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**Dendrochronological Analysis  
of Four Historical Structures,  
Somerset, Ohio  
June 2013**



Sampled: June 5th, 2013

Report submitted to Mayor Tom Johnson

By Nick Wiesenberg, Alexander Stewart and Greg Wiles

Tel: 330-263-2298, [gwiles@wooster.edu](mailto:gwiles@wooster.edu)

**General:**

This is the final report describing the reconnaissance tree-ring dating (dendrochronology) of beams in the Akers House, Gower Cabin, Wilson Cabin, and Palmer Barn, Somerset Ohio. On June 5<sup>th</sup> 2013, Greg Wiles, Nick Wiesenberg, and Alexander Stewart sampled beams under the supervision of Mayor Tom Johnson. The objective of this work was to provide calendar dates for the felling of the timbers used in the construction of these structures.

Dendrochronology is the science of analyzing and dating annual growth rings in trees. Its first application was in the dating of ancient Indian pueblos of the southwestern United States (Douglass 1921, 1929). Andrew E. Douglass is considered the “father” of dendrochronology and developed the application of tree ring data to archaeological dating. The dendrochronological methods first developed by Douglass have evolved and been employed throughout North America, Europe, and much of the temperate forest zones around the world (Baillie, 1982, 1995).

**Methods and Analyses:**

Core samples were taken from timbers that contained visible outer surfaces and in some cases bark. The cores were primarily from oak and a few hickories. The location of each sample varied per structure and is described in *Table 1*.

Cores were prepared and cross-dated using standard dendrochronological techniques (*Figure 1*; Holmes, 1983; Stokes and Smiley, 1968). The samples were carefully glued into grooved mounts and sanded to a high polish to reveal the annual tree rings clearly. The rings widths were then measured under a microscope to a precision of  $\pm 0.001$  mm. and then cross-dated against each other (*Figure 1*). The cross-dating of the obtained measurements utilized the COFECHA computer program (Holmes 1983).

COFECHA is used to first establish internal, or relative cross dating among individual samples. This step is critical because it locks in the relative positions of the timbers to each other, and indicates whether or not the dates of those specimens with outer rings are consistent. Subsequently, the internally cross-dated series are each compared with independently established tree-ring master chronologies compiled from living trees and dated historical tree-ring samples. All of the “master chronologies” are based on completely independent tree-ring samples. In the Somerset 2013 study, the regional composite master dating chronologies are derived from more than 500 ring-width series from old growth living trees and historical structures across Ohio (*Figure 2*). All dating results were verified by comparison with independent dating masters and in each case the dating reported here is verified as correct.

**Results:**

Only the oak samples were successfully cross-dated with our calendar-dated master series (*Figure 2*). We were not successful in dating the hickory timbers and some of the oak cores were too broken up and were discarded. Only usable samples were recorded in *Table 1*.

All structures dated well with the exception of the Gower house. The beams sampled in the Akers house were cut after the 1822 growing season, the Palmer barn beams were cut after the 1850 growing season and the two sections cut and labeled Wilson were dated to 1814.

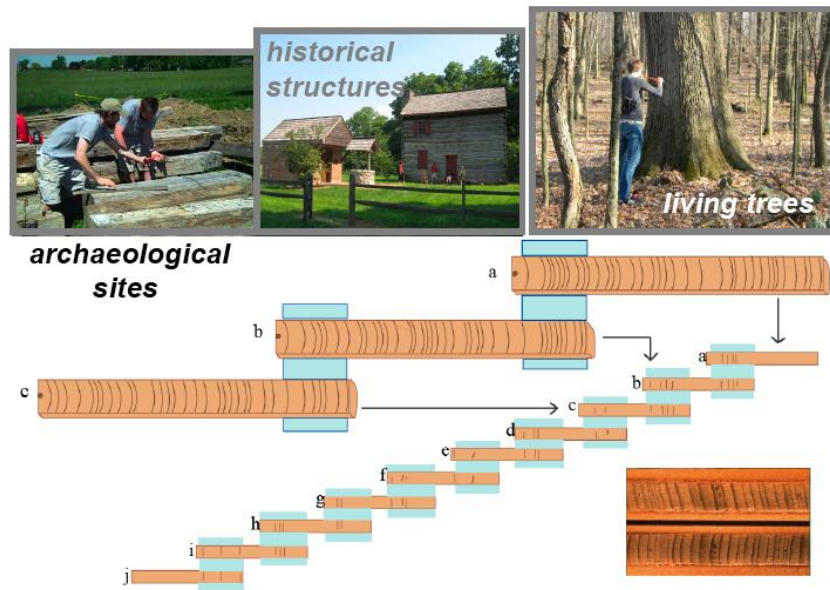
Floor joists in the basement of the Gower Cabin were difficult to obtain good outer ring data due to the degradation of the sapwood. Only two samples preserved the outer rings and these were extremely difficult to measure accurately due to the extremely narrow rings. We conclude that the trees within the Gower Cabin were felled sometime between 1830 and 1840, but an accurate tree-ring date was not possible.

**Summary:**

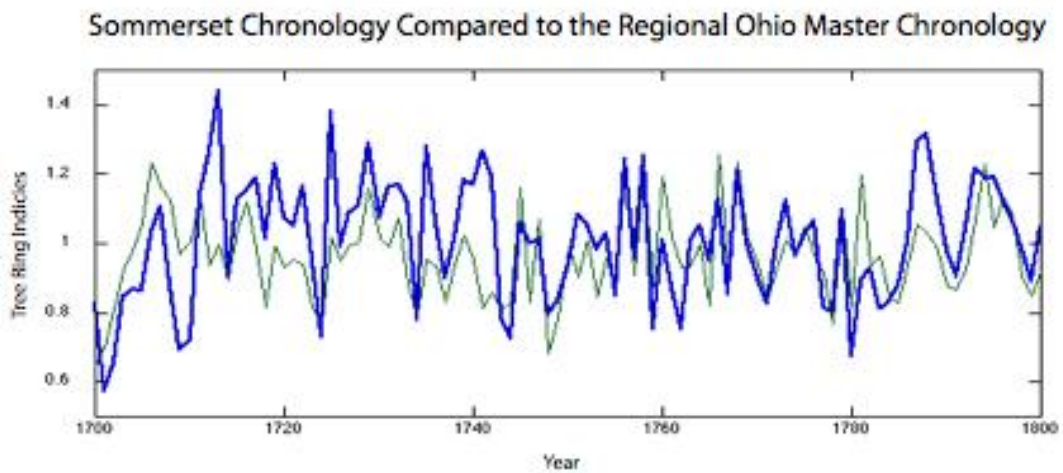
All samples marked as having an outer ring present had fully formed outer rings indicating that the trees were felled after the end of the growing season of the calendar year. The dates of the Akers House (1822), Palmer Barn (1850), and Wilson Cabin (1814) are most likely the following year of the outer ring (cut year) dates (*Table 1*).

**Table 1:** Description of successfully correlated samples from four Somerset structures.

Sample ID	Outer Ring Date	Location	Species	Presence of Outer Ring
<b>Akers House</b>				
AKERS1	1822	Hewn Basement Joist	White Oak	Yes
AKERS2	1822	Hewn Basement Joist	White Oak	Yes
AKERS3	1822	Hewn Basement Joist	White Oak	Yes
AKERS4	1822	Hewn Basement Joist	White Oak	Yes
AKERS5	1822	Beam Over Doorway	White Oak	Yes
<b>Gower House</b>				
GOWER1	1824	Basement Log Joist	White Oak	No
GOWER4	1833	Basement Log Joist	White Oak	Yes?
GOWER7	1817	Basement Log Joist	White Oak	No
GOWER9	1836	Basement Log Joist	White Oak	Yes?
<b>Palmer Barn</b>				
PALMER1	1841	Basement Hewn Joist	White Oak	No
PALMER2	1837	Basement Hewn Joist	White Oak	No
PALMER3	1819	Upper Level Hewn Post	White Oak	No
PALMER4	1850	Upper Level Hewn Post	White Oak	Yes
PALMER6	1850	Upper Level Sawn Post	White Oak	Yes
PALMER7	1843	Upper Level Sawn Post	White Oak	No
PALMER8	1847	Upper Level Sawn Post	White Oak	Yes
<b>Wilson Cabin</b>				
WILSON1	1814	Hewn Wall Log Section	White Oak	Yes
WILSON2	1814	Hewn Wall Log Section	White Oak	Yes



**Figure 1.** This diagram illustrates the process of tree-ring crossdating. Patterns in ring widths from historic structures and wood associated with archeological sites are matched to living tree-ring chronologies and thus calendar dates can be assigned to each ring.



**Figure 2.** Regional Ohio ring-width series (green) compared with the Somerset chronology (blue) consisting of nineteen dated samples. The R-value of 0.495 is significant at the 0.0001 level.

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