SAMPLING THE INTERNATIONAL CROWN FIRE MODELLING EXPERIMENT JACK PINE–BLACK SPRUCE FUEL COMPLEX

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ABSTRACT

Various methods and techniques were utilized in sampling the ground, surface, ladder, and crown fuel characteristics of the jack pine (*Pinus banksiana*)–black spruce (*Picea mariana*) forest associated with the International Crown Fire Modelling Experiment (ICFME), Northwest Territories. The approach involved both general sampling in the study area as a whole (e.g., forest floor and tree crown samples) and the use of a systematic grid structure for the actual experimental plots to be burned (e.g., stand structure and dead–down woody fuels).

The bulk density of the forest floor layer (i.e., litter and duff) was characterized by 100 30 × 30-cm quadrat samples, sectioned by 2-cm depth class intervals; selected samples were "ashed" in order to determine the percentage of inorganic materials. Depth of burn (DOB) pins were placed in each plot prior to burning. Within a day or two following each fire, measurements of the DOB and the depth of organic matter remaining were made, which made it possible to determine the pre-burn forest floor depth. Given the bulk density and plot data it was then possible to estimate the pre-burn forest floor load as well as the litter–duff consumption.

The line intersect method (LIM) was employed to sample the weight per unit area of twigs, limbs, branches, smaller stems, and large logs lying on the ground surface. For the main 150 × 150-m ICFME plots, 16 LIM transects were established as part of the plot grid structure. These 20-m long transects were sampled before and after each experimental fire, which in turn allowed for the calculation of the pre-burn fuel loads by roundwood diameter size class and degree of woody fuel consumption.

Understory and overstory trees were inventoried to determine both stand structure (e.g., stem density, basal area) and fuel characteristics. Tree stems with a diameter at breast height (DBH) of greater than 3.0 cm on each of the experimental plots were inventoried at the grid points using the point-centre-quarter method (n = 45 for the main 150 × 150-m ICFME plots). The species and condition (live or dead) of each sampled overstory tree was noted and measurements made of the DBH, total height, and live crown base height. The understory tree stems less than 3.0 cm DBH were in turn sampled in the same manner using a 2-m radius fixed plot at each grid point; the diameter at ground level was also measured.

A total of 118 jack pine and black spruce trees in the general study area were felled, sectioned into 1-m intervals, the crown materials separated by condition (live or dead) into their various size classes (i.e., needle foliage, <0.5 cm, 0.5–1.0 cm, and 1.0–3.0 cm) and subsequently oven dried. The oven-dry weight of the various crown fuel components were then regressed against DBH. The resulting regression equations coupled with the stand inventory data made it possible to estimate the understory ladder and overstory crown fuel loads and bulk densities. Post-burn sampling of selected understory and overstory trees on each plot was undertaken in order to determine the degree of understory ladder tree and overstory tree crown fuel consumption.

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