Consortium of Appalachian Fire Managers and Scientists
A JFSP KNOWLEDGE EXCHANGE CONSORTIUM

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# 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 Apps. Recent research on fire-scarred pines indicates that fire was frequent on pine and oak-pine sites throughout much of the region before and after Euro-American settlement, from as far back as the late 1500s through the early 1900s, until the fire suppression era (Lafon and others 2017, Stambaugh and others 2018). The historical abundance of pines in the Appalachians is reduced today due to a lack of fire and other land use changes. Trends are alarming: for example, it's been estimated that woodlands dominated by shortleaf pine have declined in area by more than 50% since just 1980 (range-wide), and in the Appalachians, its regeneration is poor (Anderson and others 2016). Fire is being reintroduced to restore open pine and oak-pine woodlands. However, unlike remnant longleaf pine systems on the coastal plain, where there has been a longer and more continuous history of prescribed fire and fire effects research, 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, and other authors examined historical fire and pine regeneration events to better understand the role of fire in hard pine regeneration. Their paper, 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*.

Fire-scarred remnant pitch pine tree before and after cutting with a chainsaw in the central Appalachians of Pennsylvania. This tree recorded its first fire (black arrow on cross-section image) 6 years after germinating in 1768, and then recorded (and survived) fourteen additional fires (some indicated by white arrows) before the end of its recording period in 1899.

**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**:

- Most samples were quite old – nearly three-quarters established from 1530 to 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 **the majority of 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.

*Other literature noted*:

Anderson, M., Hayes, L., Keyser, P.D., Lituma, C.M., Sutter, R.D., and Zollner, D. 2016. Shortleaf Pine Restoration Plan. 57 p. www.shortleafpine.net

Lafon, C.W., Naito, A.T., Grissino-Mayer, H.D., Horn, S.P. and Waldrop, T.A., 2017. Fire history of the Appalachian region: a review and synthesis. *Gen. Tech. Rep. SRS-219.* Asheville, NC: US Department of Agriculture, Forest Service, Southern Research Station., *219*, pp.1-97. https://static1.squarespace.com/static/546cbcc7e4b06ce240c13156/t/58a45f5b37c581e31ee94b83/1490234396541/Fire+History+of+the+Appalachians.pdf

Stambaugh, M.C., Marschall, J.M., Abadir, E.R., Jones, B.C., Brose, P.H., Dey, D.C. and Guyette, R.P., 2018. Wave of fire: an anthropogenic signal in historical fire regimes across central Pennsylvania, USA. *Ecosphere*, *9*(5),

# Save the Date

Another TREX event is coming to the Southern Blue Ridge!

When: October 26-November 6, 2020

Where: Table Rock Wesleyan Camp and Retreat Center, Pickens SC

Registration will open in May of 2020

https://apfire.wixsite.com/sbrtrex

# *Save The Date!*

Thursday, June 4th, 2020

North Georgia Prescribed Fire Council Meeting
Chattahoochee Technical College
Jasper, Georgia

Registration available soon at www.garxfire.com

## JFSP Funding Opportunity Announcement (FOA) – Early Notification

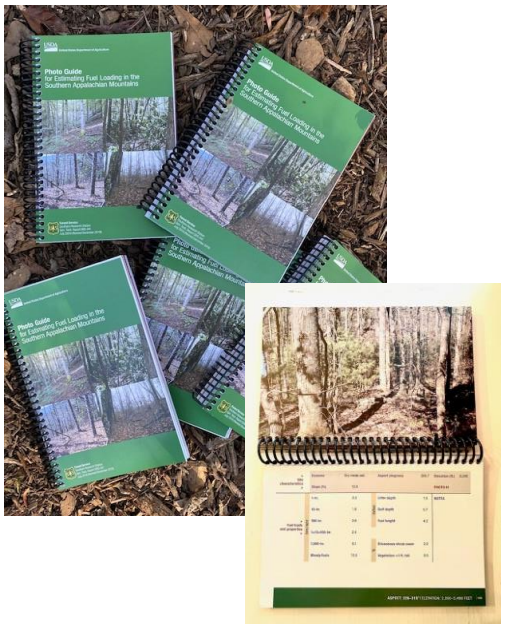
The Joint Fire Science Program has announced the potential funding opportunity (FOA) topics for 2020. There are three research topics tentatively selected for 2020 along with the Graduate Research Innovation (GRIN) Award. The purpose of providing advance notice of FOA topics is to provide research teams the opportunity to develop partnerships for innovative and effective science creation and delivery. Please don't hesitate to reach out to CAFMS to discuss opportunities for science co-

The forecast topics are:

- Types and distribution of ignitions and their relation to fire size and impacts
- Science in support of fuel treatment performance metrics
- GRIN FOA - Graduate Research Innovation (GRIN) Award

https://www.grants.gov/web/grants/view-opportunity.html?oppId=325472.

**The final FOA will be posted in July 2020**




# It's here, it's here!!

The printed copies of the Photo Guide for Estimating Fuel Loading in the Southern Appalachian Mountains are in. If you would like a print copy email helen@cafms.org. Shipments may be slow due to COVID-19.

## Communicate With Us!

Find us on twitter @APfirescience or find us on Facebook by searching Consortium of Appalachian Fire Managers and Scientists.

## Join CAFMS:

The consortium is for all land managers and researchers in the region who deal with any aspect of fire. To join, simply provide us with some contact information at the web site listed below.

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