

## Hard Pine Regeneration and Historic Fire in the Central Appalachians, PA

Fire-adapted hard or yellow pines (shortleaf, pitch, Table Mountain) occur throughout the southern and central Appalachians, while red pine reaches its southern range limit in the central Appalachians. Historical abundance of pines in the Appalachians is reduced today due to a lack of fire and other land use changes. Fire is being reintroduced to restore open pine and oak-pine woodlands, however more knowledge on appropriate fire practices for successful hard pine regeneration is needed for the Appalachians. To address this knowledge gap, Michael Stambaugh, Joseph Marschall, et al. examined historical fire and pine regeneration events to better understand the role of fire in hard pine regeneration. Their paper published in *Forest Ecology*, is titled, “[Successful hard pine regeneration and survival through repeated burning: an applied historical ecology approach was recently published in the journal Forest Ecology and Management.](#)”



### Study Site and Methods:

- 12 fire history sites were studied in central PA.
- 550 cross-sections of mostly remnant dead, plus some living pines were used to determine site fire histories and pine regeneration years.
- The majority of samples were red pine (286/4 sites) and pitch pine (187/6 sites).
- Analyses focused on the average number of years... 1) From a pine establishment year to the previous fire (fire promoting new pine regen) 2) To the first fire after a pine establishment year (new pine regen surviving fire)

### Key Findings:

- Nearly three-quarters of all samples were established from 1530 - 1750
- Stands were multi-aged and showed no evidence of large-scale stand-replacing fires.
- The great majority of successful pine regeneration occurred soon after a fire - for pitch pine 50% of trees established within five years of a fire and 75% within 11 years.
- In sharp contrast, very little successful pine regeneration occurred during periods without fire – only 1% of pitch pines established >20 years after a fire.
- On average, there was a slightly longer fire-free period experienced by pines after they established but many pines survived a fire soon after establishing – 50% of pitch pine samples survived a fire (were not top-killed) within 5 years after establishing.
- Overall and across species, historical pine regeneration events occurred during periods of frequent low to moderate-severity fires. In addition to the ability to survive a fire soon after establishing, these trees survived long periods of periodic to frequent fire throughout their lives.

The two lead authors, Michael Stambaugh and Joseph Marschall are with the Missouri Tree-Ring Laboratory at the University of Missouri. Mike and Joe are also the lead Principal Investigator and Coordinator, respectively of the [Oak Woodlands and Forests Fire Consortium](#), which, like [CAFMS](#), is a regional fire science exchange funded by the [Joint Fire Science Program](#). This research was generously funded by the Pennsylvania Game Commission and was conducted on their Gamelands.