EVALUATING BOLE DAMAGE AND CROWN DECLINE AFTER PRESCRIBED FIRE IN AN APPALACHIAN HARDWOOD FOREST ON THE CUMBERLAND PLATEAU, KY

Elizabeth Loucks and Mary A. Arthur[†]

Wounding of valuable timber trees during prescribed fires is a primary concern of forest managers, as fire scars often serve as the entry pathway for decay fungi and insects. Bark-char height has been found to be a good predictor of mortality and wounding, and thus future wood quality. However bark-char height and bole damage have not been well studied on a landscape scale in closed canopy forests after prescribed fires for which fuel loading and fire behavior were also measured. Sixty 10 x 40 m plots were established during the summer of 2002 on three separate study sites. Slope and aspect were recorded for each plot. Within each plot, trees were tagged and measured, crowns were evaluated for dieback, boles were evaluated for damage below dbh, the presence of woody litter greater than 1 inch in diameter within 30 cm of each tree was recorded, and litter depth around each tree was categorized. Plot fuel load was measured in January and February 2002 using Brown's planar intercept transects method and by collecting 30 X 30 cm sections of the forest floor. Management prescribed fires were ignited either by hand or by helicopter, in late March and mid-April, resulting in considerable variability in fire intensity and severity among the three study sites. Temperatures were recorded using temperature sensitive paints on aluminum tags. Immediately after the fires, fuel loads and stem-bark char heights and widths were recorded. During the summer of 2003, trees will be re-evaluated for crown decline and bole damage. We will use multiple regression to analyze the factors that influence char height, including dbh, species, plot fuel loading, litter depth, and presence of woody fuels. Bark-char heights ranged from zero to seven meters in height. Char heights tended to be lower on smooth, thin barked species, such as American beech (*Fagus grandifolia*) and sugar maple (*Acer saccharum*), and higher on rough barked species such as sourwood (*Oxydendrum arboreum*) and black oak (*Quercus velutina*). While accurate estimates of bole damage will not be available for one to two growing seasons after the fires, immediate mortality, bole damage, and crown dieback appear to be greatest in areas of high fire intensity where bark-char heights also tended to be higher.

[†]Elizabeth Loucks, Department of Forestry, TP Cooper Building, University of Kentucky, Lexington, KY 40546 Phone: 859-257-8289 Fax: 859-323-1031 Email: elouc2@uky.edu