



## 2019 Simple Plot Protocol:

Monitoring Immediate Postburn Vegetation and Fuel Characteristics  
Developed by Colorado Forest Restoration Institute  
CFRI - 1916

### Methods Overview

Fuel treatment effectiveness monitoring plots installed in prescribed burn units require an immediate postburn visit to collect observations of factors affecting substrate and vegetation burn severity, tree mortality, and fuels reduction. Immediate postburn monitoring should be conducted within 2-3 weeks, or up to 2 months, after fire has interacted with sampling plots.

We will take repeat measurements of plot photos, litter, duff, fine woody fuel, and course woody fuels using pre-burn methods described in Colorado Forest Restoration Institute’s Field Data Collection Protocol for Evaluating Fire Mitigation Effectiveness. This immediate postburn protocol is meant to be an addendum to the full monitoring protocol and is not sufficient for sampling by itself. Be sure that sampling crews always have with them the full protocol that was used to measure plots pre-treatment.

The Fire Monitoring Handbook (FMH) (USDI 2003) provides rational and protocols the National Park Services uses to establish and monitor fire effects. Those data are organized and served using the national FEAT and FIREMON Integrated (FFI) database system. Postburn condition of overstory trees, saplings, substrate, and vegetation burn severity will be recorded using FMH protocols. Additional observations relating to soil burn severity will be made according to RMRS-GTR-243.

### Field Protocols

#### Navigate to plot location

Bring sampled plot map and plot information packets to assist with relocating plots. Always have the full pre-treatment data sheets available (paper or electronic copies) to assist in plot relocation, to verify sampling methods used, and any data collection errors or anomalies encountered. The minimum plot information should include plot coordinates, elevation, slope, aspect, transect azimuth, pre-treatment photos, and the tree and sapling list. A metal detector can assist in finding the steel monuments.

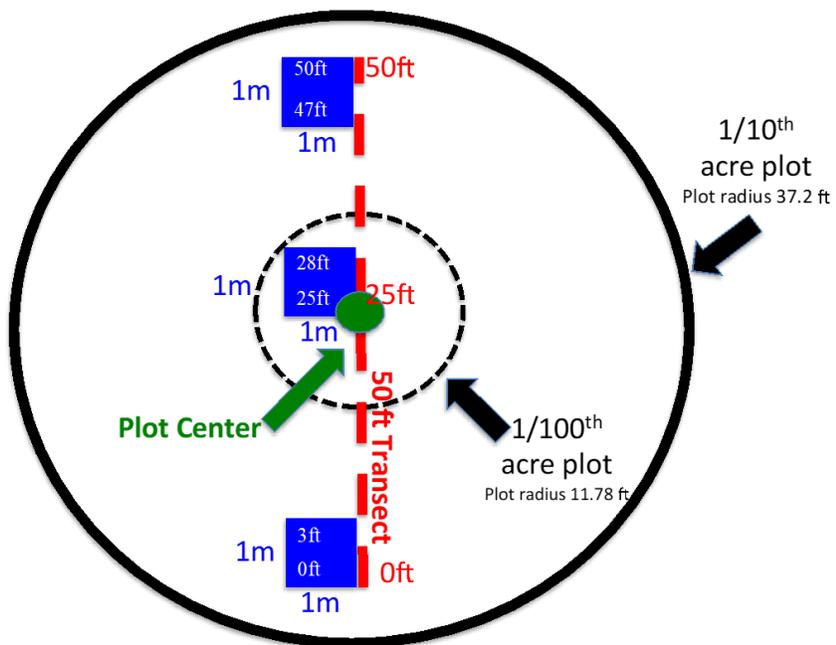


Figure 1: Simple plot layout with plot center at 25ft. Plot center has been located at 0 in some cases and should be observed where it was initially installed and measured pre-treatment.



### Plot Center

Check that plot monuments remain in place and remain viable following fire. If necessary, replace damaged monuments at plot center and 50ft along the random azimuth (Figure 1). Ensure that each monument has a silver “CFRI Long-term Monitoring Plot” tag (be sure to mark monument location (25 ft or 0 ft), the plot name, and the sample date on the silver tag using a ballpoint pen).

Wrap a piece of pink flagging around the top of each nail. If flagging is missing in post-treatment years, re-flag nails.

Standing at the plot center (25 ft on transect), take 4 photos. Fill out a white board with the plot code and date. Photos should be framed such that the white board is visible/legible and minimizing visible people in the shot. Photos will be used to describe fuel conditions and to help locate plots post treatment.

### Soil and Vegetation Burn Severity

1. Record soil and vegetation burn severity observed in 10 subplots placed in 5ft increments, from 0 – 45ft, on the left side of the transect when facing the 50ft end.
2. Place the bottom right corner of a 6in x 6in frame at each observation point. Record the following in each observation frame:
  - a. Estimator’s initials
  - b. Substrate and Vegetation Severity – Classify severity of each variable using the characteristics defined in Table 1 (FMH-21, USDI, 2003).
  - c. Ash Depth – Measure depth from top of ash to substrate to the nearest 0.25 in
  - d. Ash Color – Note the color of ash (i.e. black, grey, red, white)
  - e. Comment – Notable burn severity or intensity effects

### Forest Floor Substrate

Using the ocular estimate method, measure ground cover at the soil surface to the nearest 1% within the 1 m<sup>2</sup> sample frame. This includes litter/duff, moss/lichen, soil/gravel (<1 cm), rock (>1 cm), and 1000 hr fuel. Each category should be measured separately and total ground cover sums to 100% (e.g. 80% litter/duff, 20% rock).

- a. If stumps or live tree trunks occur in the frame, record them separately as woody basal.
- b. If large dead plant material suppresses growing space, record as herbaceous vegetation basal (rarely found in Colorado).
- c. Exclude live vegetation from ground cover estimates.

### Fine Fuels

Using the Photoload technique, estimate fuel loading for 1hr, 10hr, and 100hr fuels in tons/acre within the frame ([http://www.fs.fed.us/rm/pubs/rmrs\\_gtr190.pdf](http://www.fs.fed.us/rm/pubs/rmrs_gtr190.pdf)). The photos on pages 15-17 are intended as guides and not absolute choices. Estimate as close to the picture as possible or chose an intermediate loading between pictures if appropriate. A go-no-go fuels gauge can be used to help classify fuels in the sample frame.

- 1hr fuels (0 to 0.24 inch)
- 10hr fuels (0.25 to 0.99 inch)
- 100hr fuels (1.00 to 2.99 inches)



### Understory Cover and Height

Using the ocular estimate method, measure vegetation canopy cover to the nearest 1% within the 1 m<sup>2</sup> sample frame of all non-woody vegetation (graminoids – grasses and grass like plants, and forbs). As a rough guide, a closed fist equals ~ 1% cover.

1. Record Total Herbaceous Cover of all non-woody vegetation that is rooted in the 1 m<sup>2</sup> sample frame.
2. Estimate average total maximum height of all herbaceous vegetation at the highest point of each plant that is rooted within the 1m<sup>2</sup> frame to the nearest inch.

### Postburn Overstory Tree and Sapling Condition

Trees and saplings as measured pre-treatment should be tagged with sequentially numbered metal tags. Typically, trees were measured in a variable radius plot using a prism BAF of 10 square feet and saplings within a 0.01-ac fixed radius plot, but be sure to repeat the pre-treatment methods and BAF. Snags broken or fallen below breast height do not need to be re-tagged, but leave a note if a tagged tree fell down.

Plots with trees left untagged during the pre-treatment visit should be tagged when measured post-treatment. Swing prism to ensure all trees included in the variable radius plot were sampled during pre-treatment. Verify that all sampled pre-burned overstory and sapling trees are re-measured by referring to the initial and prior visit tree lists. Trees are intentionally measured and listed in clockwise order starting along the transect.

Nail numbered tag into tree at breast height, oriented facing plot center, so that the nail is angled upwards and at least one inch of nail remains exposed, leaving ample space for tree growth. For trees on a slope, determine breast height while standing on the upslope side of the tree. For trees with a lean, determine breast height by leaning with the tree. If a tree tag is missing, replace it with a new tag and record the new tag number for the given tree.

Record the following postburn condition information for each tree and sapling:

1. Tag – tree tag number
2. Ht to Red Needles – Minimum height to continuous dead foliage vegetation for all live trees and class 1a snags (to the nearest ft). This measure should be the lowest continuous vegetation (needles, branches, etc.) not including the main stem (tree trunk), and not where the lowest branch converges with the trunk.
3. Max Scorch Ht – Maximum scorch height – Measured from ground level to the highest point in the crown where foliar death is evident (to the nearest ft) (Fig 1: Fig 35. USDI, 2003).
4. % CVS – Percent crown volume scorched – Estimate the percent of the entire crown that is scorched (to the nearest 1%). This is estimated as the proportion of brown fire scorched needles in the total canopy, with brown and green needles summing to 100%. This should be collected no longer than 2 months after the burn to limit needles lost to cast.
5. Max Stem Char Ht – Maximum stem char height – Measure from ground to the maximum point of char on bole (1-ft). Note, this is absolute highest point of char, not continuous point. Use hypsometer or measuring tape (whichever is more convenient).
6. Bark beetles – Note Y/N for presence or absence of pitch tubes or frass on each bole within 6' of the ground.

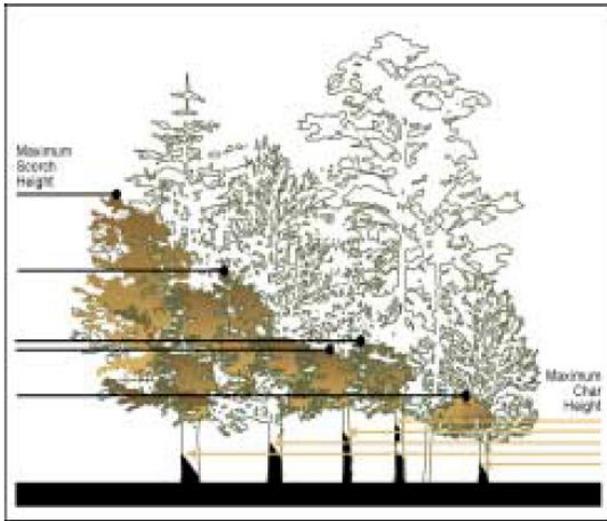


Figure 2: Max Scorch and Max Char Height. Fig 35, USDI, 2003

FMH-21

	Unburned (5)	Scorched (4)	Lightly Burned (3)	Moderately Burned (2)	Heavily Burned (1)	Not Applicable (0)
<b>Substrate (S)</b>	not burned	litter partially blackened; duff nearly unchanged; wood/leaf structures unchanged	litter charred to partially consumed; upper duff layer may be charred but the duff layer is not altered over the entire depth; surface appears black; woody debris is partially burned; logs are scorched or blackened but not charred; rotten wood is scorched to partially burned	litter mostly to entirely consumed, leaving coarse, light colored ash; duff deeply charred, but underlying mineral soil is not visibly altered; woody debris is mostly consumed; logs are deeply charred, burned-out stump holes are common	litter and duff completely consumed, leaving fine white ash; mineral soil visibly altered, often reddish; sound logs are deeply charred, and rotten logs are completely consumed. This code generally applies to less than 10% of natural or slash burned areas	inorganic preburn
<b>Vegetation (V)</b>	not burned	foliage scorched and attached to supporting twigs	foliage and smaller twigs partially to completely consumed; branches mostly intact	foliage, twigs, and small stems consumed; some branches still present	all plant parts consumed, leaving some or no major stems/trunks; any left are deeply charred	none present preburn

Table 1: Substrate and Vegetation Burn Severity Codes, FMH-21, USDI 2003.



## References

- Keane, R.E. and L. Dickinson. *The Photoload Sampling Technique: Estimating Surface Fuel Loadings From Downward Looking Photographs of Synthetic Fuelbeds*. USFS General Technical Report RMRS-GTR-190, pages 15-17. April, 2007. [http://www.fs.fed.us/rm/pubs/rmrs\\_gtr190.pdf](http://www.fs.fed.us/rm/pubs/rmrs_gtr190.pdf)
- Parsons, A., P.R. Robichaud, S.A. Lewis, C. Napper, and J.T. Clark. 2010. Field Guide for Mapping Post-Fire Soil Burn Severity. Gen. Tech. Rep. RMRS-GTR-243. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- USDI. 2003. Fire Monitoring Handbook. Fire Management Program Center, National Interagency Fire Center, Boise, ID.



## Gear List

### Plot Center

- 1 — 10 BAF basal area prism
- 1 — Clinometer
- 1 — Compass
- 1 — GPS and Batteries

### Quadrats

- 2 — Go no go fuels gauge
- 2 — Litter/duff ruler

### Main Compartment

- 1 — 100ft reel tape
- 1 — Hammer
- 2 — Loggers tape
- 1 — Hypsometer
- 1 — Walkie-talkie
- 1 — White board
- 1 — 6in x 6in sample frame
- Numbered tree tags and aluminum nails

### Zipper Pocket

- Batteries: AAA (4), AA (3), 9V (1)
- Pencils, Dry erase markers, Pens, Sharpies
- 40 – Plot tags and washers
- Pink flagging

### Side Compartments

- 1 — Camera

### Clipboard/Tatum: filled with below forms

- Data sheets
- Fire effects monitoring protocol
- Photo load guides for 1hr, 10hr, and 100hr fuels
- Maps of site

### Shoulder Sheath

- 1 — 1m<sup>2</sup> sampling frame
- 4 — Chaining pins
- 15 — Pin flags 2 color
- 1 — Yard stick