

Modeling Lightning-Ignited Fires in the Great Smoky Mountains using FARSITE

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Overview

- Background on natural wildfire
- Help from ArcGIS 9.3
- Running FARSITE
- Conclusions

Fire? Bad?

- Is all fire bad?
- How can it help?
 - Prescribed burning
 - Natural Ignited Burns

Types of Fires



Ground fires burn in natural litter, duff, roots or sometimes in high grass. Once started they are very difficult to detect and control.

Surface fires burn in grasses and low shrubs or in the lower branches of trees. Surface fires may move rapidly. Ease of control depends on the fuel involved.

Crown fires burn in the tops of trees. Once started, they are very difficult to control because wind plays an important role in the fire behavior.

Spotting can be produced by crown fires as well as wind and topographic conditions. Large burning embers are thrown ahead of the main fire. Once spotting begins, the fire will be very difficult to control.

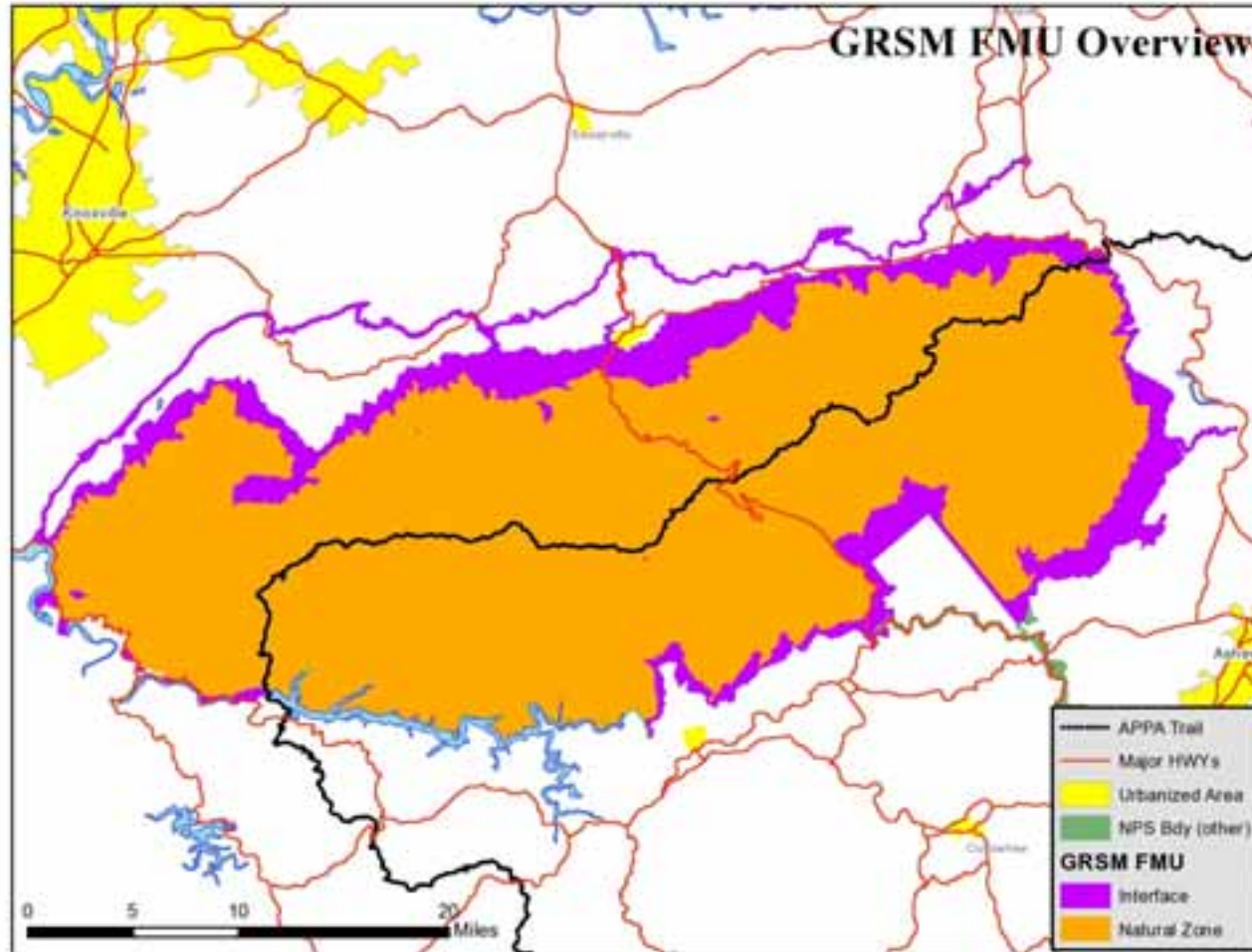
Great Smoky Mountain Wildfires and FARSITE

- Purpose
 - Compare fire spread simulated by FARSITE with real fire perimeters in the Great Smoky Mountains
 - Aid in future prediction of fire spread
 - Determine historical fire behavior
- Real Fire Perimeter Used
 - Cattail II Fire
 - Burned August 6 – August 14, 2007

History of Managed Fires in Great Smoky Mountains

- Decision to manage naturally ignited fires (e.g. lightning) made in 1996
 - Fire could not burn outside of the park boundary
 - Private land and homes surround the park

Natural Zone and Interface



Provided by the Great Smoky Mountains National Park

How FARSITE Works

- Using FARSITE vs. 4.1
 - Simulates fire spread
 - Uses topography, types of fuel, and weather conditions to calculate the growth of fire and how it behaves
 - The fuel types are categorized by the Scott and Burgan Fuel Model list
 - For a full list of the fuel models visit → http://www.fs.fed.us/rm/pubs/rmrs_gtr153.pdf
 - It also uses fuel moisture when calculating how far a fire will spread

Landscape scenes – hardwood forest cover (lots of oak)





Oak forest



Foggy morning



Wildfire photos May 2007 this and next photo





Note patches of pine on dry sites on the ridge, surrounded by hardwood forest





Fire-scarred tree



A few years after a hot fire – pine regeneration



Encroachment of young white pines (fire-intolerant) in an oak-yellow pine forest



Using ArcGIS 9.3

- Topography Files
 - Spatial Analyst Tools
 - Conversion Tools

An example of a Fuel Model

- Scott and Burgan's Fuel Model 186
 - TL6
 - Moderate Load Broadleaf Litter
 - Slow fire spread
 - Small flames

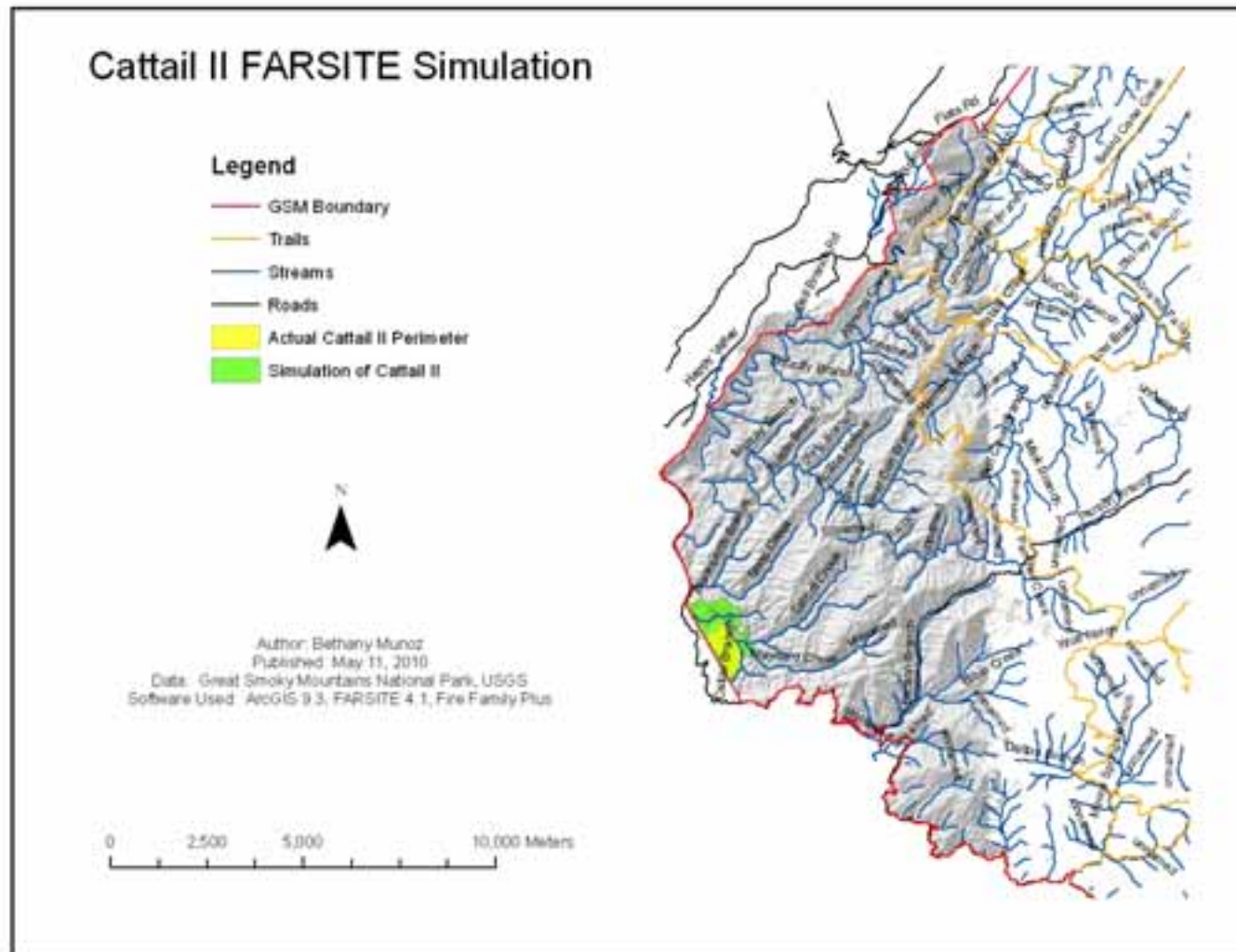


http://www.fs.fed.us/rm/pubs/rmrs_gtr153.pdf

Running FARSITE

- Landscape (.lcp)
- Project (.fpj)
- Disable Crown Fire
- Set Parameters
- Set Duration
- Locate Ignition Point
- Simulate

Cattail II Simulation vs. Real Fire Perimeter



More to Come

- Simulation of the Chilly Springs Fire
 - Occurred in 2006
 - Midwest Great Smoky Mountain National Park

Questions?