

DENDROECOLOGY OF FORESTS IN MISSOURI: DISTURBANCE AND INTEGRATION OVER
MULTIPLE CENTURIES

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ABSTRACT

Disturbances are fundamental components of ecological systems which operate at variable frequencies and magnitudes that affect the structures and processes of the system. Multiple disturbance types have functioned in oak (*Quercus*)-shortleaf pine (*Pinus echinata*, Mill.) forests including drought, fire, and canopy disturbances that may be natural (wind, ice, insect defoliation) or anthropogenic (logging).

To study historic disturbances, long-term patterns of tree-ring widths were used to assess the disturbance dynamics across multiple sites in Missouri in order to better understand multiple disturbances and disturbance integration. Growth release analysis (a proxy for canopy disturbance) indicated that species responded to gap openings (1-4 releases), but some trees did not exhibit a growth release suggesting these trees established in large gaps and reached the canopy without a release. An assessment of canopy accession indicated the two most common strategies to reach the canopy were gap origin-no release and gap origin-major release. Both fires and growth release events were frequent among all sites (mean intervals = <10 years). Evidence, based on superposed epoch analysis, suggests significant associations between disturbances over 200 years of analysis.

This dissertation demonstrates that frequent, mixed-severity disturbances affected the radial growth of shortleaf pine and oak species at upper slope positions in Missouri over multiple centuries.