



Addendum: Sampling Masticated Fuels

Treatment prescriptions involving mastication of trees, shrubs, and down woody debris can change the surface fuel arrangement by mixing litter, duff, fine woody debris, and mineral soil into a single layer. This amalgam of fuel requires alternative fuel measurements to estimate a loading.

For each quadrat that includes masticated fuels not accurately captured with the photoload method, such as masticated wood mixed with litter/duff/soil or a deep masticated wood layer, use the following protocol:

1m² Sample Frame

1. Groundcover

- a. Use the ocular estimate method to measure cover of ground cover classes to the nearest 1% within the 1 m² sample frame. Classes include litter/duff, moss/lichen, soil/gravel (<1 cm), rock (>1 cm), 1000hr fuel, woody basal (stumps or live tree trunks), and herbaceous vegetation basal (large dead plant material suppressing growing space; rarely found in Colorado). Each class should be measured independently and together sums to 100% (e.g. 80% litter/duff, 20% rock). Exclude live vegetation from ground cover estimates.

2. Depth of Forest Floor

- a. Forest Floor: When masticated fuel is integrated into the litter/duff layer, measure depth of the entire fuel bed from mineral soil to the maximum forest floor fuel height (nearest 0.25in) at each corner of each sample frame. Record the percentage of the profile that is litter, duff, and woody material, respectively.

3. Herbaceous Vegetation Cover and Height

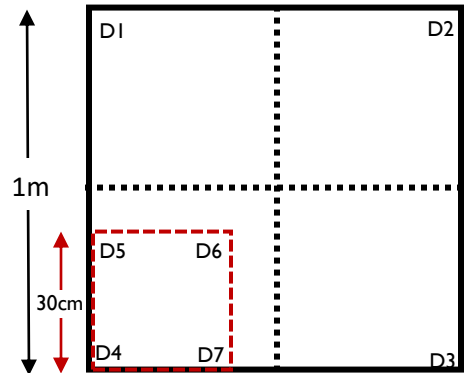
- a. Using the ocular estimate method, measure canopy cover of all non-woody vegetation to the nearest 1% (graminoids and forbs). As a rough guide, a closed fist equals ~ 1% cover. For cover <1%, classify cover as either 0.1% or 0.5% as appropriate.
 1. Total Herbaceous Cover: all non-woody vegetation rooted in the sample frame.
 2. Estimate average total maximum height of all herbaceous vegetation at the highest point of each plant, as it stands, rooted within the frame (nearest 1in).
 3. Record canopy cover for the 3 most common herbaceous species rooted in each frame. Identify plants to the species level using the USDA PLANTS database 4 letter code, or the full Latin nomenclature if code is unknown. The goal is to identify dominant plants in the plot. If you can't identify to species, record as unknown graminoid or unknown forb. Note succulent plants (e.g. cactus, sedum, etc.) that are less reactive in a fire than grasses or other forbs.

4. Photoload Estimates

- a. Use the Photoload technique (RMRS-GTR-190, 2007) to estimate fuel loading for visible 1hr, 10hr, and 100hr fuels in tons/acre within the frame. Photos in Appendix



- b. B 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.
- i. 1hr fuels (0 to 0.24 inch)
 - ii. 10hr fuels (0.25 to 0.99 inch)
 - iii. 100hr fuels (1.00 to 2.99 inches)



5. Photoload Calibration Plot

In order to estimate litter, duff, and woody fuel loading for quadrats with masticated forest floor, we add a 4th quadrat—the photoload calibration plot (PCP)—outside the plot and collect the forest floor biomass within a 90cm² sub-quadrat. The PCP quadrat frame is located outside the plot (e.g. 3 large steps off one end of the transect away from plot center).

- a. First, measure the PCP quadrat using the steps listed above, omitting the herbaceous vegetation cover and height, and including forest floor depth measurements at the corners of the 90cm² sub-quad (see Figure 1: D5, D6, D7).
- b. Collect non-living organic material (woody fuels, litter, duff) in a 4th quadrat outside the plot (e.g.). If duff, litter, and fine woody fuel are mixed with mineral soil into an amalgamous forest floor, collect all litter, duff, 1-hr, and 10-hr fuels within the 90cm² frame in the lower left corner. Collect all 100-hr fuels from the entire 1m x 1m frame. All biomass is to be returned to the lab, oven dried to constant mass, and weighed to attain dry weight of all non-living biomass.
- a. Label each of the biomass bags with 1) plot code, 2) date, 3) fuel type, (4) plot size (1m² or 90cm²) and sample frame location (PCP).
 - i. Fuel Types

Figure 1: Photoload Calibration Plot. Collect depths from each corner of the 1m² frame and 90cm² frame. If mastication mixes fuel layers, collect as a single layer of forest floor from 90cm² frame.

If masticated fuels are mixed into a single fuel bed:

1. Forest Floor (90cm²) *litter, duff, 1-hr fuel, 10-hr fuel*
2. 100-hr fuel (1m²)