Mount Allison
Dendrochronology Lab

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Tree Ring Dating of the John Allison Structures, Florenceville, N.B.

By

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Introduction

With increasing frequency, parts of New Brunswick's heritage are being lost. Old barns are being removed from farming properties, often for the purpose of reselling the long solid beams for incorporation into newer structures, but just as frequently because property owners feel they can put the land to better use. These barns are, however, a valuable kind of unwritten cultural heritage, documenting the development and succession of ownership of rural lands. Though standing barns can provide us with historical insight, the dates of construction and the history surrounding the origins of many of these barns remain a mystery. Such is the case in the region around the small village of Florenceville.

Florenceville is a small rural village located just off the Trans-Canada Highway, adjacent to the US border in the Saint John River Valley in northwestern New Brunswick, approximately 32 km north-northwest of the larger regional centre of Woodstock. Though the local economy is now centred around potato farming, traditionally lumbering and shingle making, in addition to farming, were mainstays of the community, as the region was forested in spruce, pine, and cedar.

The Saint John River Valley's European inhabitants were initially led by British Loyalists fleeing New England as political refugees in 1780. These Loyalists were given land grants in return for their service to the crown. One such land grant was made in 1795 to a sergeant in the Corps of Pennsylvania Loyalists, for a property located on Mountain View Road, just outside of Florenceville. This property is now owned by John Allison. Four undated farm structures stood on the property: two barns (Figure 1), a granary and a hen house (Figure 2). Though both barns have since been removed from the property, the boards from which they were built were incorporated into a new garage building. The hen house and granary are still standing.

Figure 1 - A photograph of two of the Allison family barns taken circa.1955 (photograph courtesy of the Allison family collection).

Figure 2 - A photograph of the granary (left) and the henhouse (right) taken circa.1955 (photograph courtesy of the Allison family collection).

Upon the request of John Allison, in late February 2004 a small group of researchers from the Mount Allison Dendrochronology Lab (MAD Lab) travelled to Florenceville to assess the possibility of using tree rings to date the original barn materials and extant structures on his property. We hoped to ascertain the date of their construction, with the goal of identifying who the original builder was, in order to enhance the documentation of local history. Predictions by the current owner point to construction prior to the 1860s.

Research Theory

To date any structure using ring-pattern correlation requires two complete series of data, a living chronology with a fixed and known end date and a floating chronology that can be matched to the living chronology. Since very little dendrochronological work has been done in Maritime

Canada, few living chronologies are available. Therefore, dating the Allison buildings requires a two-tier process. In addition to collecting enough wood samples to build a floating chronology for the structures, we also need to assemble a fixed chronology against which to date it.

The first step in collecting these data is to determine with what tree species the barns were built, in order to match the barn samples with a fixed chronology of the same species. This is important as not all species will react in the same manner to the same changes in climatic factors. Because dendroarchaeological analysis involves finding corresponding growth patterns in wood, correctly identifying and matching the species is crucial to accurately dating a structure.

Following species identification, individual structure samples can be drawn together to create a floating chronology. Given the suspected age of the Allison structures, creating a fixed chronology from live samples that stretches back to the original construction date poses a challenge, especially given that the majority of old trees have been cleared from the surrounding area. A potential solution to this problem is to find a younger floating chronology that can serve as a bridge between the Allison floating chronology and the living fixed chronology. John Allison identified the Buxton barn, illustrated in Figure 3, as such a potential bridge structure.

Figure 3 - A photograph of the John Buxton barn, which is hoped to be a potential bridge structure linking old chronologies to the present day wood patterns (photograph courtesy of John Allison).

Assuming the living and bridge chronology series can be successfully crossdated to create one continuous fixed chronology, finding the age of the barn to within a subannual accuracy should be relatively straightforward.

If the barn samples reveal fairly homogeneous cut dates, this date will indicate when the barns were likely to have been built. Such a correspondence between cut date and construction date is especially valid in frontier locations, where the timbers used in construction were rough cut, suggesting that the wood most likely came from nearby rather than being purchased and transported from a great distance. In the case of the Allison structures, rough cuts are evident in many of the beams in the granary and garage buildings still standing.

Data Collection

On-site visual analysis of bark remaining on rough-cut boards, and of core samples obtained from beams in the Allison granary and garage, revealed that wood appeared to be white pine (*Pinus strobus*), a species common in the area surrounding the farm. White pine is also known to have been frequently used for construction purposes.

Based on this initial analysis, paired samples were collected from eight mature white pine trees near the Allison farm using an increment borer (Figure 4). Sampling was carried out using an opportunistic sampling method. These white pine cores were collected in the hope of forming the base of a living chronology.

Figure 4 - Sampling living white pine in Forenceville, NB in February 2004.

In addition to the core samples taken from beams, John Allison agreed to cut several board samples from the structures on his property for further analysis. Through the assistance of John Allison, samples from the Buxton structures were also made available. In total 21 wood samples of boards, beams, and planks were taken from the Allison structures, and 15 from the Buxton structures. These samples were then delivered to the MAD Lab in Sackville for preparation and analysis.

Sample Preparation and Analysis

Samples were mounted and sanded in preparation for analysis. Cores were first glued into slotted boards before being sanded to an extra fine smooth polish (600 grade sandpaper). Larger board samples were cut at the MAD Lab Silver Lake annex before being finely sanded for analysis.

One of the purposes of sanding samples so finely is to enable the identification of cell structure under magnification. Without bark and needle samples, species identification can often only be done through identifying differences in structure at a cellular level.

Upon comparison of our core samples taken from living white pine trees with the samples taken from the structures, it became apparent that the structures were not predominantly built from white pine. Pine wood is notable due to the presence of distinct resin ducts upon close examination of cell structure (Figure 5). None of the boards sampled from the structures had this feature present, indicating the buildings were not made of pine. The examination of cell structures also failed to reveal any prominent radial parenchyma (Figure 6), which are indicative of cedar species. Through a process of deduction and elimination of local species, we therefore ascertained that the barn was probably built from spruce. Currently a more thorough analysis is being conducted to evaluate which spruce species was used.

Samples from the Buxton barn were split off from the group and are reported in a second document, MAD Lab report 2004-02. The Allison samples were then examined using a computerized Velmex system to measure individual ring widths to 0.001 mm accuracy for all the samples. Samples were visually crossdated and then checked using the program COFECHA. All samples were first crossdated with other samples taken from the same structure using COFECHA, in order to find samples with relatively strong coherent signals. Board pairs with stronger signals were then used as a starting point for a master chronology. In total seven different structure samples have been incorporated into the floating master chronology which spans 163 years (Table 1).

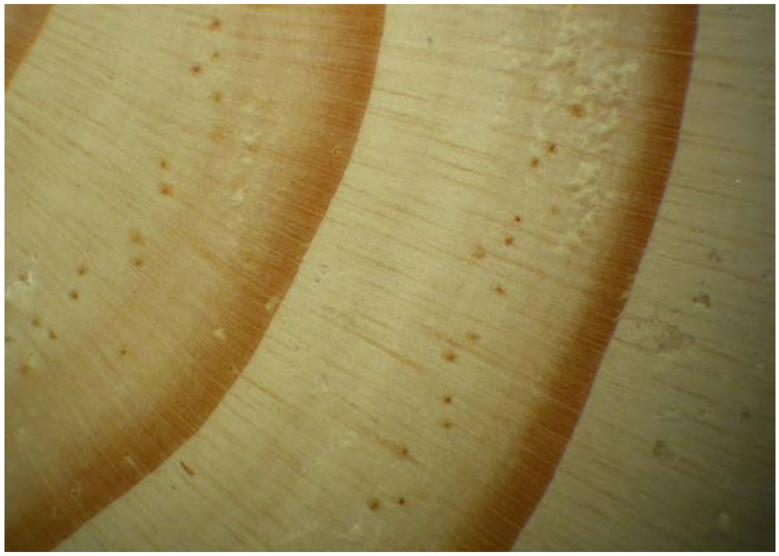

Figure 5 - A photograph of resin ducts within the rings of white pine. The ducts are the lines of dark spots within the earlywood of each ring.

Figure 6 - A photograph of prominent radial parenchyma in a sample of eastern white cedar. The parenchyma are the dark radial bands perpendicular to the annual ring boundaries.

Table 1 - Results of the COFECHA analysis for the floating Allison structure samples in the study. The floating samples were given an arbitrary death date of 2000 for this exercise.

Sample	Interval	# Years	Correlation with Master
JA5b	1912-1999	88	0.179
JA5a	1921-2000	80	0.267
JA3	1905-1995	91	0.397
JA1b	1864-2000	137	0.286
JA1	1851-2000	150	0.112
JA12	1883-1990	108	0.330
JA4	1842-2004	163	0.222
		mean	0.247

Initial Results

Though the floating master chronology currently fails to reach the Pearson parametric test's critical correlation level of 0.3281 (99% confidence level), the floating master chronology series' intercorrelation level of 0.247 indicates that there is a weak signal present. This suggests the boards are from the same time period. With additional samples added to the data set, it is expected this signal can be strengthened to exceed the critical value.

The living chronology from the samples collected in February was not able to produce a usable master living chronology. The samples became broken when they thawed in the lab and the pieces produced poor samples to use as a living chronology. A late addition to this report was therefore thankfully obtained when Dr. André Robichaud generously made his Haute-Abojagane white pine/spruce chronology available for comparison. Despite the distance between study regions, we attempted to float the Allison structures' chronologies against his fixed chronology to see if any correlations were strong enough to give us an estimated date of construction of the buildings.

Though weak (series intercorrelation 0.279), a correlation between the Allison barns' chronology and Dr. Robichaud's base chronology could be found. The weakness of this correlation is easily explained by the separation of samples by distance.

A particularly strong correlation was found between the sample JA3 and Robichaud's master series (correlation with master series 0.490). Analysis using COFECHA suggested JA3 fit the master chronology best between 1751 and 1841. Using this information in conjunction with barked samples JA1 and JA1a from the Allison barns master chronology, an estimate as to the age of the barns was made at 1844 to 1849.

Conclusion

Thus far the findings of this project are inconclusive but they do represent a significant step towards the ultimate goal of dating of the Allison barns using tree-ring analysis. The major findings of this report are as follows:

-The buildings on the Allison property are made primarily from spruce (specific species to be determined);

-Some board samples from the barns can be successfully crossdated to each other, and;

-These board samples do exhibit a detectable, relatively homogeneous, weak signal and indicate a cut date of approximately 1844 to1849.

This information is aided by bark left on some of the larger board samples incorporated in the master chronology. Once aligned with a robust fixed chronology, these samples will allow accurate pin pointing of the season prior to the felling of the trees to construct the barns.

A key continuation of research into the age of the Allison structures is the strengthening of the master floating and living chronologies in order to reach the critical correlation value. The inclusion of additional wood samples and a site-specific living spruce chronology will help in this process. Though the living chronology will ultimately require the collection of a large number of spruce samples (at least 30 individual trees to enable statistical accuracy) from the area, it should help us to arrive at a more robust conclusion.