

Dendrochronology at Tonto National Monument

Dendrochronology, or tree-ring dating, has assisted archaeologists in assigning calendar dates to archaeological sites since the early twentieth century. This dating method has played a large and yet disappointing role in assisting archaeologists in determining the dates of occupation at the Upper and Lower Cliff Dwellings at Tonto National Monument. Archaeologists have cored a majority of the prehistoric wood located in the two primary cliff dwellings for dendrochronological investigations. However, only a few dates have been acquired from the wood samples. Approximately six confirmed dates have been taken from tree-ring samples at the monument since 1907 despite hundreds of samples taken. The low number of tree-ring dates obtained from the ruins is mostly due to the presence of non-datable wood, such as juniper, used by the original inhabitants of the cliff dwellings (Fox 1996).

Exploring the Dendrochronology of Tonto National Monument

Tonto National Monument is located in central Arizona about two miles southeast of Roosevelt, AZ. President Theodore Roosevelt established the 1,120 acre Monument in 1907 because of the area's "great ethnologic, scientific, and educational interest" (Proclamation No.787-Dec. 19, 1907-35 Sta. 2168). The Monument features two primary cliff dwellings, three smaller cliff dwellings and over 60 other significant sites scattered throughout the highlands and lower alluvial plains. The Lower Cliff Dwelling lies at an elevation of 3160 ft (963 m) and the Upper Cliff Dwelling at approximately 3360 ft (1024 m). Archaeologists have determined that Tonto

OVERVIEW



Lower Cliff Dwellings at Tonto National Monument.

cliff dwellings were occupied during the Late Classic Period, Gila Phase (A.D.1320-1450) occupation with a preceding Roosevelt Phase (A.D.1280-1320) (Guebard 2006).

The dates ascribed to the Tonto Cliff Dwellings come from the application of several dating methods that include: radiocarbon dating, archaeomagnetic dating, ceramic cross-dating, and dendrochronology. Nine different tree-ring sample collection events have occurred at Tonto National Monument beginning with the famous Southwest archaeologist, Emil Haury (Table 1; Dean 1995; Windes 2007). The 1995 NPS data recovery and stabilization events at the ruins included a dendrochronological study of the Upper and Lower ruins (Fox 1996). New samples were taken from the Upper Cliff Dwelling and previously collected tree-ring samples were re-analyzed. In 2006, Thomas Windes cored almost all prehis-

Table 1. Table showing collection event dates and collectors.

Sample Numbers	Collector	Date
Ton 1-8	Duffen	1937
Ton 9-12	Lloyd Pierson	1950
Ton 13-14	John C. McGregor	May 13, 1928
Ton 15-16	Bryant Bannister	April 25, 1965
Ton 17	National Park Service	Unknown Date
Ton 18-67	Laboratory of Tree-Ring Research (LTRR)	May 22, 1995
Ton 68-69	LTRR	February 21, 1995
GP 771-785	Emil W. Haury and E.B. Sayles	May 23, 1935
Ton 86-158 (No Ton 111)	Tom Windes	July, 2007



toric wood elements observed in the Lower and Upper Ruin totaling 72 samples.



Lower Cliff Dwellings at Tonto National Monument.

Dendrochronology at the Lower Cliff Dwelling

The Lower Cliff Dwelling (AZ U:8:47 or TONT 85A-51) includes a 16 room masonry/adobe pueblo built into a large rockshelter. Records available from past coring events at the Lower Cliff Dwelling tend to be poorly documented. Poor documentation makes identifying the exact specimen and location of the older samples difficult (Windes 2007). Tree-ring samples taken by E. B. Sayles and archaeologist Emil Haury in May 1935 provided the best samples that could be located by Windes and his crew at the Lower Ruin in 2006. Sample number GP-771 was a core taken by Haury and Sayles from a Douglass fir located in “Room 5”, which is now designated as Room 14. This sample at the Lower Cliff dwelling dated between A.D. 931-1109vv. In 1937 William Duffen took a sample from an unknown room in the Lower Cliff Dwelling that also dated to A.D. 1346. In 1995, Gregory Fox (1996) had the University of Arizona Laboratory for Tree-Ring Research (LTRR) collect samples from the Upper Cliff Dwelling and LTRR reanalyzed samples from both ruins. Sample Ton-68 from the 1995 reanalysis was identified as the same as sample GP-771 taken from the Lower Ruin in 1935. The reanalysis of the sample dated the wooden beam between A.D. 919-1109vv. The inclusive date for both samples is A.D. 1109vv and represents the non-cutting date. Regarding this sample, Dean (1995) suggests that “the tree died at least 50 years after A.D. 1160 and probably at least 150 years before the Lower Ruin was built.” All other tree-ring samples taken from the Lower Cliff Dwelling have not been successfully placed within the dendrochronological series of the region. In November of 2006, Thomas Windes cored almost all prehistoric wood elements in the Lower Cliff Dwelling (Windes 2007). No new dates for the Lower Cliff Dwelling were acquired (Table 2).

Table 2. Tree-ring samples taken of the Lower Cliff Dwelling.

Collector	Collection Date	Site Name	Sample Number	Room Number	Sample Date	Species	Other Information
Haury and Sayles	1935	LCD	GP-771	5*	931-1109vv	Douglass Fir	
Duffen	1937	LCD	Ton 7	UNK	1346	Douglass Fir	
LTRR	1995	LCD	Ton-68	5	919-1109vv	Douglass Fir	Confirmation of date from GP-771 – two samples are the same
LTRR	1996	LCD	Ton-68 / GP-771	5	1109vv	Douglass Fir	Inclusive date for two samples

* Sample number GP-771 is reported to have been located in room 14 of the Lower Cliff Dwelling in Haury’s report. However, the room numbering system used by Haury has been changed. Room 14 is now Room 5.



Wood in a wall at the Tonto Upper Cliff Dwelling.

Dendrochronology at the Upper Cliff Dwelling

The Upper Cliff Dwelling (AZ U:8:48 or TONT 85A-50) consists of a 32 room masonry/adobe pueblo built into a large rockshelter. The site primarily represents a Late Classic Period, Gila Phase occupation with a preceding Roosevelt Phase dating ca. A.D. 1300 – 1450 (Fox 2000). The site has yielded spectacular cotton textiles as well as impressive lithic tools, ceramic vessels and intact wooden elements such as vigas and roofs. Five tree-ring dates have been obtained for the Upper Cliff Dwelling. Haury and Sayles collected two sam-

ples in 1935. The first date came from a pinyon pine tree-ring sample, GP-785, that dated between A.D. 1256-1303v. The second date came from a Douglass fir sample, GP-782, taken mostly likely from Room 19 of the ruin. GP-782 dated very close to A.D. 1346. Haury also collected a juniper sample in 1938 that dated to A.D. 1346. However, this sample does not have a number. The GP-782 and 785 sample dates were confirmed in the National Park project conducted by Gregory Fox in 1996. Sample Ton-40 from the Upper Cliff Dwelling Room 19 is the same pinyon pine sample as GP-782 and dated to A.D. 1290vv. The inclusive date for both samples is A.D. 1290vv. Sample GP-785 was reanalyzed and the probable cutting date was determined to be A.D. 1303v (Dean 1995). The most recent date was obtained by Windes in 2007. Sample Ton-137 was taken from a secondary pinyon pine roof beam from room 5 and this dated to A.D. 1342r.

Conclusion

In spite of the hundreds of tree-ring samples taken from the Cliff Dwellings at Tonto National Monument, only a few dates have assisted archaeologists in dating the two ruins. However, the dates that are available place the ruins in their suspected Roosevelt and Gila phase time periods. Ceramics observed at the ruins also date to these two time periods, such as Roosevelt Red Ware, Salado Red, and Salado White-on-Red. Today, archaeologists have many dating techniques and methods to place sites into a period of history or prehistory. However, even through a combination of techniques archaeologists cannot always discover the exact periods of occupa-

Table 3. Tree-ring sample dates and collectors from the Upper Cliff Dwelling.

Collector	Collection Date	Site Name	Sample Number	Room Number	Sample Date	Species
Haury and Sayles	05/23/1935	UCD	GP-785	Unknown	1256-1303v	PNN
Haury and Sayles	05/23/1935	UCD	GP-782	19/17	1346	Douglass Fir
Haury	1938	UCD	Haury, 1938	5	1346	Juniper
LTRR	1996	UCD	Ton-40	19	1290vv	Confirmation of date from GP-782 – the two samples are the same
LTRR	1996	UCD	Ton-40 / GP-782	19	1290vv	Inclusive date for two samples
LTRR	1996	UCD	GP-785	Unknown	1303v	This sample was reanalyzed with results confirming the original
Windes	July, 2007	UCD	Ton-137	Room 5	1342r	PNN

tion at all archaeological sites. Talented and knowledgeable archaeologists have used the wealth of archaeological data from the two cliff dwellings and have applied current dating techniques to understand the prehistoric life-ways of the ancient people of Tonto National Monument.

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