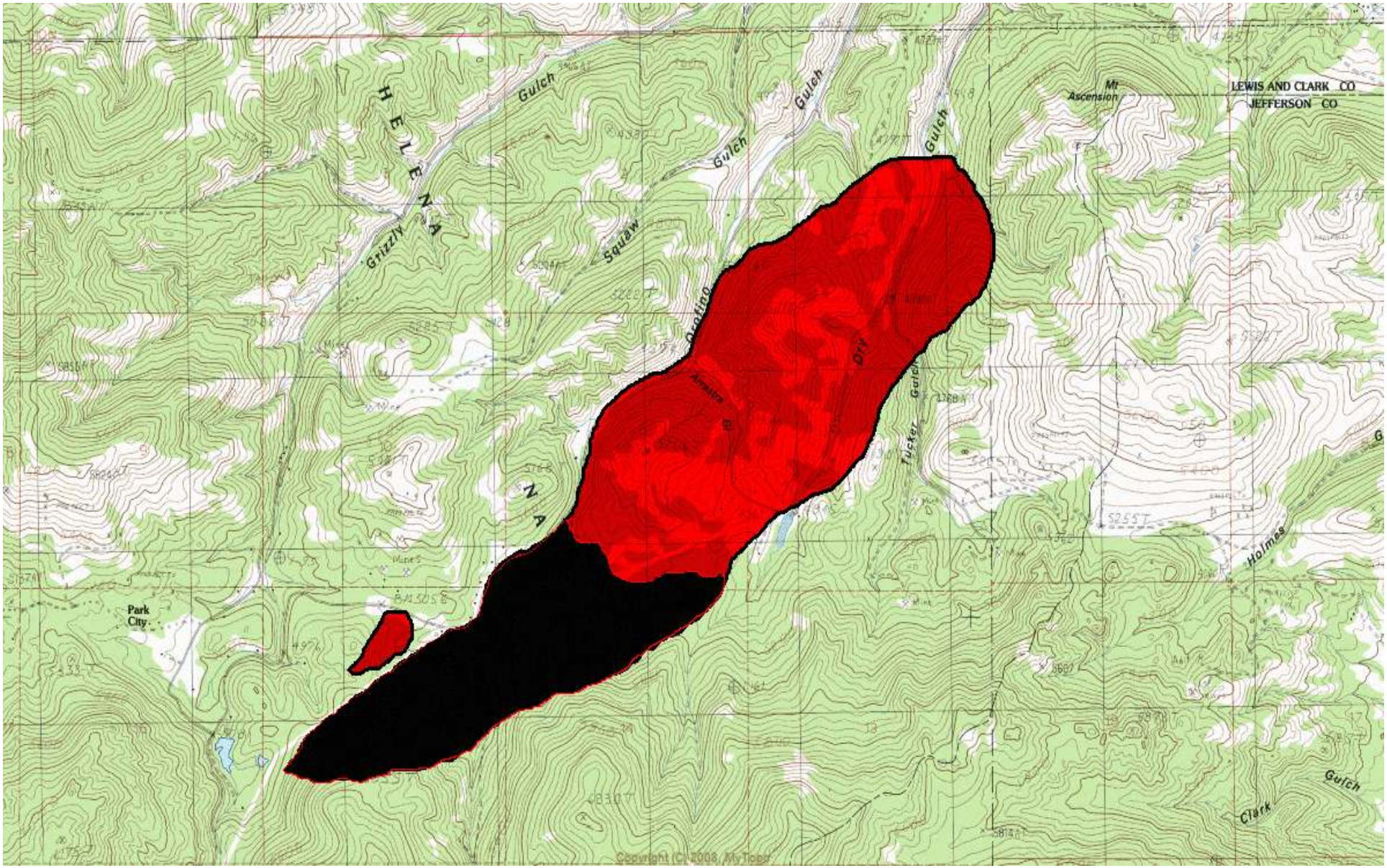
  Hot embers would be raining down on homes within the City Limits by 4pm.

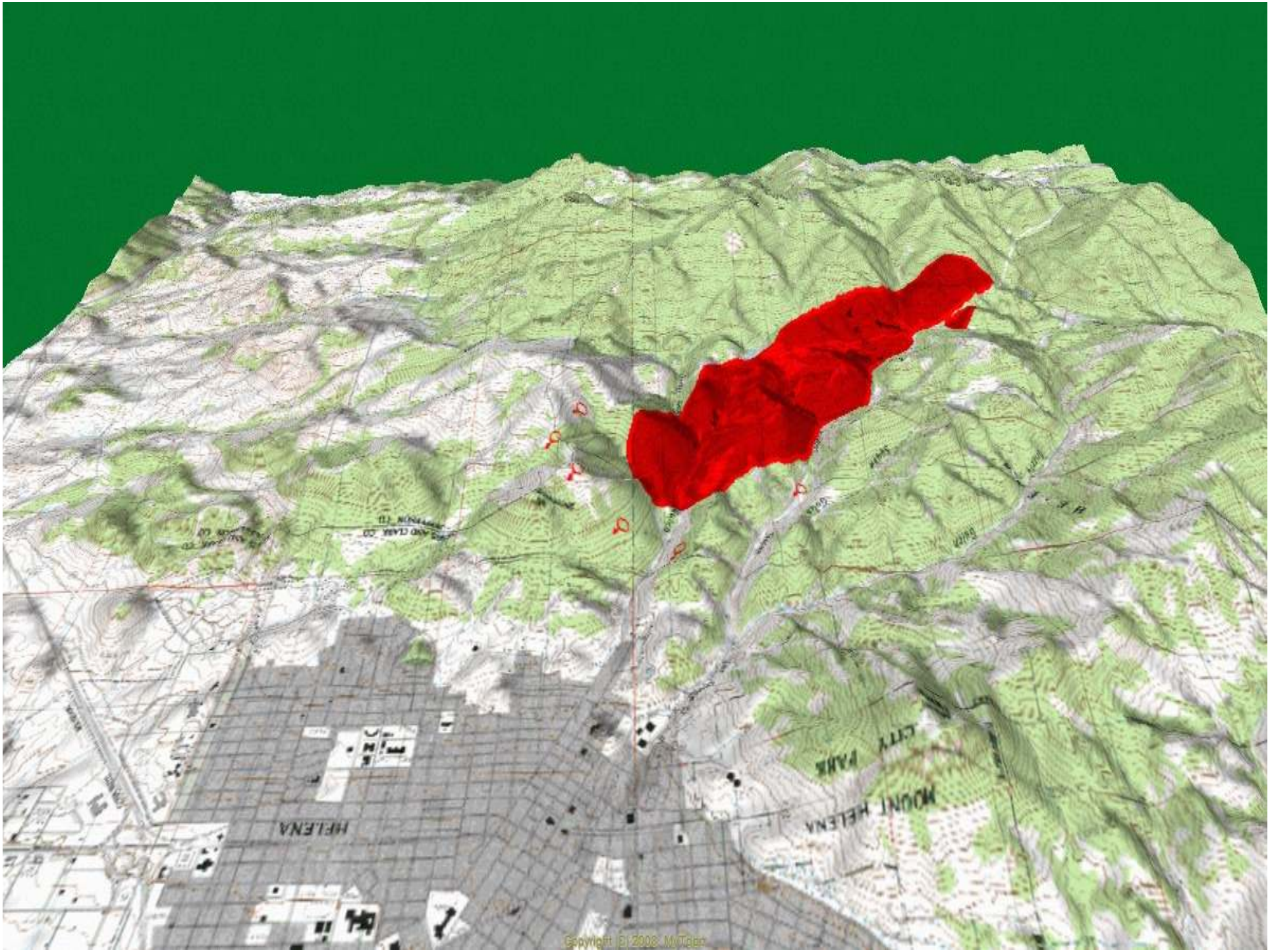
- **PROBABILITY OF IGNITION FROM SPOTTING IN RECEPTIVE FUELS IS 98%.**

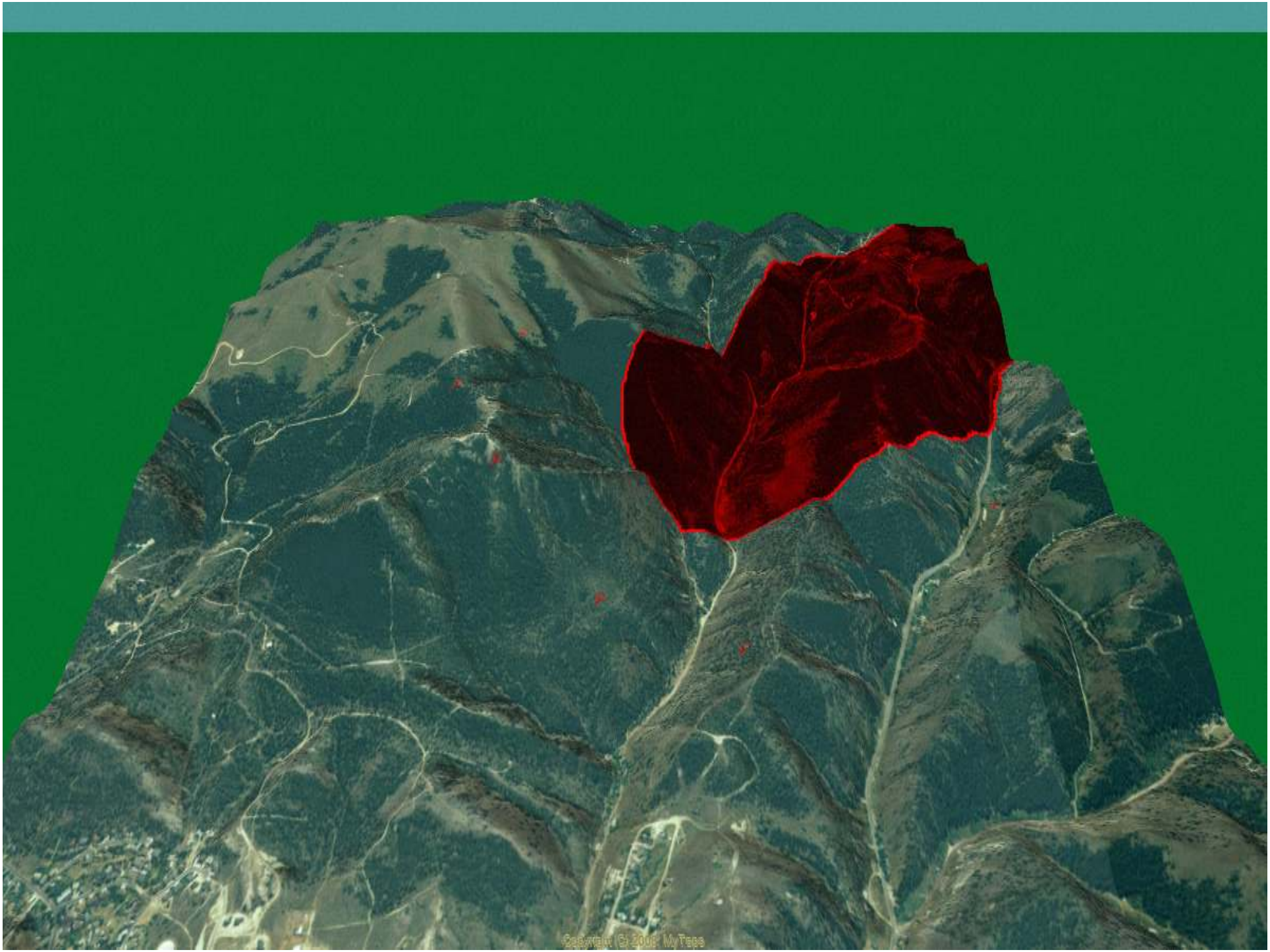
Third Hour 2:00 -3:00pm
+/- 1,280 acres



Black Indicates Pre-Epidemic Fire Perimeter in Three Hours +/- 420 acres



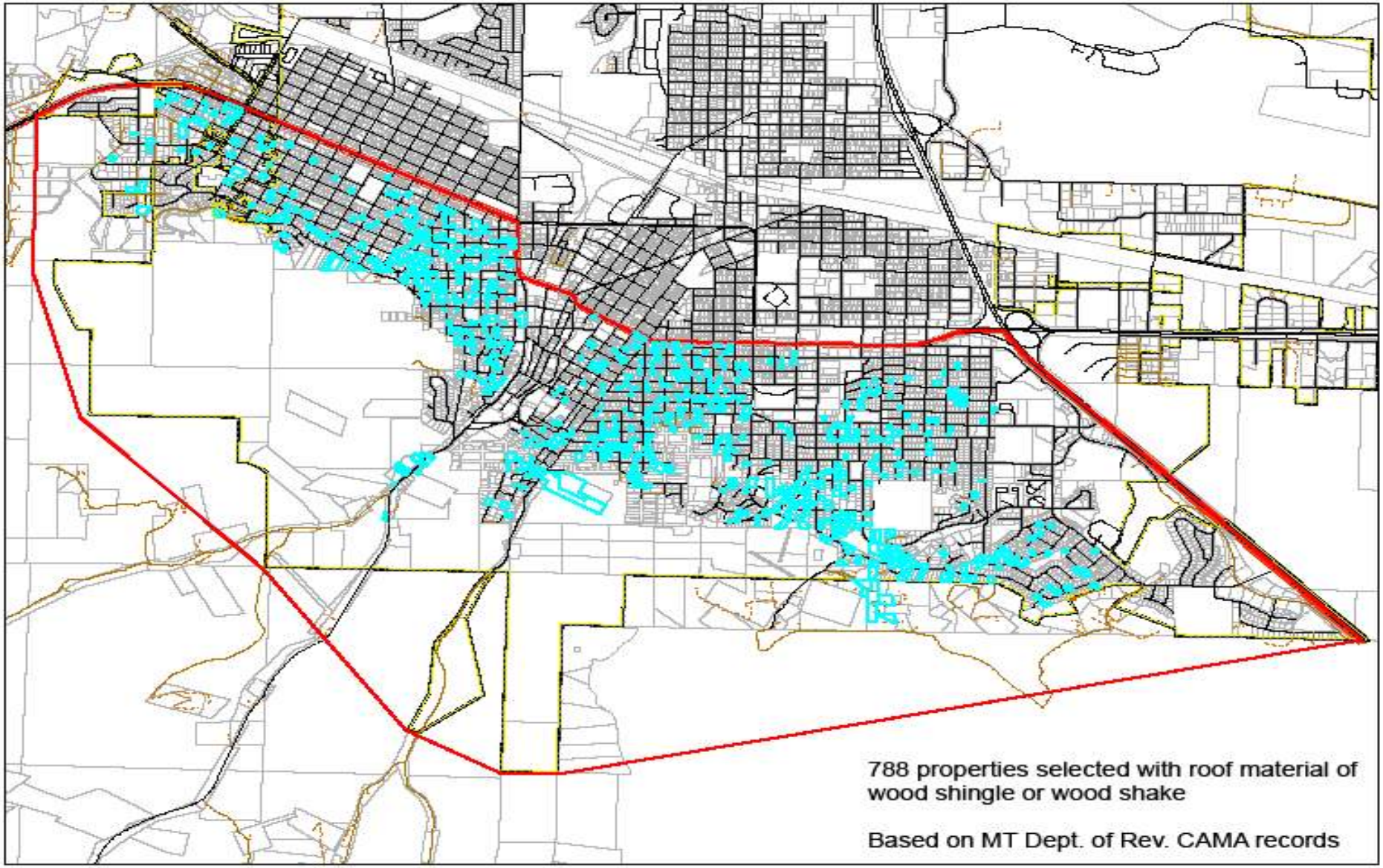

HELENA
MOUNT HELENA
CITY PARK




Home and human survival would depend entirely upon *Firewise* home construction, defensible/survivable space, fuel breaks, escape routes and safety zones.
ROAD
CLOSED

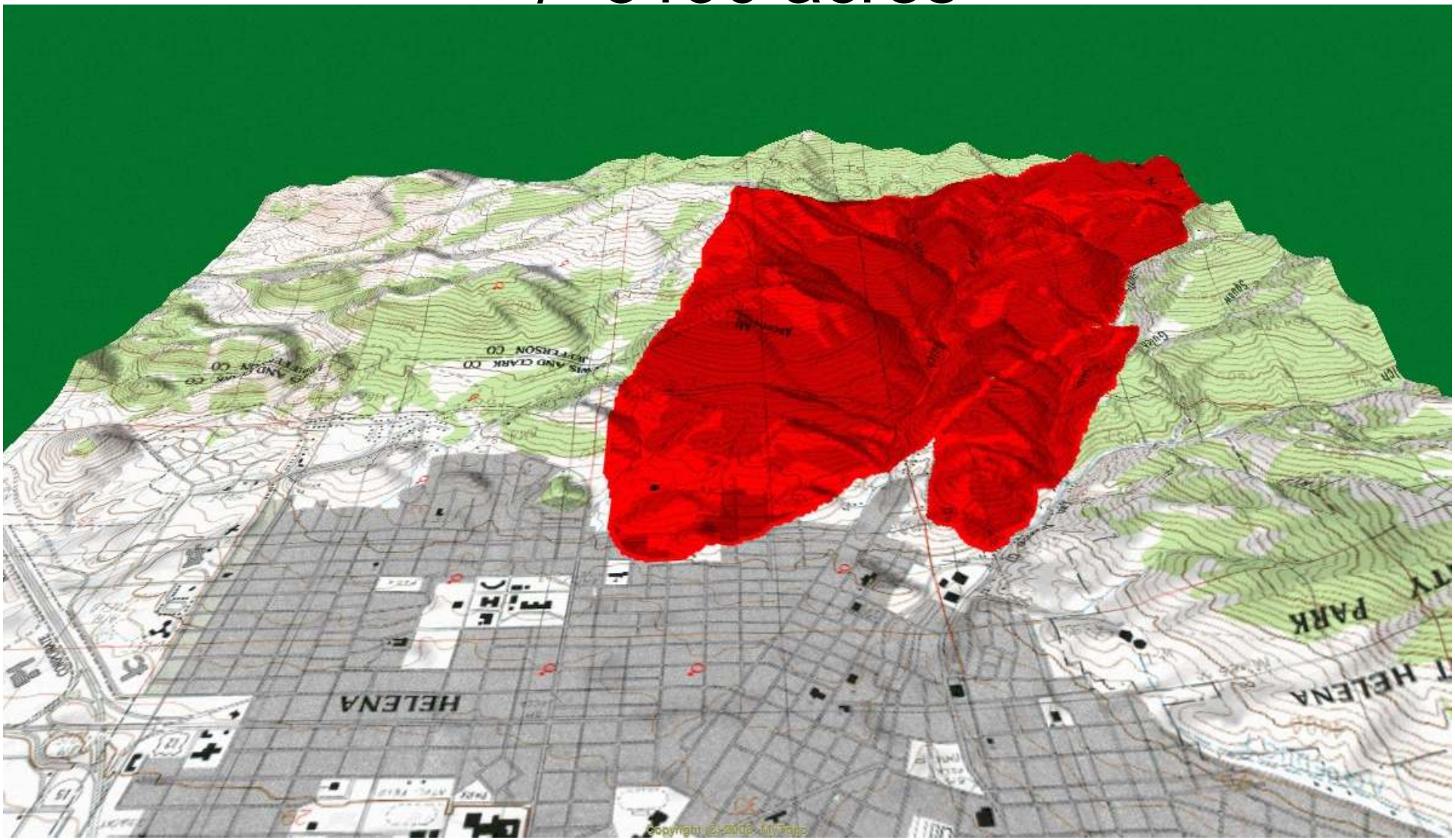

Hot embers would be raining down onto homes up to .5 miles ahead of the fire front.

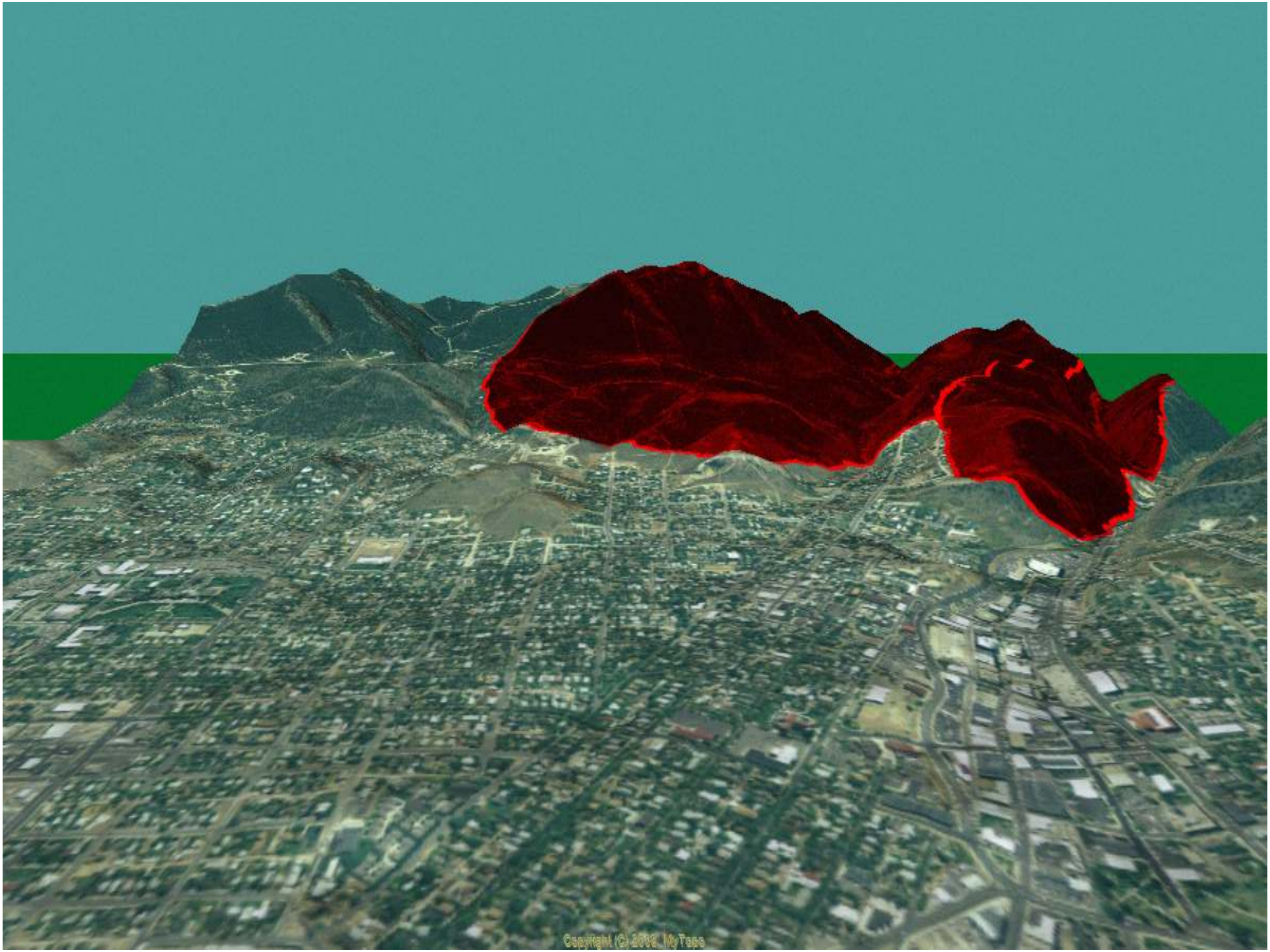
Map of shake shingle roofs



Homes with Wood Shingle type roofs are at a greater risk to catch fire than that of an asphalt or fire restive material

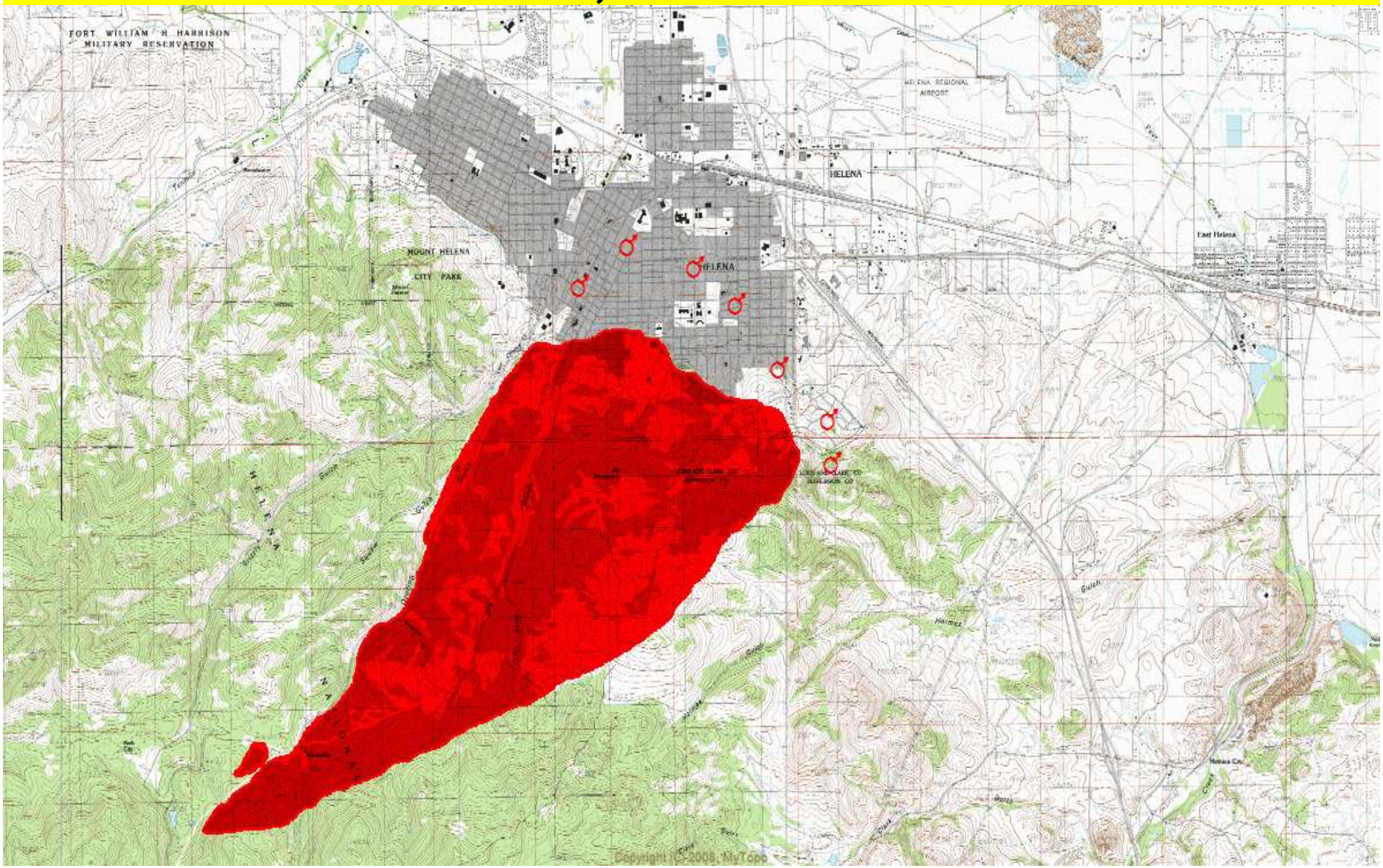
Fourth Hour 3:00 – 4:00pm
Fire Enters Helena City Limits
+/- 3190 acres

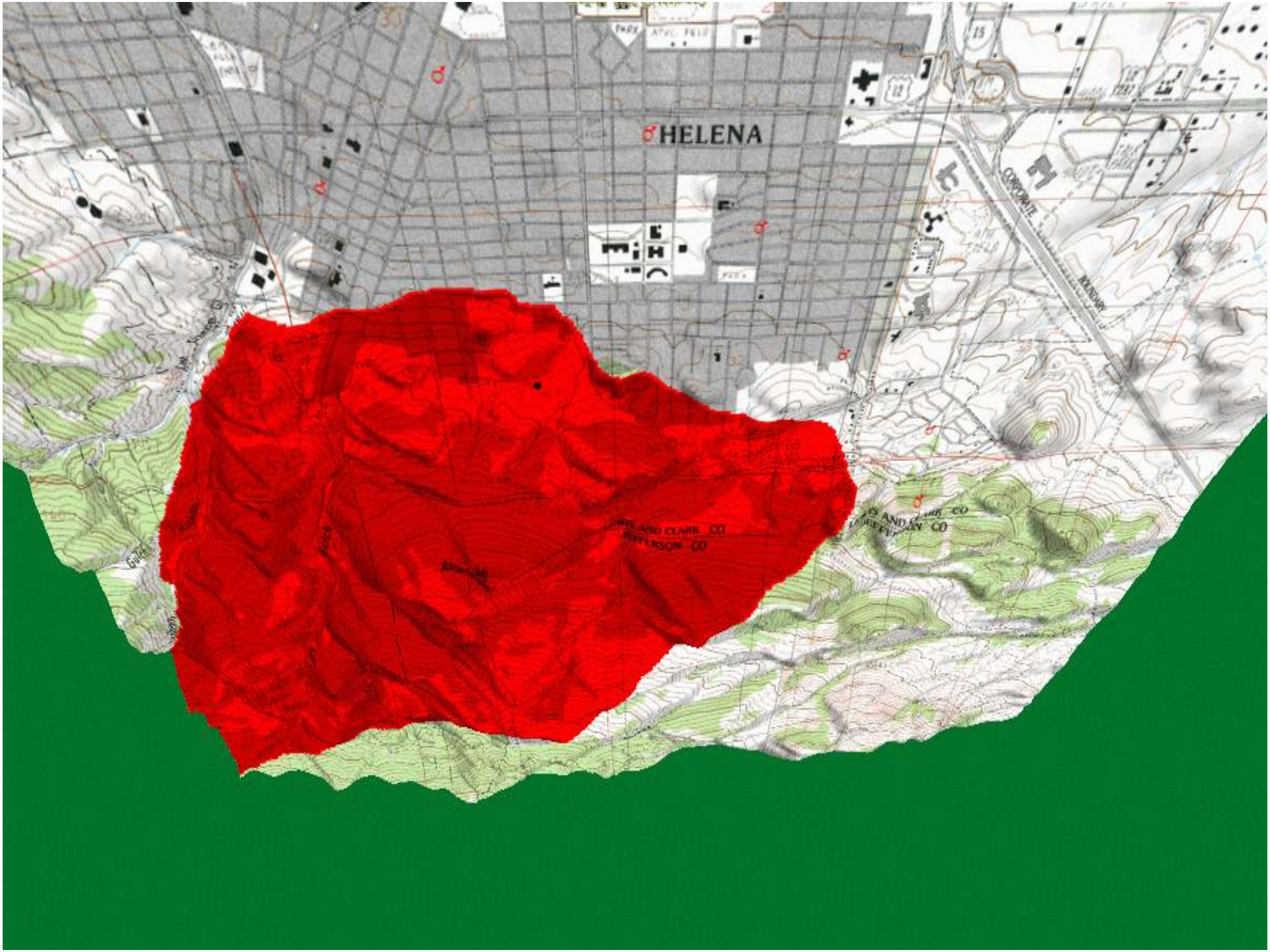


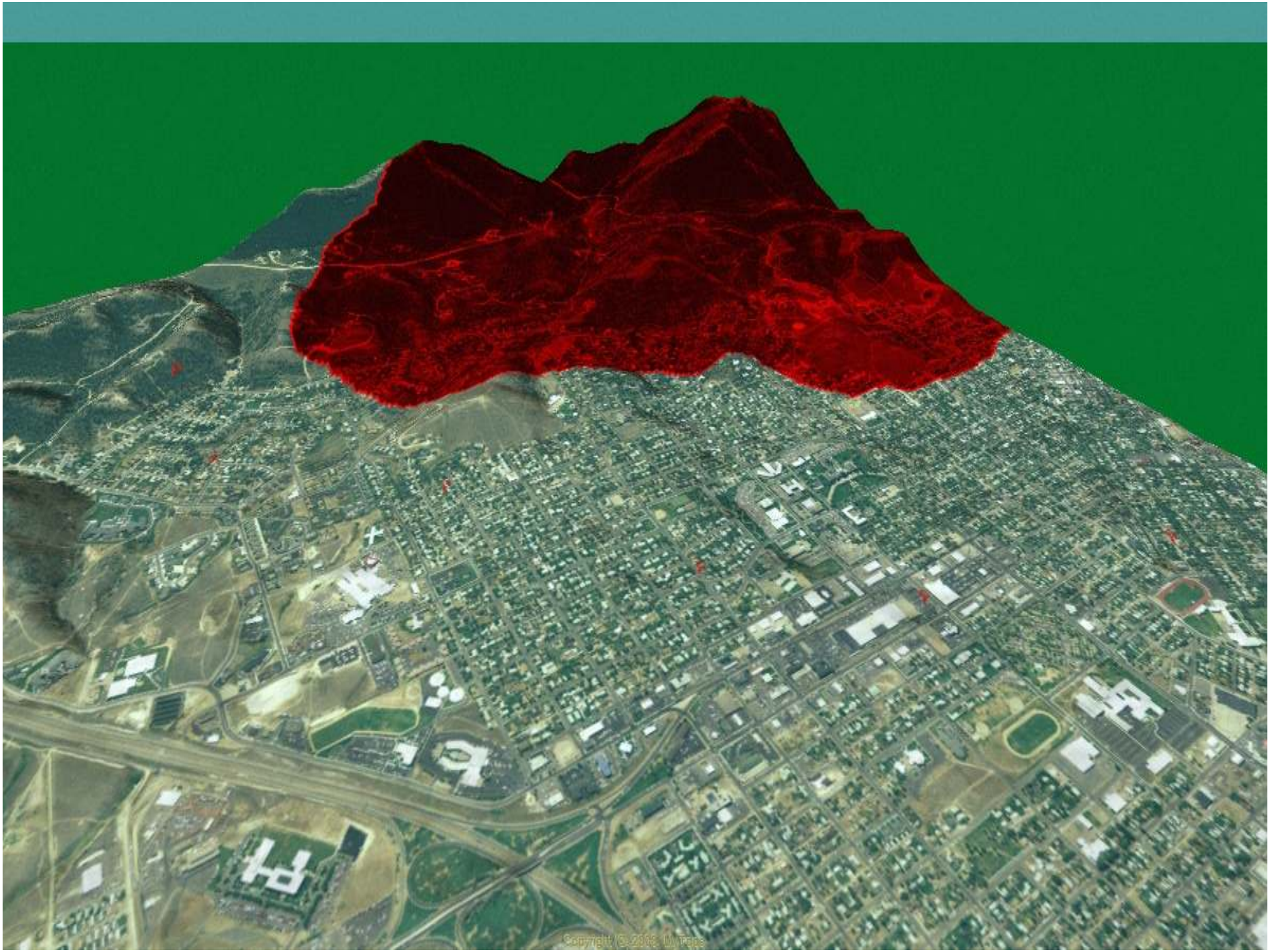

Copyright (C) 2008, MyTopo

Large fires can cause embers to fly miles away and cause other smaller fires called spot fires

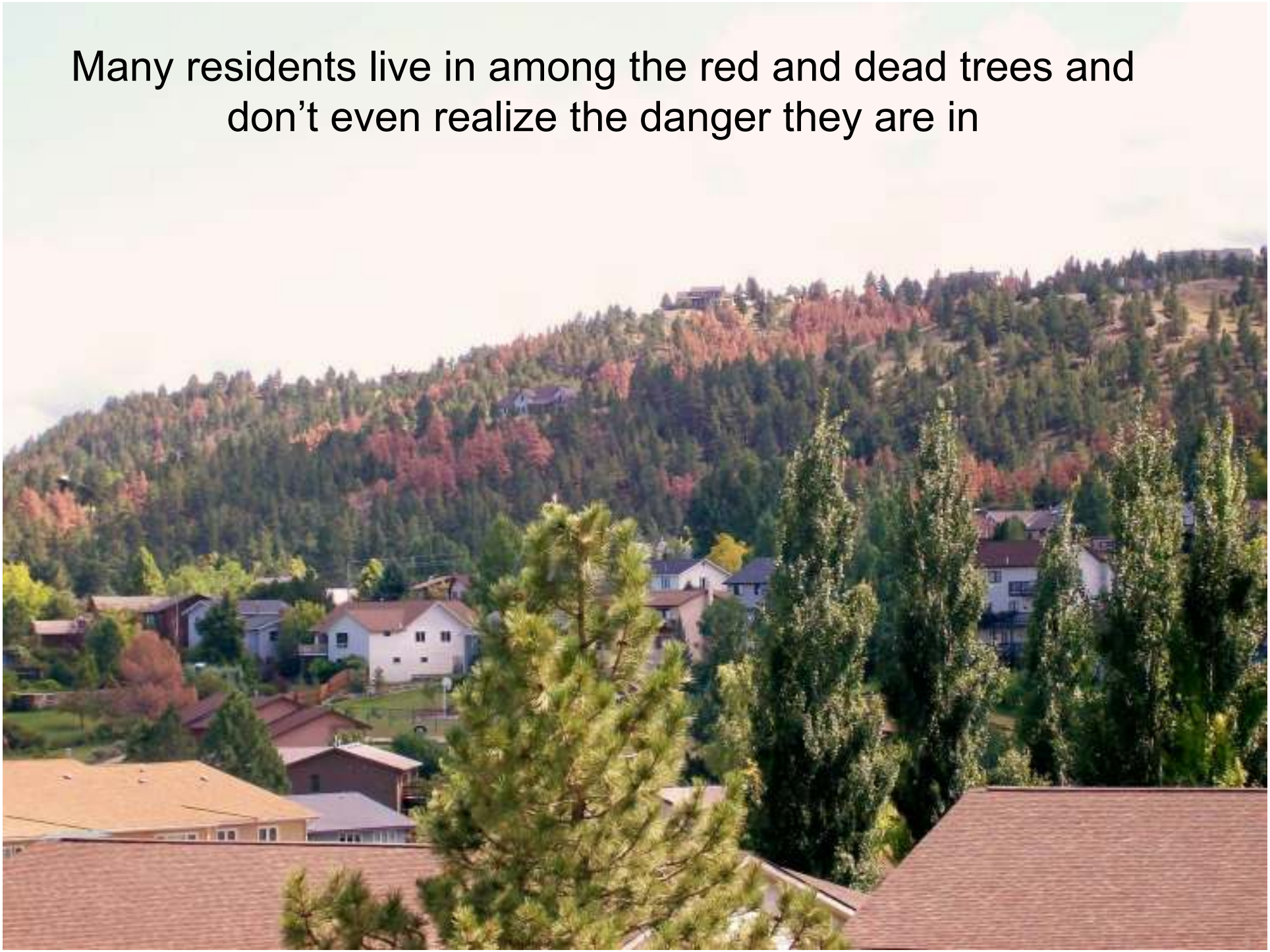
Fifth Hour 4:00 – 5:00pm
+/- 4,220 acres




HELENA
LEWIS AND CLARK CO
JEFFERSON CO

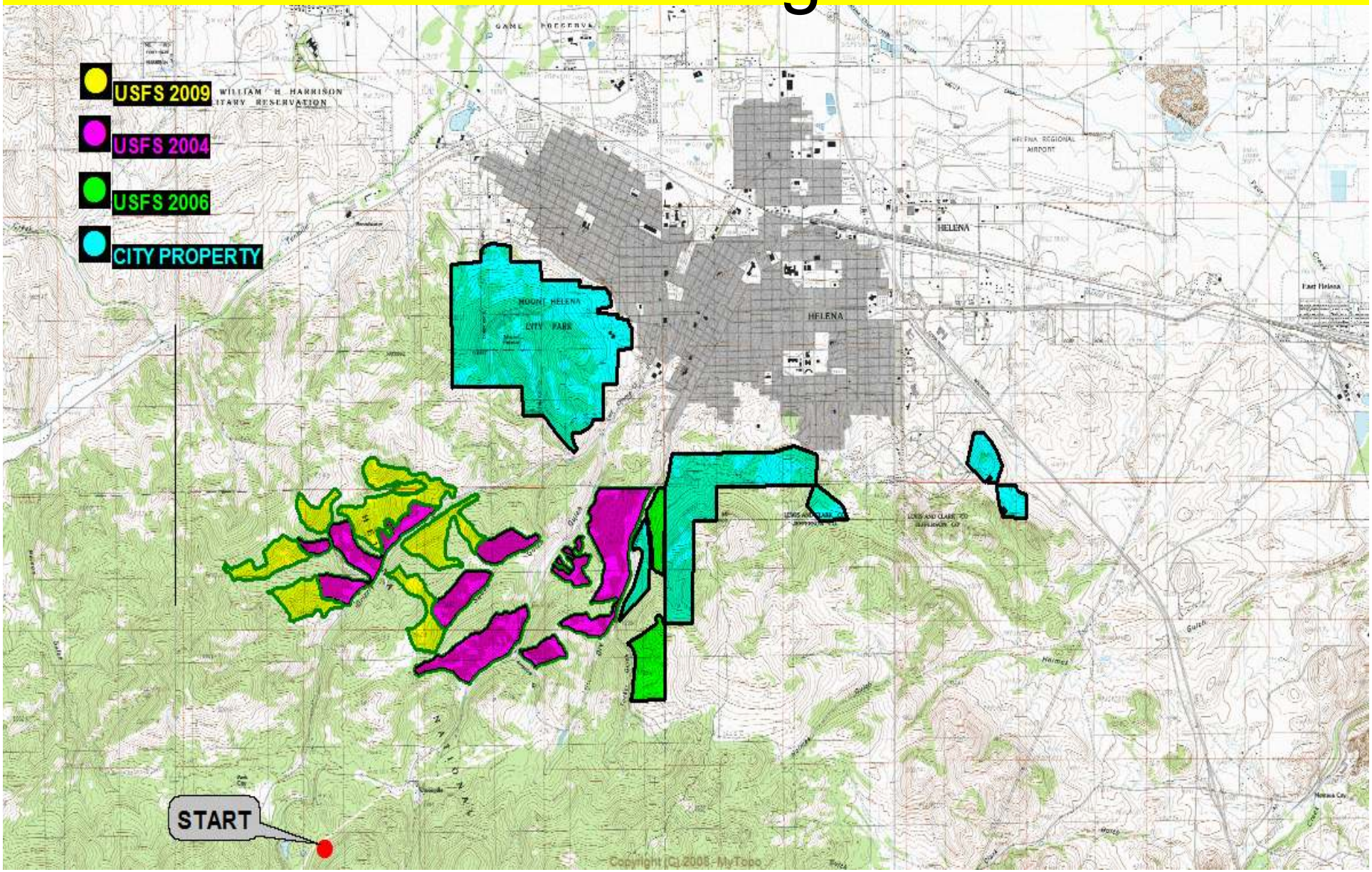


Many residents live in among the red and dead trees and don’t even realize the danger they are in




A wildland fire coming into our
city and into your home is
possible.
Are you Prepared

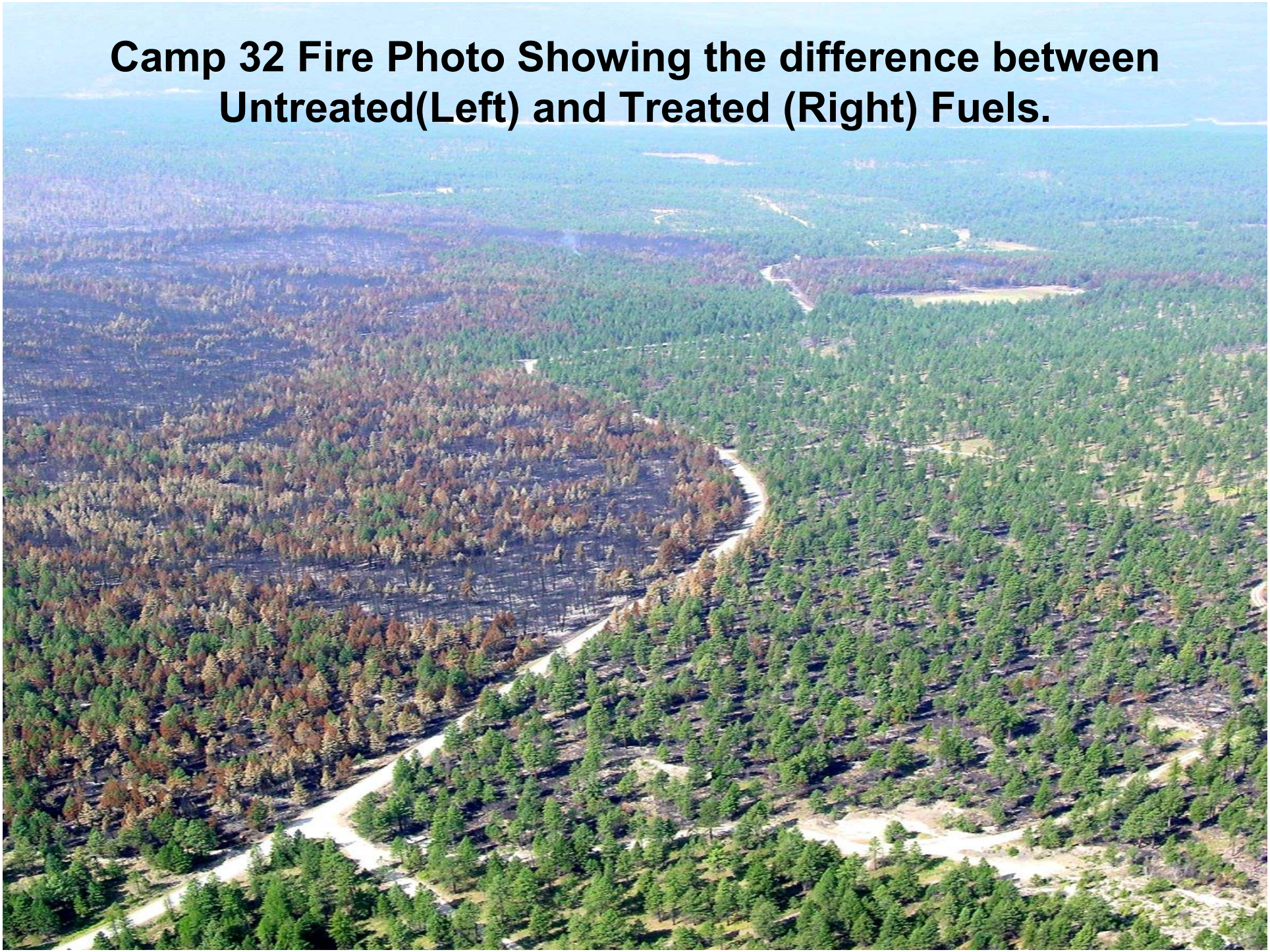
The Following Slides Depict Fire Behavior Following Treatment



FIRE BEHAVIOR POTENTIAL
WHEN FIRE ENTERS TREATED FUELS

- **Assumes dead trees have been removed with 15-20 foot crown separation of remaining trees and pruned to 6 feet.**
- **Assumes understory and slash has been treated by either chipping or burning.**
- **Fire would remain a surface fire with up to five foot flame lengths. A crown fire could not be sustained!**
- **Rate-of-Spread would be reduced to about ¼ mile per hour depending upon amount of surface fuel, i.e. chips or cured grass.**

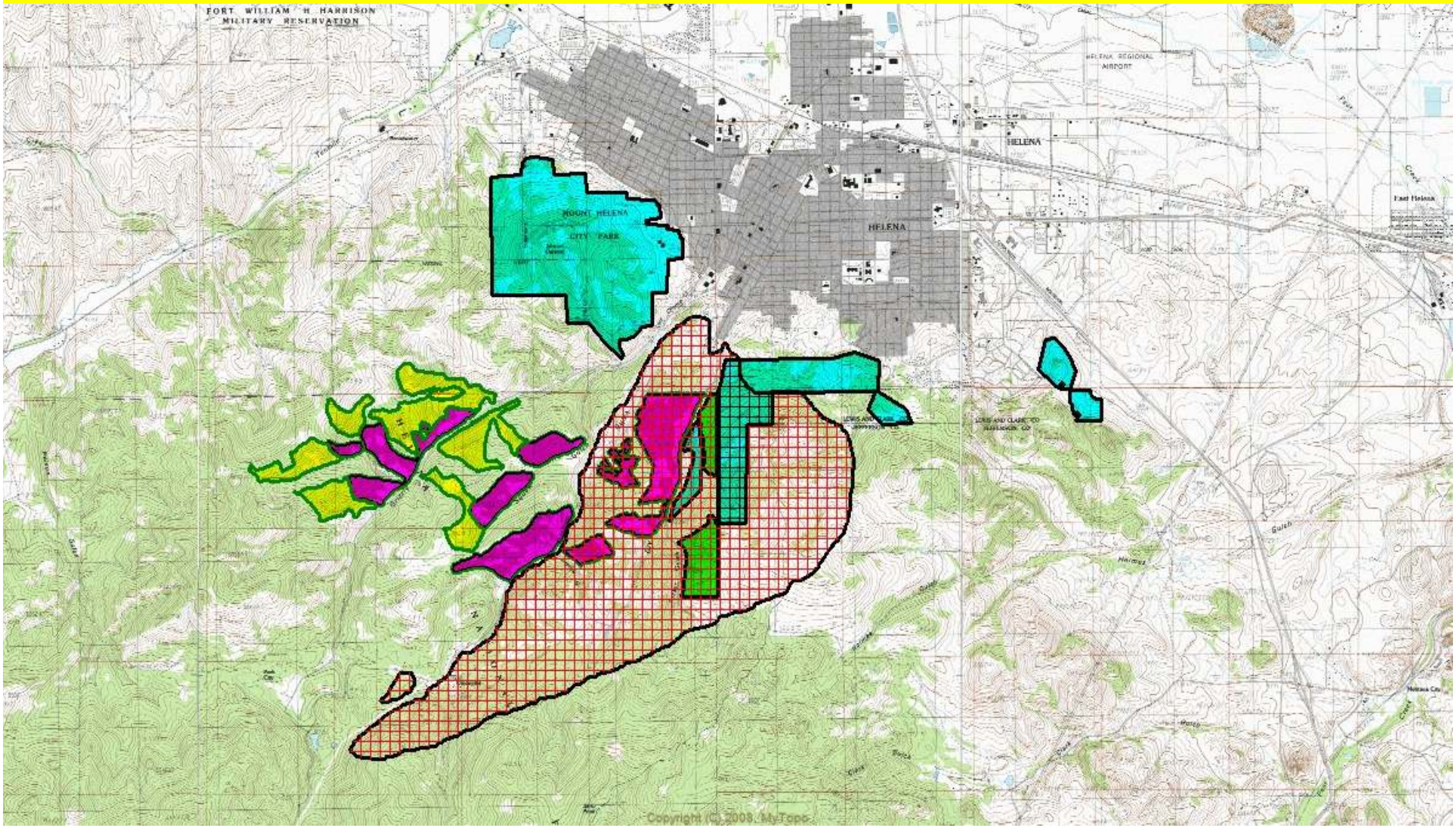
Camp 32 Fire Photo Showing the difference between Untreated(Left) and Treated (Right) Fuels.



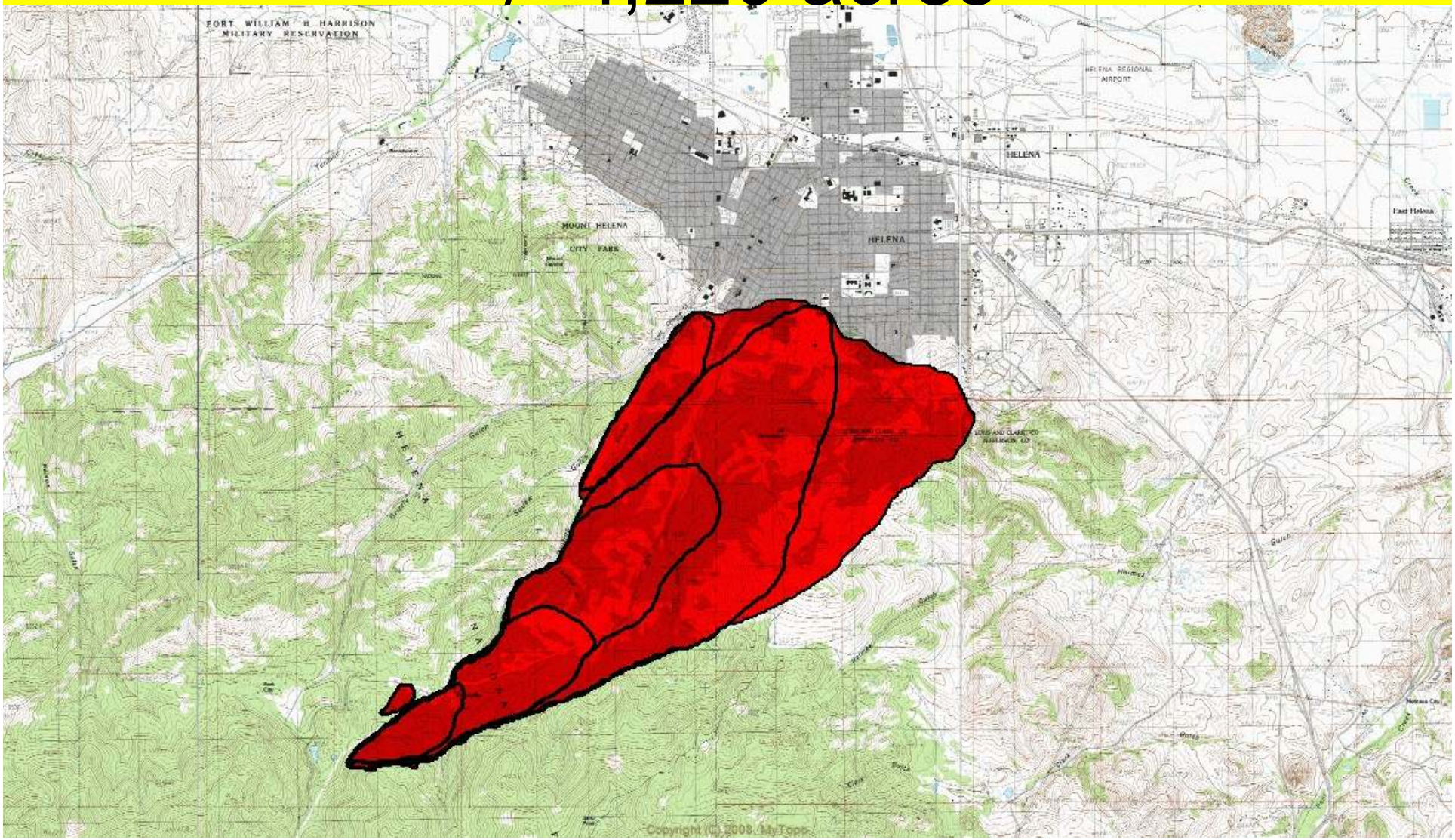
Camp 32 Fire – Fire Effects of Treated Fuels


Mount Helena's first
Mitigation project

Fifth Hour With Treatment
Fire has not entered the City of Helena
+/- 3,140 acres



Fifth Hour Without Treatment
Fire has entered the City of Helena
+/- 4,220 acres



FIRE BEHAVIOR
POST DOWNFALL

- Assumes all dead trees have fallen to the ground with none removed.
- In this climate all small limbs and needles would remain on the ground as fine fuels for decades.
- Total fuel load could be over 100 tons per acre.
- Some young trees would be growing up through the dead and down logs.


9
3

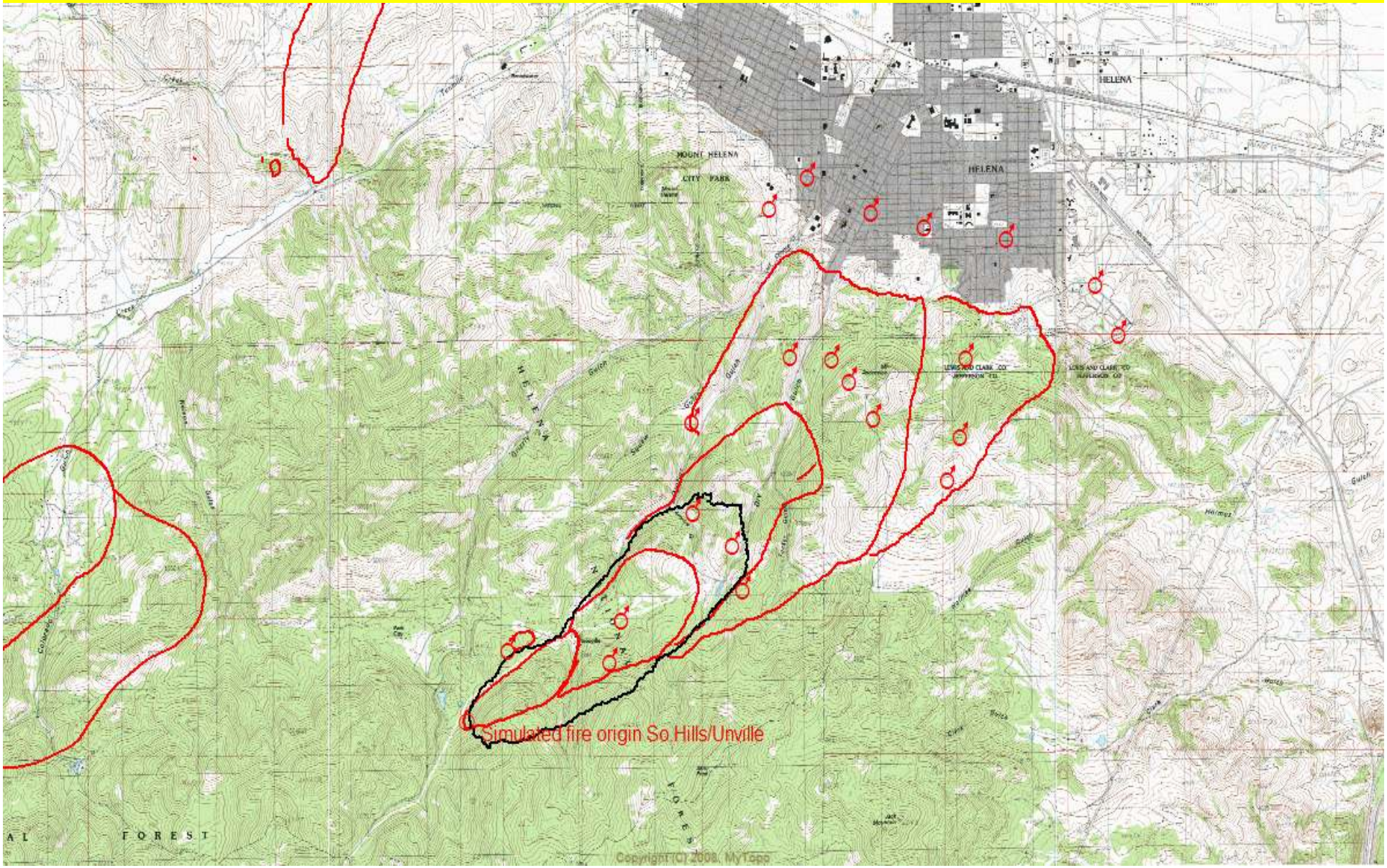
FIRE BEHAVIOR FUEL MODEL 13

- Fires spread quickly through the fine fuels.
- Intensity builds up more slowly as the large fuels start burning.
- Active flaming is sustained for long periods.
- A wide variety of firebrands can be generated.
- These contribute to spotting problems as the weather conditions become more severe.

FIRE BEHAVIOR INTERPRETATION

- Surface fire ROS up to ½ mile per hour.
- Flame lengths from 14 to 18 feet.
- An active crown fire could not be sustained.
- Some remaining green trees could torch out lofting embers .3 mile down wind with 100% Probability of Ignition.
- Within one hour a fire start could be as much as 40 acres in size.
- Control efforts at the head of the fire would be ineffective.

Black is perimeter of “Post Downfall” after five hours



Hydrophobic Soils Following Intense Fire


NON DEFENSIBLE SPACE


SAVE YOUR PROPERTY


BE SAFE AND AWARE


MITIGATE YOUR PROPERTY
AND
PREPARE TO EVACUTATE