Mount Allison
Dendrochronology Lab

A Dendroarchaeological Analysis of the Sinclair Inn Cellar, Annapolis Royal, Nova Scotia

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Contents

Abstract

A sample of a stringer log used in the construction of the cellar of the Sinclair Inn was sent to the Mount Allison Dendrochronology (MAD) Lab in Sackville, New Brunswick. Ring widths from the sample were compared with those of a Nova Scotia red spruce master chronology in order to determine the timeline in which the tree grew and to find the year that it was cut down. Using pattern matching, it was determined that the tree was cut down in 1706, allowing us to estimate that the building was constructed anytime between 1706 and 1708.

Introduction

In July of 2011, the MAD Lab was asked by Wayne Morgan in Annapolis Royal, to date a sample taken from the cellar of the Sinclair Inn. It is believed that the original inhabitants of the building – Jean Baptiste Soullard and Francoise Louise Comeau – settled in this area in as early as 1708 (Annapolis Heritage Society, 2010). Using the sample given, the MAD Lab was employed to determine the accuracy of this estimate.

Methods

The Sinclair Inn Museum is found at 230 Lower Saint George Street in Annapolis Royal, Nova Scotia (Lat. 44°44'25.6" N, Long. 65°30'36.6" W). In July of 2011, a section of one stringer log found as part of a series of stringers from the cellar of the Inn was removed and sent to the MAD Lab in Sackville, New Brunswick to be processed.

The log section arrived on July 26th, 2011, and was heavily water logged. The sample was then processed through standard lab methods to prevent deterioration and make the sample viable to work with. The sample was given the MAD Lab code 11ZS000 and was placed in a drying oven for 48 hours at 40°C. The sample was checked as it dried and was wrapped with duct tape to prevent the sample from pulling apart and to reduce splitting, (Figure 1). Once the outer portions were dried, a bandsaw was used to cut a 5 cm wide cookie off of the original piece and was given the MAD Lab code 11ZS001. The cookie and the leftover portion of the log were then placed back into the oven for a further 24 hours at 40 °C to ensure that the material was dried to a surface depth to be worked on.

Figure 1 – The original log sample received by the MAD Lab on July 26th, 2011, given the MAD Lab code 11ZS000.

Once the drying process was completed, the best side of the newly created cookie that had been cut off with the bandsaw was sanded with progressively finer sanding paper (80 to 400 grit) and then buffed, resulting in clearly visible annual tree rings. Two paths of measurement were determined for the cookie and marked directly onto the soundest portions of the wood (Figure 2), and given the MAD Lab codes 11ZS001A and 11ZS001B. The rings along the two paths were then counted and the widths between each ring measured using the computer program WinDendro with an accuracy of 0.001 mm.

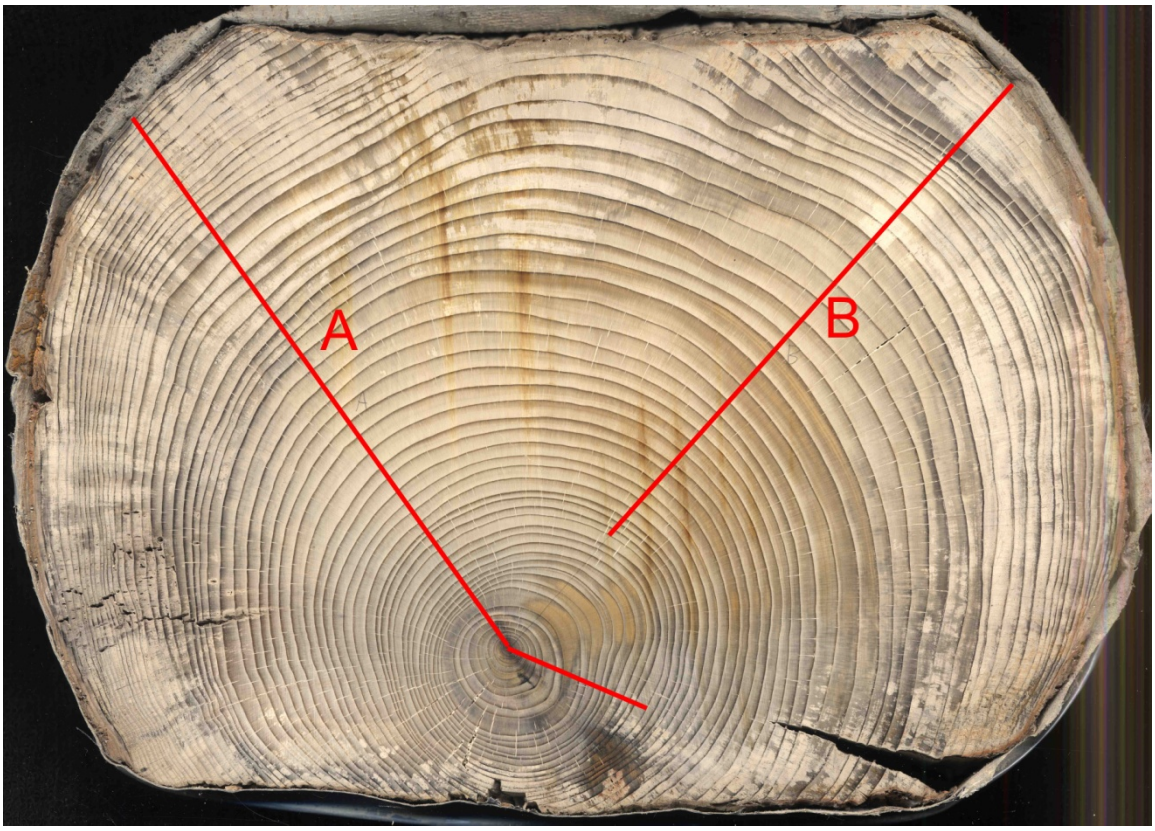

Figure 2 - Sample 11ZS001 cookie from the cellar of the Sinclair Inn, with paths A and B identified.

To statistically determine the most likely timeline in which the tree in question lived, the average of the measurements obtained from the Sinclair Inn cellar cookie was crossdated with a Nova Scotia red spruce master chronology already created by the MAD Lab and available from our archive. Crossdating of the Sinclair Inn cellar sample to the master chronology was done using the program COFECHA. In order to pass the 99% confidence level, the sample cookie measurements must correlate to the chronology at a value of 0.4226 or higher based on 30-year segments. Using COFECHA, the best probable timelines that gave the greatest intercorrelation values were determined. To visualize the correlations of the sample to the chronology at the determined timeline, the program ARSTAN was used to standardize the radial growth patterns of the master chronology and of the sample, after which Microsoft Excel was used to create graphs of the comparisons.

Results and Discussion

Using COFECHA to determine the years in which the tree in question may have grown, the timeline that gave the greatest average intercorrelation value when compared with the red spruce master chronology was 1641 to 1706 (Table 1). The average intercorrelation value found between these years was a very significant 0.5705, which is well above the 99% confidence level (Table 1). To further verify that this timeline best fits the chronology, other timelines were tested and graphed and their confidence levels determined. None of the next five possible locations in time achieved a correlation greater than the 99% confidence level. The next highest possible timelines and their intercorrelation values can be found below in Table 1. Graphical interpretations of the Sinclair Inn cellar cookie's measurements (1641-1706) compared to the master chronology can also be seen in Figures 3 and 4.

Table 1 - The intercorrelation values of Path A and Path B as measured from the Sinclair Inn cellar cookie and the average of these two values for six of the best fitting timelines of the tree's growth as compared to the red spruce master chronology. Note: Values above the 99% confidence level for the series intercorrelation of 0.4226 or higher are bolded.

Timeline	Intercorrelation Value		Average Intercorrelation
	Path A	Path B	
1641-1706	**0.585**	**0.556**	**0.5705**
1696-1761	0.315	0.414	0.3645
1723-1788	0.336	0.205	0.2705
1785-1850	0.336	0.147	0.2415
1771-1836	0.388	0.079	0.2335
1788-1853	0.061	0.258	0.1595

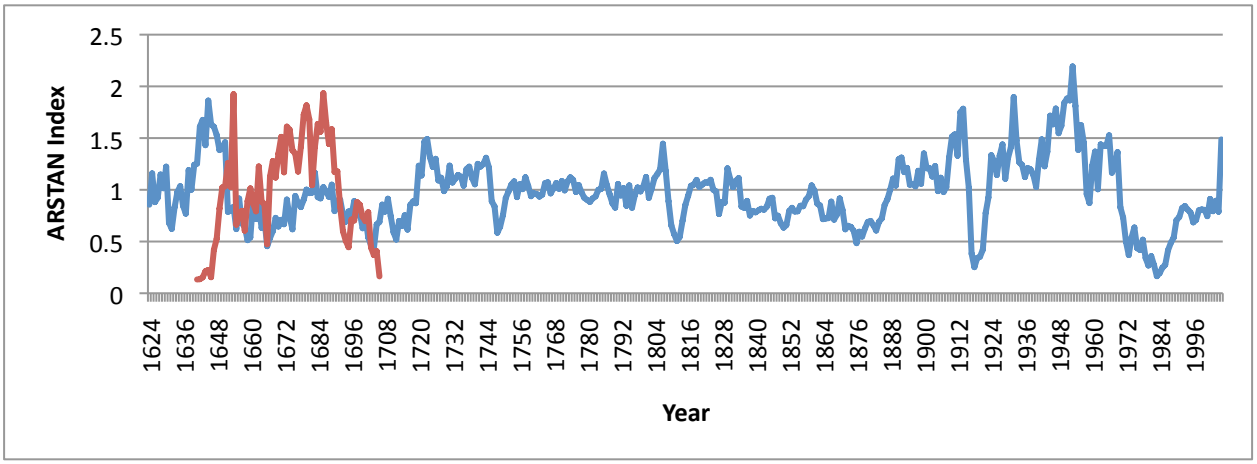

Figure 3 The Nova Scotia red spruce master chronology curve (blue) compared to the Sinclair Inn cellar MAD Lab sample 11ZS001 cookie (red).

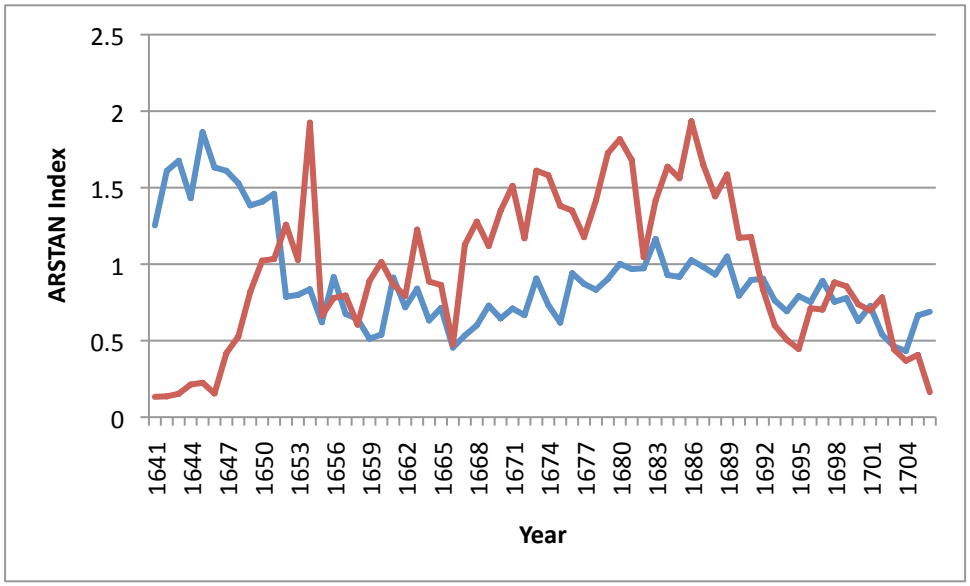

Figure 4 Close-up of the Nova Scotia red spruce master chronology curve (blue) compared to the Sinclair Inn cellar MAD Lab sample 11ZS001 cookie (red) between the years 1641 and 1706.

While not as obvious in graphical form as compared to the numerical values obtained by COFECHA, it can still be seen in Figure 3 and more-so in Figure 4 how times of increased growth for the Sinclair Inn cellar sample match well with times of increased growth of the trees in the master chronology. Part of the difference in the magnitude is that the comparison is one sample from the cellar compared to the average of over 50 samples in the master chronology.

It can therefore be concluded with a high degree of certainty that the tree used in the Sinclair Inn cellar stringer complex, was cut in 1706 with over 99% confidence. It is entirely possible for this tree to have been used immediately to construct the structure or it is also possible that it was left for a year or two before being utilized in the construction. Therefore we can estimate that this level of the Inn was constructed between the years of 1706 and 1708. This fits in very well with when the Inn was originally estimated to have been built, which was believed to have been as early as 1708.

Conclusion

It was found with over 99% confidence that the sample obtained from the Sinclair Inn cellar came from a tree that grew from 1641 to 1706, when it was chopped down and used as construction material. Since this tree could have been used immediately or left to season for up to a couple of years before being used, it is estimated that this level of the Inn was built between the years of 1706 and 1708.

References

Annapolis Heritage Society. (2010). "Jean Baptiste Soullard & Francoise Louise Comeau". Accessed Aug. 9, 2011. http://annapolisheritagesociety.com/museums/sinclair-early.html.