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Tree-ring dating of timbers from Sabine Hill, home of General Nathaniel Taylor, Elizabethton, Tennessee, USA

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ABSTRACT

Historians believe that the main two-story structure called Sabine Hill at the Sycamore Shoals State Historic Area in Elizabethton, Tennessee represents the house possibly built by General Nathaniel Taylor beginning around 1814 or 1815. We conducted a dendrochronological investigation on hewn logs and squared beams from several locations within Sabine Hill to determine the years when the trees were harvested and incorporated into the historic structure. We were able to collect and eventually crossdate tree rings from 26 beams and logs. These samples yielded a chronology spanning AD 1698 to 1818 and showed a statistically significant correlation ($r = 0.47$, $n = 121$ years, $t = 5.86$, $p < 0.0001$) with an absolutely dated oak data set composed of chronologies previously developed across the southeastern USA. We found that several logs from the cellar and one wall post were cut in 1818 while one wall post was cut in spring of 1819. One wall post from the “hyphen” room, believed to be a later addition, had a cutting date of late 1848 to early 1849. All other samples had outermost rings that were near- or non-cutting dates. These findings suggest that General Taylor had little to do with the actual construction of Sabine Hill because he had passed away two years prior to the first harvesting of trees used to build Sabine Hill. Our study demonstrates how dendrochronology can clarify the years of construction and the likely builders of historic structures, adding depth and understanding to the rich history of early Tennessee.

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1. Introduction

Dendrochronological research on historic structures is growing rapidly in the eastern U.S. because the historical agencies and societies that manage such structures need scientific verification of construction dates to support requests for maintenance funding and to provide insight into the cultural history (Flynt, 2009; Grissino-Mayer, 2009; Barclay and Rayburn, 2014). Once accurately dated, historic structures are all the more valuable scientifically because they contain some of the oldest wood in the eastern U.S., which can be used to develop chronologies by which the past environment (e.g. past climate trends) can be interpreted. Lassetter (1938) first attempted the use of tree rings to determine the construction date of historic structures in the Southeastern U.S. and successfully dated four cabins that were later dismantled and relocated before flooding caused by dam construction by the Tennessee Valley Authority. Dendrochronology did not take a foothold in the

southeastern U.S., however, for several decades due to misconceptions that tree-ring dating could not be successfully applied in such a moist environment. Finally, Stahle (1979) was one of the first to systematically apply tree-ring dating in the Southeastern U.S. (but see also Hawley, 1941; Estes, 1969; Bowers, 1973; Cleaveland, 1975) by examining and dating numerous log structures throughout the state of Arkansas. Later studies by Pulice (2000) and Mann (2002) combined archaeological dating methods (e.g. ceramic assemblages, window glass thickness, nail typology) with dendrochronological dating techniques to determine accurate construction dates for historic structures. Such interdisciplinary studies provide a more comprehensive understanding of historic sites by associating construction dates with changes in land-use, architecture, and ownership. Later studies cemented the reliability of tree-ring dating on beams and logs from a variety of historic structures, from Spanish missions in Florida to crib dams in North Carolina (Bortolot et al., 2001; DeWeese Wight and Grissino-Mayer, 2004; Grissino-Grissino-Mayer and van de Gevel, 2007; Grissino-Mayer et al., 2009, 2010; van de Gevel et al., 2009; Garland et al., 2012; Stachowiak et al., 2016).

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Fig. 1. The historic Sabine Hill house located at Sycamore Shoals State Historic Area in Elizabethton, Tennessee. A weatherboard-covered log pen (left) had been attached to the main house by the “hyphen” room that has since been removed during restoration.



Fig. 2. First floor joists accessible in the cellar. The log in the center is hand-hewn while the log behind and to the right is un-hewn with intact bark.

Sabine Hill (Fig. 1) is believed to have been built beginning around 1814 or 1815 by Nathaniel Taylor (b. 1771, d. 1816) (Smith, 1936; Clawson et al., 2012), a brigadier general who participated in the War of 1812. Taylor had a distinguished military and public service career. He served as a state militia colonel for the newly-formed State of Tennessee by 1803 and was Carter County’s first sheriff and Justice of the Peace. He then served in the Tennessee state legislature from 1803 to 1805 and was a trustee of Duffield Academy in Carter County, all the while running the Taylor iron forge (Clawson et al., 2012). During and after the war, General Taylor and his troops were stationed at Fort Montgomery, Alabama. Taylor remained there until at least February of 1815 before returning to Elizabethton (Clawson et al., 2012), where he died soon after his return on 20 June 1816. In theory, trees used to construct Sabine Hill could have been harvested by family members just prior to his leaving Alabama or soon after his arrival back in Elizabethton. The construction date(s) for Sabine Hill, however, are uncertain because some historians and architects have speculated that Sabine Hill was built around 1818 (Patrick, 1981; Brown, 2005; Clawson et al., 2012) by Taylor’s widow, Mary Patton Taylor (b. 1773, d. 1853).

Sometime later, a log structure was erected to serve as an external kitchen and connected to the back of the larger house with an intervening separate room (called the “hyphen” room) to form a distinct “L” (Clawson et al., 2012) (Fig. 1). The current two story house consists of two bedrooms upstairs, two rooms downstairs (the sitting room to the east and the “Red, White, and Blue” room to the west), an unfinished cellar, and a central passageway (hall) stretching from front to back on each floor, forming a “central passage” house (Foster, 2004). Sabine Hill recently has been restored and several analyses were performed to help inform this restoration, including a conditions assessment (Clawson et al., 2012), a paint analysis (Mosca, 2013), and an archaeological report (DeCorse and Creswell, 2013). Some doubts still remained, however, regarding the suggested 1814 vs. 1818 construction dates for Sabine Hill. The primary goal of our proposed project was to conduct a dendrochronological investigation on logs and squared beams from several locations within Sabine Hill to determine the years when the trees were harvested and incorporated into the historic structure. Our sampling focused primarily on numerous vertical posts as well as a few diagonal wall braces (these were smaller in dimension) that were exposed when the walls were partially demolished during the restoration process, as well as the hand-hewn and whole logs in the cellar that serve as joists to support the first floor (Fig. 2).



Fig. 3. Location of sample SH1005 (arrow) showing how most of the beams we sampled on the first and second floors of Sabine Hill had been squared during fabrication.

All squared structural elements had been hewn or processed with a water-powered frame (i.e. “sash”) saw based on the regularly spaced, vertical saw marks (Howard, 1989; Wilbur, 1992; Howe et al., 1997).

2. Methods

2.1. Field methods

We extracted 12 mm diameter cores from the log joists, vertical wall posts, and diagonal braces using a specially-designed, hollow drill bit powered by a variable-speed 13 mm (0.5 in) drill. If bark was present, we drilled into the sample at a right angle to this surface. Nearly all posts and braces, however, had been squared during fabrication. On these, we drilled through one corner diagonally to the opposite corner (Fig. 3). If needed, we took a second core at another location, drilling from the third corner diagonally until reaching the opposite corner. Once extracted, the cores were immediately glued on wooden core mounts with the cells vertically aligned by carefully inspecting the orientation of cells on the core end and the sides of the core. All cores were labeled using “SH” (“Sabine Hill”), the floor number (“C” = cellar, “1” = first floor, and

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