

FIRE EFFECTS ON PLANTS, ANIMALS, AND NATURAL COMMUNITIES

FIRE SCAR HISTORY CONFIRMATION OF A LONG-TERM FREQUENT FIRE REGIME IN A LONGLEAF PINE–BLUESTEM ECOSYSTEM, KISATCHIE HILLS WILDERNESS, LOUISIANA

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ABSTRACT

We collected 19 cross sections from dead, remnant fire-scarred pine trees in a 1-km² area in the Kisatchie Hills Wilderness Area, Louisiana. All tree rings were measured and successfully cross-dated using latewood widths and cores collected from live trees. The master tree-ring chronology spanned the period AD 1595 to 2007 (413 years) and is possibly the longest pine growth record in the state. Fire-scarred sections spanned the period 1595 to 1905 (311 years). Charcoal was present on the exterior of all samples and the most fire scars on a single tree was 34 while the majority had more than eight scars. A total of 181 fire scars were dated, resulting in 115 different fire-years. The full period (1595 to 1905) mean fire interval was 2.21 years (Weibull median interval = 1.83 years). From 1650 to 1793 the mean fire interval was 3.25 years. In 1793, when the population density was about 0.3 humans/km², the fire frequency abruptly increased to a mean fire interval of 1.31 years until 1880. Microscopic fire scars showed evidence of “double burning” (two fire scars in 1 year) in 1700 and during the 1850s. Most of the fire scars ($n = 151$) were dateable to the season of injury. The majority of fires (63%) occurred while trees were forming latewood and 29% of the events occurred while trees were dormant. Years of severe fires (represented as increased percentage of trees scarred) were associated with historic drought years (e.g., 1751, 1830, 1832, 1863). Overall, this evidence of historic frequent burning confirms what is 1) thought to have been required to maintain longleaf pine–bluestem systems, and 2) is estimated to have occurred based on fire frequency estimates using climate and human population estimates.

Keywords: drought, fire history, longleaf, scars, tree-ring.

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