Forest Structure and Composition Monitoring:
A collaborative approach evaluating long-term changes on prescribed burn units in Virginia

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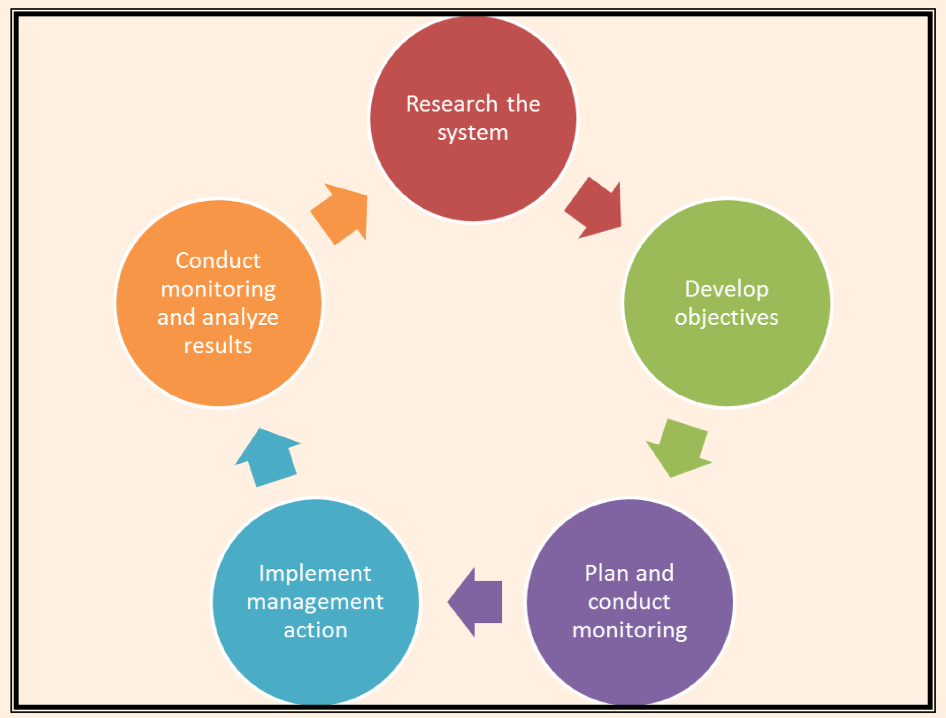
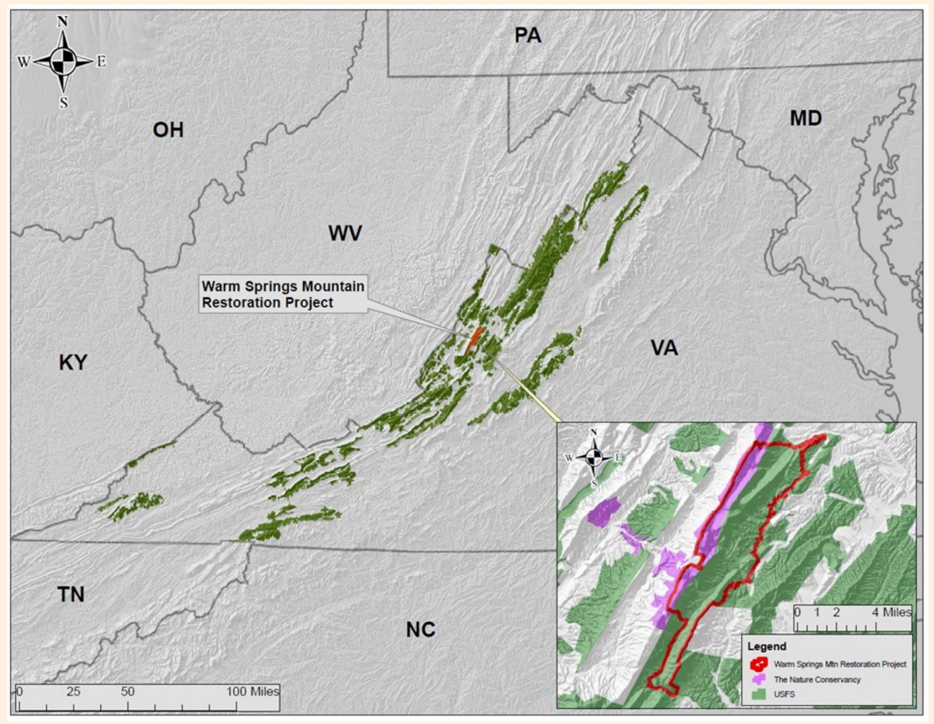
Introduction

The George Washington and Jefferson National Forests (GWJNF) and The Nature Conservancy's Warm Springs Preserve collaboratively adopted the Forest Structure and Composition Monitoring Protocol in 2009. The monitoring program focuses on collecting long-term canopy, overstory, mid-story, and understory data on one-hundredth acre circular plots installed across prescribed burn units. Monitoring data is an essential element of the adaptive management process. Fire management officers use summarizations to evaluate fire effects after burns, influencing future burn frequencies and techniques to achieve desire landscape conditions.

The Adaptive Management Process



Study Area



Rationale

- Monitoring provides quantitative feedback to burn plan objectives– were objectives met within desire time frames?
- Gives fire management officers the best available science to inform decisions
- Provides the public with tangible results regarding landscape condition
- Tracks landscape changes over time with permanent and consistent monitoring
- Provides fire personnel the opportunity to better understand fire effects on the landscape
- Promotes strong interagency cooperation and partnerships
- Meets Southern Region Forest Service Manual policy (FSM 5100-5142.3)

Objectives

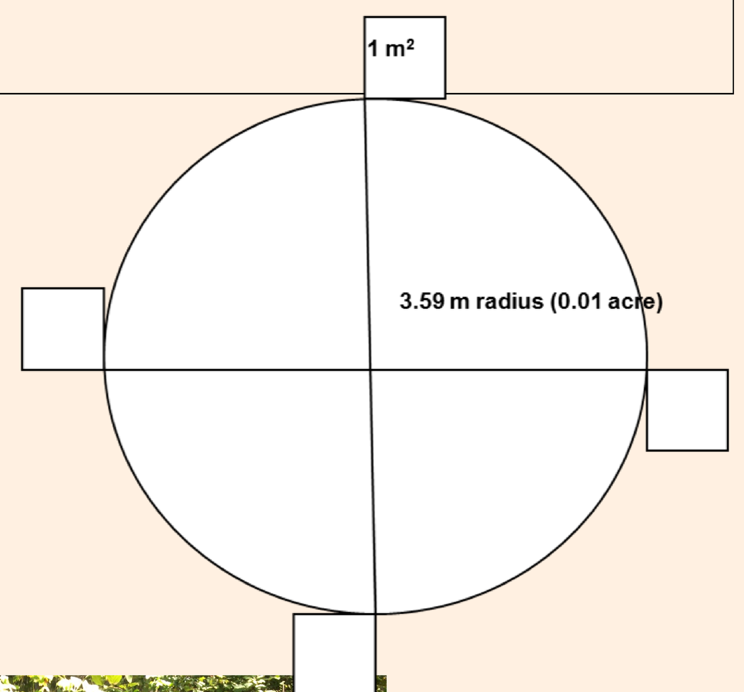
The forest structure and composition protocol was developed as part of an adaptive management program. As such, monitoring objectives are derived from resource and fire management program objectives which are to be periodically re-evaluated.

For Pine Forests (Dry), Oak Forests (Dry-Mesic), and Mesic ecosystem types:

1. Compare evergreen, deciduous, and sky (open) canopy cover between Baseline and one year post-burn.
2. Compare *Pinus* and *Quercus* seedling/sapling density between Baseline and one year post-burn
3. Compare *Acer* seedling/sapling density between Baseline and one year post-burn.
4. Compare understory diversity between Baseline and one year post-burn.

Methods

- **One 3.59m^2 radius plot– 0.01 acre**
  - -Measure trees and shrubs (live and dead) <10cm and >2.5 cm and >1m tall
  - -Measure trees and shrubs (live and dead) <2.5 cm DBH and >1m tall
- **Four 1m^2 Quadrats**
  - -Estimate of aerial percent groundcover of graminoids, forbs, trees, woody shrubs, woody vines, and non-native invasive plants using cover classes in the Daubenmire scale
  - -Count all woody trees and shrubs 15cm-1m in height
- **One Plotless Basal Area Factor 10**
- **Four 3.59m canopy transects in each cardinal direction**
- **Two photographs per plot (North and South)**



Plot Information

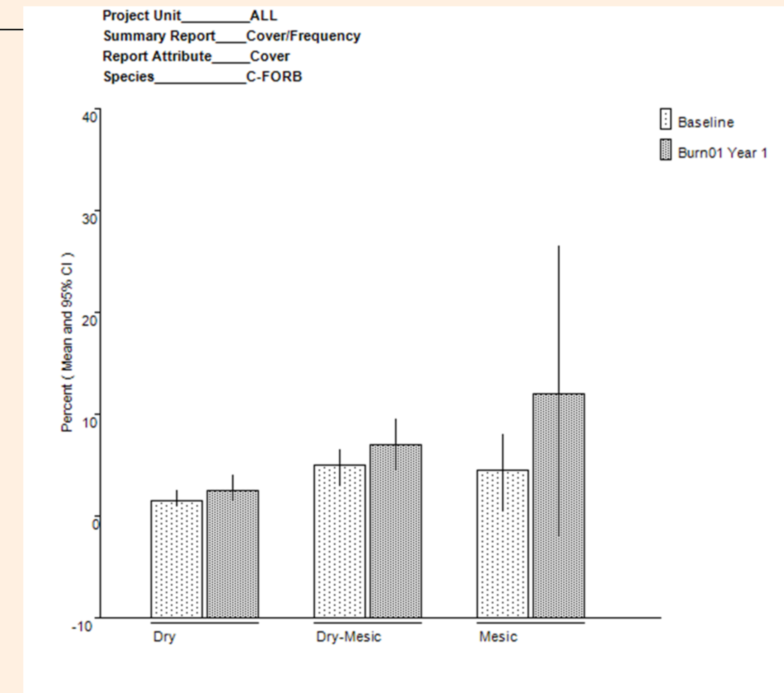
Monitoring Status	Number of Plots
Baseline	384
Burn 1 YR 1	149
Burn 1 YR 5	29
Burn 2 YR 1	40
Other Visits	130

Forest Service personnel Butch Shaw (left) and Harold Sutherland (right) conduct Baseline monitoring on the Mount Rogers National Recreation Area in Southwest Virginia.

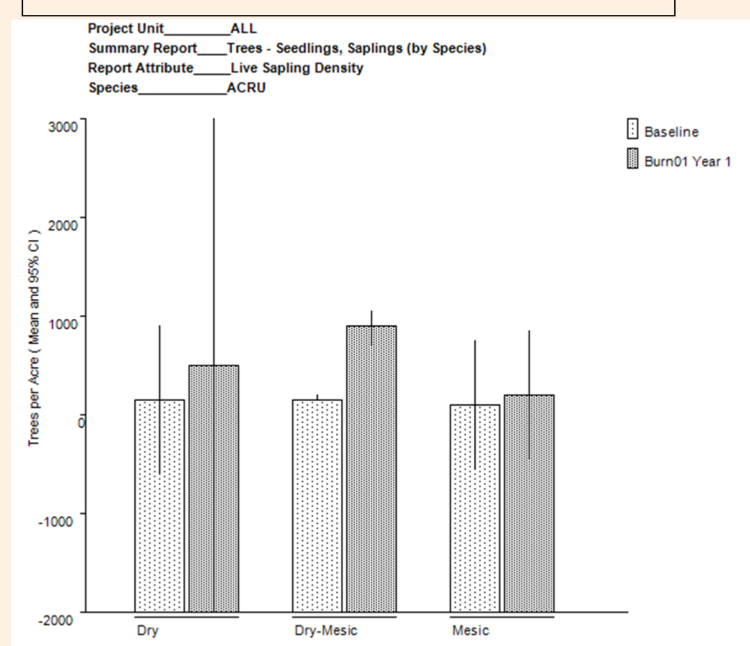
Canopy Cover Type	Baseline %	1 Year Post-Burn %
Deciduous	70	65
Evergreen	11	11
None (Open)	16	23

Canopy cover for Oak-Forest Plots monitored pre-burn and one year post-burn. Open canopy cover showed a statistically significant increase from baseline data collection with a probability of 0.0431 (α= 0.05).

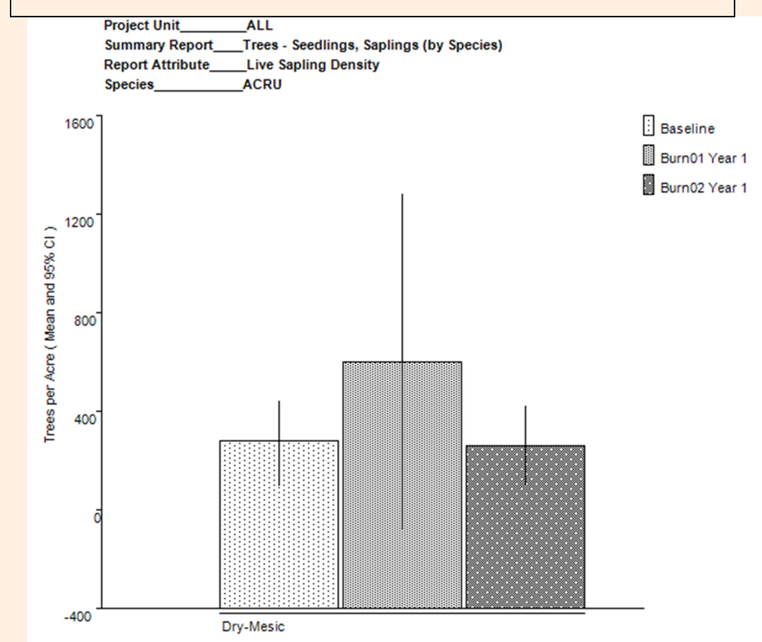
Liatris spicata blooming post-fire. Photo courtesy of Steve Croy, USFS.



Forb cover in all vegetation types at baseline visit and one year after Burn 1.



Live sapling density of *Acer rubrum* at baseline visit and one year after Burn 1. Dry-mesic plots show a significant increase after one burn with a probability of 0.0021 (α = 0.05).



Live sapling density of *Acer rubrum* one year after Burn 2. Trends show a sharp increase in density after one burn followed by a density slightly below baseline values after a second burn.

Conclusions

Forest structure and composition monitoring has contributed to strong partnerships between the US Forest Service, The Nature Conservancy, as well as other agencies such as the Virginia Department of Game and Inland Fisheries and the Virginia Department of Conservation and Recreation. Landscape scale change is a slow process, therefore continued monitoring is necessary to accurately track changes and trends over time. Data collected adds to the knowledge of fire managers and encourages science-based decision making as these agencies work towards achieving desired landscape conditions throughout the Central Appalachians.

Repeat Photography Series

Photos are taken from plot center facing North on the Porters Mill Prescribed Burn Unit, located on the Warm Springs Mountain Restoration Project. They clearly illustrate the effects one wildfire and one prescribed burn can have on forest structure and composition.