

EXPERIMENTAL EVALUATION OF FIRE HISTORY RECONSTRUCTION USING DENDROCHRONOLOGY IN WHITE OAK (*QUERCUS ALBA*)

Ryan W. McEwan¹, Todd Hutchinson², Robert Ford³, Brian C. McCarthy^{4†}

Fire history often is reconstruction through dendroecological analysis of fire scars on tree boles. An understanding of historical fire regimes is critical for understanding current forest structure and forest dynamics, and for evaluating forest management practices. Even so, the validity of this approach has rarely been evaluated experimentally. Do we know whether fire scars accurately record fire history in dendroecological samples? We collected basal cross sections from stands where prescribed fires had occurred to examine the efficacy of fire history reconstruction in eastern hardwood forests. We collected samples from 82 trees in two sites, each having experienced three fire treatment intervals (frequent, infrequent, and control) over the last nine years. Prescribed fires were set in 15 area/time combinations. Of these, 10 were recorded as fire scars. In all areas, the first year of prescribed fire was recorded in at least one of the samples, and scarring occurred when there had been pauses in the burning regime of more than 3 years. Although the known fire history generally was reconstructed through tree-ring analysis, the proportion of samples bearing scars was exceedingly low (12 percent). Fires that occurred in subsequent years generally were not recorded in the tree-ring record (one of six cases), suggesting that multiyear fuel accumulation is necessary to create fire intensity needed to wound trees. Our study suggests that tree-ring analysis is an effective tool for reconstructing burning regimes when the fire-free interval is long enough to allow for fuel accumulation; however, a frequent burning regime (intervals of 1 to 3 years) may be undetectable.

¹Doctoral Candidate, Ohio University, Department of Environmental and Plant Biology; ²Research Ecologist, USDA Forest Service, Northeastern Research Station; ³Dendrochronologist, USDA Forest Service, Northeastern Research Station; ⁴Professor of Forest Ecology, Ohio University, Department of Environmental and Plant Biology; [†]Corresponding author, 315 Porter Hall, Ohio University, Athens, OH 45701, 740.593.1615, email: mccarthy@ohio.edu.