

Science You Can Use *in 5 minutes*

Lost and Found: What historical records reveal about forest management

Historical records show that over a century ago, fire-tolerant oaks dominated more than half of the forests across Kentucky and the southern Appalachian Mountains. Today, they account for barely a fifth. Species that historically occupied the margins, including red maple, eastern redcedar, and yellow poplar, have moved to the center. Ecologically, the shift happened relatively fast. Understanding why, and what it means for management, is aided by going back to the [forest composition assessments](#) produced by the U.S. Geological Survey and Forest Service surveyors in the early 1900s, before fire exclusion and industrial

timber harvesting transformed the landscape.

Brice Hanberry, a Forest Service Research and Development research ecologist, analyzed early U.S. and state government forest assessments conducted between 1900 and 1909, records long overlooked as ecological tools. The southern Appalachian region and Kentucky lack General Land Office survey data, making these assessments an important source for quantifying historical forest composition. Dr. Hanberry compared the assessments to Forest Service [Forest Inventory and Analysis](#) data collected between 2010 and 2014 in

Kentucky and between 2009 and 2016 in the southern Appalachians. County or watershed estimates are available in these century-old assessments and synthesized in the articles, which are provided in the further reading section below.

The picture that emerges is a landscape shaped by active stewardship. Indigenous peoples routinely burned forests to maintain open lands for food and travel. Early Euro-American settlers continued the practice. “These historical records show that we used to have lots of oaks, we used to have a lot of fire,” Hanberry says. “These were the processes that supported these



Outcomes from two different fire histories in the Sumter National Forest, Andrew Pickens Ranger District, South Carolina. Left: Decades without fire have led to a denser, closed forest with increased mid-story and fire-sensitive species. Right: Frequent fire maintains a more open pine–oak system with lower tree density and an herbaceous understory. Courtesy photos by Adam Warwick, The Nature Conservancy.

ecosystems.” Those early assessments describe oaks and American chestnut comprising roughly 60 percent of all trees, with evidence of surface fire across 80 percent of the landscape.

Frequent burning by Indigenous people and early Euro-Americans was a defining process associated with more open forest structure, including grasslands.

For Adam Warwick, Southern Blue Ridge Fire and Stewardship Manager with The Nature Conservancy, historical records help to reset expectations. “A lot of what we’re managing today just isn’t how these systems used to function,” he says. Oaks and pines were dominant because of how much low-severity surface fires were part of the system.

The pattern extends beyond the southeast. From historical records, Hanberry found that 125 years ago the area outside Denver, Colorado had low tree densities. “Now it’s forested,” she says. “Think about how different your management imperative for maintaining a forested landscape may become by knowing that 125 years ago the landscape was open.”

Both fuels management and ecosystem restoration use the same tools and point toward the same structural target. Prescribed fire and mechanical thinning can achieve widely spaced large-diameter trees, reduced ladder fuels, and an open, herbaceous understory. Frequent surface fire historically limited the recruitment of small-diameter trees, thus reducing midstory and understory density and maintaining more open woodland conditions. Historical records show this was the prevailing forest structure before a policy of fire exclusion.” It’s not about recreating the past exactly,” Warwick says, “but it gives us a much better target to work toward as we bring fire and other tools back into the system.”

Management Implications

- Historical records indicate that repeated burning by Indigenous people and early Euro-Americans contributed to the maintenance of more open forest systems in the Southern Appalachians and Kentucky.
- In the past, as much as 80 percent of these landscapes had recent fire, suggesting that fire and thinning can effectively reduce ladder fuels and crown fire risk and restore open forest structure and oak and pine dominance.
- Fuels management and habitat restoration can converge on similar structural outcomes: widely spaced, large-diameter trees, reduced midstory density, and an open herbaceous understory achieved through prescribed fire and mechanical thinning.
- Comparable historical assessments using General Land Office surveys exist for other regions, suggesting that this approach to understanding historical forest composition is broadly applicable.

Featured Scientists

[Brice Hanberry](#) is a research ecologist with Forest Service Research & Development.

[Adam Warwick](#) is the Southern Blue Ridge Fire and Stewardship Manager with The Nature Conservancy.

[Sylvia Kantor](#) is the author of this Science You Can Use.

Further Reading

Hanberry, B.B. 2026. [Divergent historical and current forest composition in Kentucky, including Daniel Boone National Forest, United States](#). *Frontiers in Forests and Global Change*. 9: 1662275.

Hanberry, B.B.; Warwick, J.A. 2025. [Retrieving historical forest composition in the southern Appalachian region, United States](#). *Forest Ecology and Management*. 596: 123118.

Hanberry, Brice B.; Seidel, Jacob M. 2024. [Envisioning transition from open landscapes to forested landscapes in the Routt National Forest, Colorado, United States](#). *Fire*. 7: 82.

Hanberry, Brice B.; Seidel, Jacob M.; DeLeon, Phillip. 2024. [Exploring tree density increases after fire exclusion in the northern Front Range and Great Plains, Colorado, USA](#). *Fire*. 7: 103.



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