

Quantifying Canopy Mortality in Prescribed Fire Units

The George Washington and Jefferson National Forests have a long history of using prescribed fire in the oak and oak-pine forests of western Virginia. The most recent forest plan (article was published in 2018) encourages the use of fire to create early successional and open canopy forest habitat across landscapes and sets landscape-scale goals for these habitat types. Implied in these goals is that overstory canopy trees will be killed by fire. The direct effects of prescribed fires on the two national forests have been monitored by photo points and on-the-ground plot-level measurements for 10 years. However, there was still a need to determine how much early successional and open canopy forest was being created at the landscape scale.

Methods to determine post-fire canopy mortality through remote sensing are available and used primarily in the Western US. These reflectance-based methods are not clearly defined for eastern hardwood forests. After discussing the need for the information for the two national forests and the public, Jean Lorber, Conservation Scientist with The Nature Conservancy in Virginia, took on the challenge of directly mapping canopy gaps created by prescribed fire. Using repeated aerial imagery and known burn unit boundaries, Jean painstakingly digitized and characterized (early successional or open forest) canopy gaps for 75 burn units covering over 85,000 acres.

Jean's findings are documented in a recent publication from the Northern Research Station, USDA Forest Service (<https://doi.org/10.2737/NRS-RP-31>). The work had two main goals: 1) to determine if forest plan objectives for the two canopy gaps types were being met across the landscape and 2) to explore possible drivers for the mortality patterns observed within the burn units.

Key Findings:

- Mean percentage of burn unit area in early successional canopy gaps was 5% after one burn, 9% after two, 17% after three, and 14% after 4 burns
- Mean percentage of burn unit area in open forest canopy gaps was 5% after one burn, 7% after two, 9% after three, and 8% after 4 burns
- Early successional habitat goal met (goal is 12% of landscape)
- Harder to achieve open forest conditions with fire alone (goal is 67% of landscape)
- Even repeated burning did not create more open-canopy forest conditions
- Canopy gaps were associated with drier forest types
- Canopy gaps were associated with higher heat load index sites, up to a point

Take Home:

- May need to burn differently to get open forest conditions or incorporate noncommercial timber management
- Large variability in gaps created in any one burn unit
- Are the forest plan goals too precise?

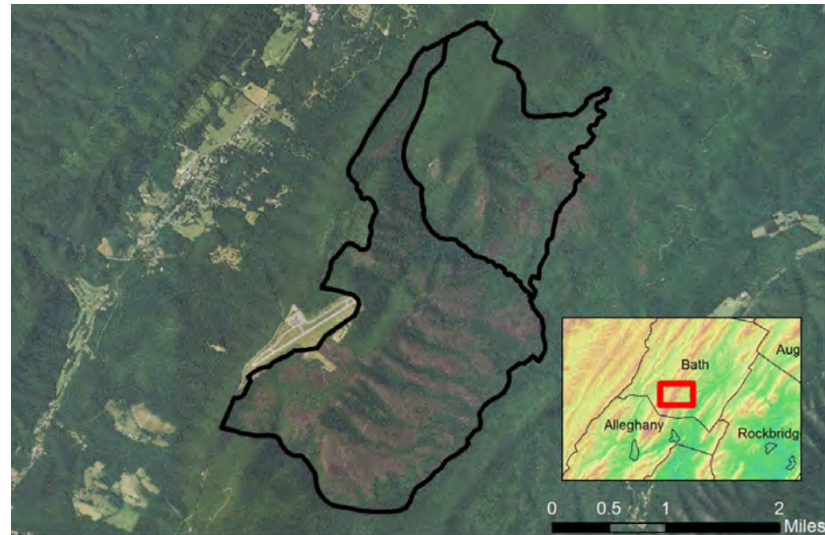


Figure 1 -2: Example of burn unit assessment showing the 3 mapped canopy conditions

