

Immediate Post-Burn Simple Plot Protocol

Field Data Collection to Assess Immediate Post-Burn Vegetation and Fuel Characteristics

Methods Overview

Fuel treatment effectiveness monitoring plots installed in prescribed burn units require an immediate postburn visit to collect observations of substrate and vegetation burn severity, factors affecting 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 Simple Plot Protocol. 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. Post-burn 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.

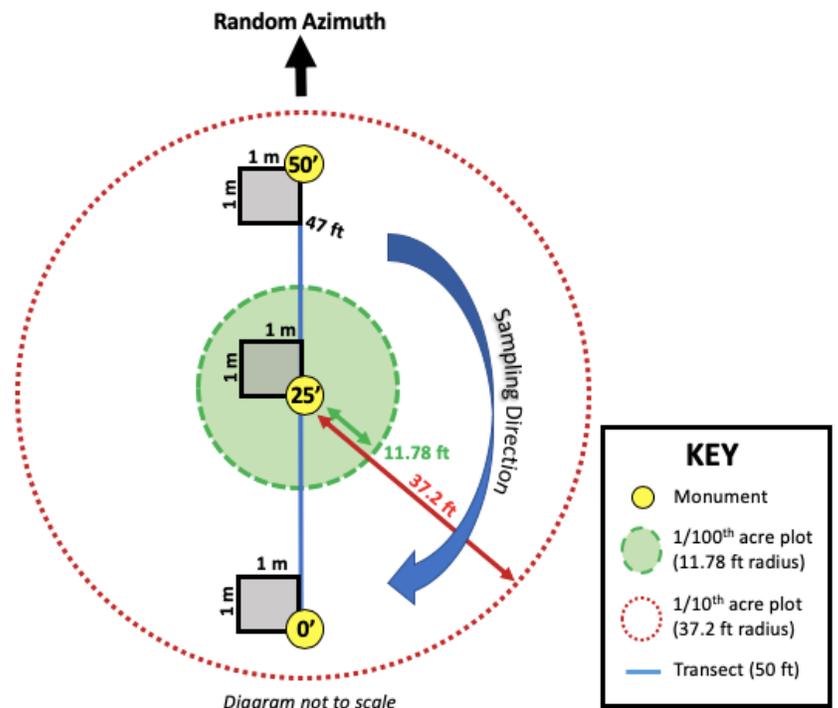


Figure 1: Simple plot layout with plot center at 25ft.

Plot Center

Check that plot monuments remain in place and remain viable following fire. If necessary, replace damaged monuments (Figure 1). Ensure that each monument has a silver “CFRI Long-term Monitoring Plot” tag (be sure to mark monument location (50 ft, 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. Take photos in the landscape orientation, frame photos so the white board is legible, and exclude gear and people in the shot. *For post-treatment plots, check pre-treatment photos to ensure the same view is captured.*

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. Substrate and Vegetation Severity – Classify severity of each variable using the characteristics defined in Table 1 (FMH-21, USDI, 2003).
 - b. Ash Depth – Measure depth from top of ash to substrate to the nearest 0.25 in
 - c. Surface Color – Note the color of the forest surface (i.e. black, grey, red, white). Unburned is NA.
 - d. 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 m² 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. Do not record fresh needle cast. Plots should be measured as soon as possible post-burn to avoid scorched needle cast influencing substrate measurements.
- c. Ash is recorded as bare ground.
- d. If large dead plant material suppresses growing space, record as herbaceous vegetation basal (rarely found in Colorado).
- e. Exclude live vegetation from ground cover estimates.

Fine Fuels, Litter and Duff

1. **Quadrat Photo:** Standing on the opposite side of the transect tape, take a downward-looking photo of the quadrat, include the whiteboard to the side of the quadrat with plot code, date, and quadrat location (e.g. “40 ft”).
2. **Photoload:** 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). 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)

3. Litter and Duff Depths: In each quadrat corner, measure litter and duff depths to the nearest 0.25 inch.

Distinguishing between litter and duff:

- **Litter:** Loose layer made up of needles, dead grasses detached from the plants, recently fallen leaves, twigs not visible from above where the individual pieces are still identifiable and little altered by decomposition.
- **Duff:** Layer below the litter layer and above the mineral soil. It is made up of litter material that has decomposed to the point that the individual pieces are no longer identifiable. [Per FIREMON protocol (RMRS-GTR-164-CD)]

Understory Cover and Height

Using the ocular estimate method, measure vegetation canopy cover to the nearest 1% within the 1 m² 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 m² sample frame.
2. Estimate average total maximum height of all herbaceous vegetation at the highest point of each plant that is rooted within the 1m² frame to the nearest inch.

Postburn Overstory Tree and Sapling Condition

Trees and saplings 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.

Refer to the tree lists from prior visits to verify all sampled pre-burn overstory trees are remeasured. Trees are intentionally measured and listed in clockwise order starting along the 50 ft end of the transect. **Record a note if pre-burn species, height, or CBH appear to be incorrect.**

Trees within the plot not measured during the pre-treatment visit should be tagged and completely measured post-treatment (including DBH, height, and CBH if possible),

If a tree tag is missing or melted, replace it with a new tag and record the new tag number for the given tree, along with the old tag number in Notes. Snags, trees with no green needles or leaves remaining, and trees broken or fallen below breast height do not need to be re-tagged, but leave a note if a tagged tree fell down.

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.

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

Tag number	If tag is missing or melted, replace it with a new tag <i>if the tree has any green needles</i> . Record the new tag number in the Tag Number field and the old tag number in Notes.
Species	Record species of each tree.
Height to red needles	Height from the ground to the lowest scorched red needles. Note if green needles remain below the minimum scorch height. If no needles remain, record the pre-burn height of the tree. <i>Measure to the nearest foot.</i>
Max Crow Scorch Height	Height from the ground to the top of the red needles/leaves. Check that this is not taller than the pre-treatment tree height. If no needles remain, record the pre-burn height of the tree. <i>Measure to the nearest foot.</i>
Max Stem Char Height	Measure from ground to the maximum point of char on bole. Note, this is absolute highest point of char, not continuous point. Use an ocular estimate up to 10ft and employ a range finder when height is >10ft. If the stem char reaches the top of the tree, record the pre-burn height of the tree. <i>Measure to the nearest foot.</i>
% Crown Volume Scorched	Estimate the percent of the entire crown that is scorched to the nearest 10%, or to the nearest 1% if under 10%. This is estimated as the proportion of red fire scorched needles in the total canopy, with red and green needles summing to 100%. This should be collected no longer than 2 months after the burn to limit needles lost to cast. If all needles were consumed (and the tree was alive pre-burn), then CVS is 100%
Bark beetle evidence	Record presence or absence (Y/N) of pitch tubes or frass on each bole. To standardize for heights of observers, observation area should remain within 6' of the ground.

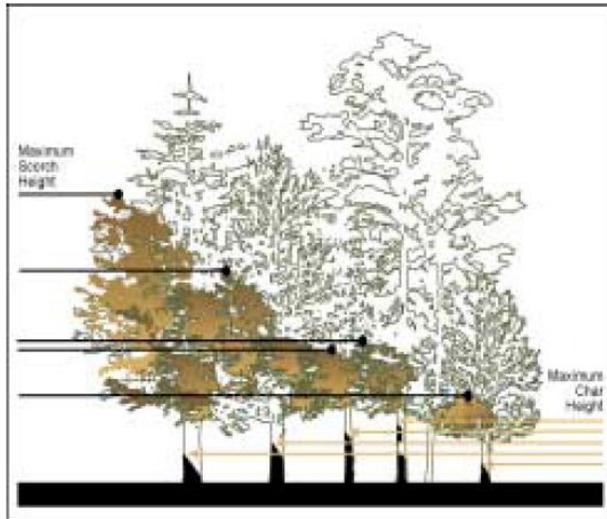


Figure 2: Max Scorch and Max Char Height. Fig 35, USDI, 2003

FMH-21

	Unburned (5)	Scorched (4)	Lightly Burned (3)	Moderately Burned (2)	Heavily Burned (1)	Not Applicable (0)
Substrate (S)	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
Vegetation (V)	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
- 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
- Plot tags and washers
- Pink flagging

Clipboard/Tatum: filled with below forms

- Data sheets
- Fire effects monitoring protocol
- Simple plot protocol
- Photoload guides for 1hr, 10hr, and 100hr fuels
- Fuel Model Key
- Map of site

Shoulder Sheath

- 1 — 1m² sampling frame
- 4 — Chaining pins
- 20 — Pin flags 2 color
- 1 — Yard stick