Tree-Ring Dates from the Hot Sulphur Bath House, Jemez Springs, New Mexico

by
Thomas W. Swetnam
Laboratory of Tree-Ring Research
University of Arizona
Tucson, AZ 85721

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post card (from 1920s?)

photo from 2015

At the invitation of Tanya Struble, Tom and Suzanne Swetnam collected tree-ring samples on October 2, 2015 from the "Hot Sulphur Bath House" located adjacent to the "Giggling Springs". This old bath house was owned and operated at one time by the Abouselman family. The Abouselman home is nearby (about 100 yards to the NE).

The purpose of the tree-ring sampling was to determine the likely construction date(s) of the old bath house. Tree-ring dating is a method that has been widely used for determining the dates of construction of ancient dwellings throughout the Southwestern U.S., North America, Europe, and many other locations. The method was first developed and applied in the Southwestern U.S. during the 1920s by Andrew Ellicott Douglass, an astronomer at the University of Arizona. Dr. Douglass' tree-ring dating established the construction (and abandonment) dates of many famous Southwestern archaeological sites, including the "Great Houses" at Chaco Canyon, New Mexico, and the Cliff Dwellings at Mesa Verde, Colorado. Tree-ring dating, also known as "dendrochronology", has been used extensively in the Jemez Mountains, including dating of window lintels in the Mission de San Jose at Giusewa in Jemez

Springs (dating from the early 1610s and 1620s). Dr. Douglass was the founder and Director of the world's first laboratory dedicated to all aspects of dendrochronology, the Laboratory of Tree-Ring Research (LTRR). Professor Swetnam also served as Director of the LTRR (from 2000 to 2014). To learn more about the LTRR and dendrochronology, visit the LTRR website at : http://ltrr.arizona.edu/

Methods

A total of 8 specimens were obtained from 2 boards, 2 wall studs, 1 ceiling joist, and 3 wall cross-supports in the bath house. The construction of this building is wood frame, with wood lath and plaster on the inner and outer walls. The sampling of the wall studs and cross-supports was from the northern wall of the larger building and room. Also, one ceiling joist was sampled in this room, and one loose board was collected laying on the ground near the NW corner of the large room (HSB1). The end of one board was cut from the false front on the small, apparent addition on the front (east) side of the building (HSB8). The photos below show the locations of the specimens obtained. An electric drill was used to non-destructively obtain core samples from two wall studs (HSB 2 & 3) and from a ceiling joist (HSB 4). The three wall cross-supports removed from the wall on the north side were re-sectioned, mounted and belt-sanded (to 400 grit).

All of the samples were chosen because they showed evidence of a so-called "waney edge", i.e., an outermost surface of the board that appeared to be the original outermost wood beneath the bark, containing that last-formed ring before the tree was felled. The waney edge on lumber typically appears as a rounded surface on one side, and sometimes bark is still present, adhering to the outermost ring. That was the case for the board from the NE corner of the large room (HSB1).

Tree-ring dating of the specimens was accomplished by the skeleton-plotting method (Stokes and Smiley 1968) using a composite Jemez Mountains ponderosa pine tree-ring width chronology from three sites (Cat Mesa, Fenton Lake and East Fork) (Swetnam and Lynch 1993).

Results

Most of the specimens were successfully crossdated. Table 1, below, listed the innermost and outermost dates for each specimen.

Specimen ID	Inner Ring Date	Outer Ring Date	Type of Sample	Location
HSB1	1816	1891	board	from NW corner
HSB2	1843	1895	core from wall stud	north wall
HSB3	1842	1895	core from wall stud	north wall
HSB4	not dated		core from ceiling joist	west, center of large room
HSB5	1852	1891	wall cross-support	north wall
HSB6	1838	1891	wall cross-support	north wall
HSB7	1838	1891	wall cross-support	north wall
HSB8	not dated		board	false front on east side

Interpretations

It is apparent from the tree-ring dating that the building was likely constructed after 1891, and probably during or after 1895. All of the best crossdating specimens were the wall cross-supports, and they all have outermost rings of 1891. The 1891 ring was incomplete, with just the beginning of latewood cells on a couple of samples. This indicates these trees were felled during the summer of 1891.

The confidently dated specimens crossdate very well with the Jemez ponderosa pine tree-ring composite chronology. This means that there is strong agreement between patterns of wide and narrow rings. The quality of the crossdating is strong enough that it is almost certain that the trees felled for this lumber were growing in the Jemez mountains, and possibly within San Diego Canyon.

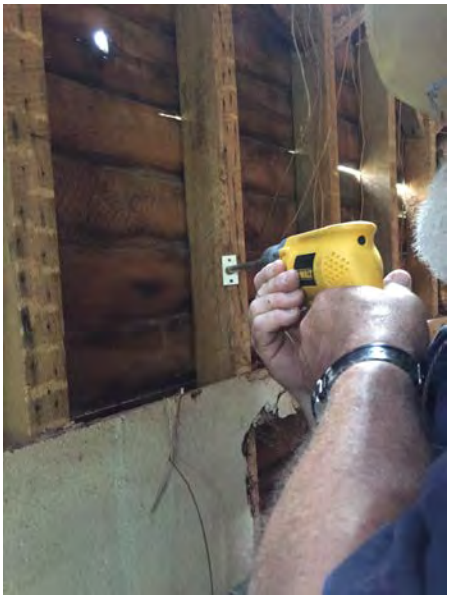
Two of the core samples from the wall studs (HSB 2 & 3) were crossdated, but the core from the ceiling stud (HSB 4) could not be confidently crossdated. The latter specimen had too few rings and too little ring-width variations to match it with the composite Jemez chronology. The two dated core samples both have outermost ring dates of 1895. The 1895 ring is incomplete, with only a few latewood cells in one case at the outside. Again, this indicates the tree was harvested in the summer time. The two dated cores have very similar ring patterns overall, and it seems possible these wall studs came from the same tree.

One of the boards sampled (HSB1), which came from the NE corner of the large room, crossdated very well with the composite Jemez chronology, and it also had an outermost tree-ring date of 1891. The other board (HSB8), which came from the false front of the small room at the front of the building, could not be confidently dated because it had too few rings.

In summary, the dates of the boards and studs range from 1891 to 1895. Given that the wall studs are almost certainly original, it seems likely that the construction date was in 1895 or a year later, or perhaps some years later if the lumber had been stored before use. The earlier 1891 dates of the wall cross-supports probably indicates these boards had been harvested and stored for some years prior to construction of the main building in 1895 or later. These cross supports are short boards with waney edges, and they could have been essentially scrap lumber that was used for these non-load bearing supports inside the walls.

Stokes, M.A., and T.L. Smiley. 1968 [1996]. An Introduction to Tree-Ring Dating. University of Arizona Press. 73 pp.

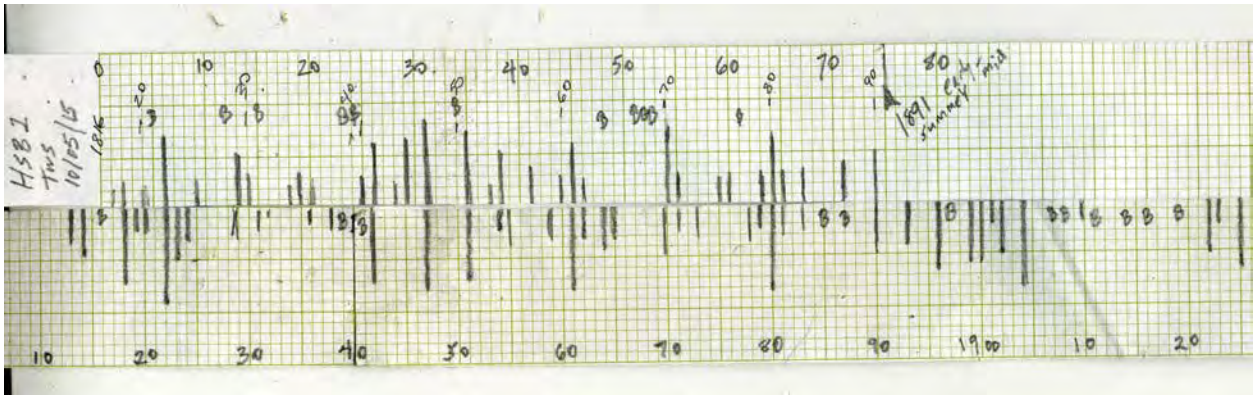
Swetnam, T.W. and AM Lynch. 1993. Multicentury, regional-scale patterns of western spruce budworm outbreaks. Ecological Monographs 11, 399-424



A drill guide was used to stabilize the drill bit as a core was extracted from the waney edge showing on a wall stud. The sample shown above was HSB2 from the northern wall of the large room.

The location of one of the wall cross-supports was in the center of the photo on the left, and other examples of wall cross-supports are visible in the upper left and upper right corners of that photo. The photo on the right shows the cut end of the board (HSB8, upper center) taken from the false front on the small room addition on the east side of the building.

Examples of the mounted and sanded wall cross-supports are shown at left. The board HSB1 is at upper right. Two of the core samples (HSB 2 & 3) are shown at lower right.



An example of the crossdating of ring-width patterns using the skeleton plot method. The upper strip of graph paper shows the ring-width plot from the sample HSB1, and the lower strip shows the ring-width pattern in the composite Jemez ponderosa pine chronology. The long vertical pencil lines represent the smallest (narrowest) rings. The lines are drawn in opposite directions on the sample plot versus the composite plot, i.e., the longest lines extending upward on the sample plot are the smallest rings, and the longest lines extending downwards on the composite plot are the smallest rings (years). The dates of the rings are shown at the bottom of the composite (control) chronology. Note that consistently small rings occurred in 1822, 1829, 1842, 1847, 1851, 1861, 1870, 1880, and 1890.