

TITLE: Understanding the effects of fire management practices on forest health: implications for weeds and vegetation structure

PROJECT: INT-F-04-01

LOCATION: Northern Rockies

DURATION: Year 2 of a 3 year project

FUNDING SOURCE: National Fire Plan

PROJECT LEADER: Anne E. Black, Post-doctoral Research Ecologist, RMRS Aldo Leopold Wilderness Research Institute, aebblack@fs.fed.us;

COOPERATORS:

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PROJECT OBJECTIVES: Our primary objective is to understand how fire management tactics affect forest health by determining whether these tactics (a) increase short-term post-fire weed establishment, or (b) cause long-term differences between “natural” and “suppression-caused” post-fire patterns in vegetation structure. A second objective is to assess the opportunity to use FIA data to assist in monitoring these short and long-term effects.

JUSTIFICATION:

Fire use and suppression tactics, including hand lines, dozer lines, fire retardants, burn-outs, and the use of natural barriers, potentially cause both short- and long-term impacts to forest health. Fire management activities may increase soil disturbance, thereby promoting post-fire weed establishment. They also may initiate long-term landscape scale changes to vegetation structure that exacerbate future fire, insect or disease risk, or jeopardize wildlife habitat. We use wilderness and wildland fire use tactics as reference conditions against which to evaluate suppression tactics.

DESCRIPTION:

Our study builds on the work of Thier et al., generating multi-scaled knowledge of fire effects at many of the same locations. Within our project area (Northern Idaho and Western Montana), we compare the effects of fire management tactics used on fires managed as wildland fire use, under a containment strategy, and under aggressive suppression, seeking multiple replicates of fire severity and fire tactics. We use a combination of FIA plot data, supplemental field surveys, and GIS analysis of landscape structure to evaluate the effects of fire management actions on potential future landscape structure and forest health. Results develop methodologies for quickly assessing post-fire landscape effects and assess the potential for siting such assessments on FIA plot locations. Results also will provide an initial answer to our questions of effect and scale.

Progress, Accomplishments and FY06 Schedule of Activities:

Short-term effects: weeds We modified FY05 field sampling methodology slightly to reduce time, while still increasing area sampled over FIA plots. The original sampling methods used four, 500 m long transects at each FIA plot. This was time consuming and the full 500m did not add substantially to data collected over the first 250m; thus we

reduced overall transect length to 250 meters for FY05. These smaller transects still allow us to sample a significantly larger area than captured by the FIA methodology, allowing us to compare intensive (FIA) with extensive assessments (expanded plot). All details of the original sampling methods remain the same, except that random points are now sampled in each 25 m section of the transect. This revised methodology yields the same number of data points and area sampled at each FIA plot but now over approximately 0.5 km² instead of 1 km². We also adopted the standard FIA method to sample our extensive plots. Using both methods over the exact same ground allows us to directly compare results.

During the FY05 field season we sampled 10 plots using both our new broad scale method and the standard FIA subplot method (FIA National Core Field Guide, Version 2, January 2004). All plots occurred in areas that had burned in the 2000 or 2003 fires. Results from this sampling showed that:

13 nonnative invasive plants were present in the sampling areas

8 nonnative invasive plant occurrences were detected by the FIA method but not by the broader sampling method

6 nonnative invasive plant occurrences were detected by the broader sampling method but not by the FIA method

10 nonnative invasive plant occurrences were not detected by either method even though these species occurred in the area sampled

There are no consistent species differences found in either sampling method

It appears that the broader sampling method detected a great number of species than the FIA method when there was greater topographic variation

We have discussed these results with the Interior West FIA Program Manager and FIA scientists and will be working with them to devise methods to validate these results.

Long-term effects: landscape structure Based on FY04 assessments, we selected BARC data (Burned Area Recovery Class) as the most appropriate and consistent dataset for analyzing patch shape and internal heterogeneity. We received BARC data for 30 fires burned in 2003: 11 suppression, 13 confine, and 6 wildland fire use. Preliminary analyses indicate a significant difference in the biophysical locations of 3 fires, allowing us to proceed with analysis of 27 fires. We calculated 4 patch and 4 landscape measures in FRAGSTATS to describe shape, interspersion, dispersion, and heterogeneity of the fires. In this case, severity is treated as the patch class and the fire as the landscape class.

Preliminary analyses indicate significant differences distinguish suppression from confinement and WFU fires. However, due to low sample sizes, power is fairly low. Since similar data is available for 2005 fires, and there were numerous events in the area, we will supplement our 2003 data with that of approx. 27 fires of 2005 within our study area. We received BARC data for this set on September 23, 2005. Similar measurements of internal heterogeneity will be calculated within a buffered area around FIA locations from this dataset as well, and then tested against measures from within the entire perimeter. We will work with Interior West FIA program to determine the best buffer area for these analyses.

Our FY04 assessment also indicated that existing data archived by fire management teams is insufficient to consistently determine edge complexity, or to attribute fireline tactic. Thus, in FY05, we collected approximately 30 samples of 200 m each for each fireline type (dozer, hand, explosive and natural line). Data was collected by walking the perimeters of 6 fires and mapping the final perimeter on 7.5-minute quads. These were then digitized and will be submitted for spatial analysis of perimeter length and sinuosity in FY06.

FY06 Planned Activities In FY06, we plan to:

Complete data preparation, analyze and write-up results, and submit final report.
 Transfer data to the Clearwater National Forest and Powell Ranger District staff.
 Meet with Regional, Forest and District personnel to brief them on our activities and findings, particularly related to adequacy of data archiving necessary to enable post-fire analysis. This has been identified by each NFS level as an important component of this project.

COSTS: We were awarded \$46,000 in February of 2005, but were then asked to return \$42,000 in August 2005. However, because of cost savings in our field work (we conducted field work ‘in house’ as opposed to contracting with FIA crews), we were able to continue with the project as planned. If we receive the requested FY06 appropriation, we will remain on budget and schedule.

	Item	Requested FHM EM Funding	Other-Source Funding	Source
YEAR 3 – FY06				
Administration	Salary ¹	30,700	26,000	RMRS
	Overhead ²	6,086		
	Travel ³	-	1,500	
Procurements	Contracting			
	Equipment	-		
	Supplies	1,000		
TOTAL YEAR 3		37,786	27,500	RMRS

¹ Salaries includes 3 months salary for Project Leader, 1 data analyst for 3 months.

RMRS match covers Co-PI salaries.

² RMRS indirect overhead as required by National Overhead Rate of 19.2%.

³ Travel match is Station support for travel to a conference to present research results