

# FIRE EFFECTS AND LITTER ACCUMULATION DYNAMICS IN A MONTANE LONGLeAF PINE ECOSYSTEM

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## ABSTRACT

A common obstacle for public land managers developing fire management plans in the eastern and southern United States is the lack of quantitative information on historic fire regimes and the effects that varying fine fuel loadings can produce. Despite the ecological importance of litter, little is known about the effects of litter accumulation and decay rates in the montane longleaf pine (*Pinus palustris* Mill.) region. Historic fire information helps to set target goals for wildland fire practices and fuels management. In this thesis, four centuries of past fire regimes on the Talladega National Forest in northeastern Alabama are described along with litter dynamics of recent prescribed burning practices. Seasonally distinguishable fire events from 372 tree-ring dated fire scars were used to reconstruct past fire regimes. Litter accumulation, combined litter measurements, and model estimates were used to derive decay constants that characterize montane longleaf pine. The fire regime prior to the early 19<sup>th</sup> century was characterized by a mean fire interval (MFI) of 3 years. The onset of EuroAmerican settlement in the mid-19<sup>th</sup> century changed the fire regime to 2.5 years. The number of fires decreased during the 20<sup>th</sup> century due to changes in land use, anthropogenic influences and climate-fire relationships. Litter accumulation equations were used to demonstrate temporal changes in litter loading. For example, after a fire event that consumes nearly 100 percent of the litter, about 35 percent of the litter accumulation equilibrium is reached within 1 year, 58 percent within 2 years, and the equilibrium (99 percent accumulation) after approximately 10 years. These results can be used to determine the appropriate prescribed burning intervals for a desired fire severity.