

Old deeds, witness trees offer glimpse of pre-settlement forest in West Virginia

12 September 2012

Using old deeds and witness trees, a U.S. Forest Service scientist has created a glimpse of the composition of the forests that covered today's Monongahela National Forest before settlement and logging changed the landscape.

"European Settlement-Era Vegetation of the Monongahela National Forest, West Virginia" describes how a Forest Service scientist and her West Virginia University colleague answered questions about the composition of early forests using a unique dataset. The dataset was built with original deeds, metes and bounds surveys and a digitized, georeferenced version of parcel maps based on those surveys. The report is published by the Forest Service's Northern Research Station as General Technical Report NRS-101 and is available online at:

http://www.nrs.fs.fed.us/pubs/gtr/gtr_nrs101.pdf

"This study is extraordinary in its combination of historical documents and scientific method," said Michael T. Rains, Director of the Forest Service's Northern Research Station. "It is not every day that our work is aided by colonial America surveyors."

Trees were part of the available technology in early land surveys. Metes and bounds surveys consist of a series of bearings and distances with trees, posts, rock piles, or natural features recorded to describe corners where bearings changed. Trees used to mark the corner or near-corner of a parcel are called "witness trees." By identifying the witness trees, deeds and grants documenting transfer of ownership of these parcels also documented tree [species](#) existing at the time land changed hands.

The use of old deeds is not a new technique in forest research, but Melissa Thomas-Van Gundy, a U.S. Forest Service research forester and the study's lead author, based this study on a larger number of points than has been used previously and used a different approach in analyzing the

data.

Thomas-Van Gundy evaluated 15,589 corners representing 22,328 witness trees recorded between 1752 and 1899. Using digital versions of parcel maps made in the 1930s by Monongahela National Forest staff based on original surveys, West Virginia University students plotted the locations of witness trees and used the surveys to record species found at those locations. Thomas-Van Gundy adjusted for mapping errors and used spatial analyses to describe relationships between species and selected environmental variables, such as topographical roughness, moisture, elevation, landscape position, and soils.

Thomas-Van Gundy expanded the witness tree data from the original deed corners using an interpolation technique called 'indicator kriging,' which is based on the idea that everything is related to everything else, but closer things are more closely related. With indicator kriging, she created maps showing the probability of occurrence of a given species throughout the Monongahela National Forest.

"We already had a general idea of what species existed prior to European settlement," Thomas-Van Gundy said. "Our purpose with this study was to uncover greater detail of the early forest – basically what species would you find where in this very complex topography. We also wanted to try a different method of analysis that expands the usefulness of historic documents in recreating forests of the past."

Thomas-Van Gundy and her colleague, Michael Strager of West Virginia University, found what they expected, species composition before European settlement varied by ecological subsection. Overall, white oak was the most common species across the study area. American chestnut was the most frequent species in the Monongahela National Forest's Eastern Coal Fields subsection, American

beech in the Northern High Allegheny Mountains subsection, and sugar maple in the Southern High Allegheny Mountains subsection. After white oak, the most abundant species across the study area were sugar maple, American beech, American chestnut, and chestnut oak.

While the report aimed at gaining insight into forest composition in eastern West Virginia in the early years of the United States, it also unearthed a small detail about the original surveyors: they really knew their trees.

"In the surveys we used in this study, it's evident that the surveyors had broad knowledge of the common trees in this forest," Thomas-Van Gundy said. "They used a wide range of trees as witness trees and identified many of them to species, and while any individual surveyor may have had a favorite species to use as a witness tree, he could only choose from the species present at that particular corner."

This publication is not the last analysis planned for this dataset. Thomas-Van Gundy, who works in the Forest Service's Timber and Watershed Lab in Parsons, W.Va., plans to use the witness trees to compare the current [forest](#) to the past and to determine site variables associated with species of interest for restoration, such as American chestnut and red spruce.

Provided by USDA Forest Service

APA citation: Old deeds, witness trees offer glimpse of pre-settlement forest in West Virginia (2012, September 12) retrieved 13 May 2021 from <https://phys.org/news/2012-09-deeds-witness-trees-glimpse-pre-settlement.html>

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