A Dendroarcheological Analysis of the Carriage House at Government House, Halifax, Nova Scotia

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Table of Contents

Abstract

In an attempt to determine the history of the Carriage House, a section of floor beam was sent to the MAD Lab to be analyzed in April 2011. The beam was cut and sanded into two disks and given the MAD Lab code of 11BD000. This sample was determined to be red spruce, and therefore a master red spruce chronology was used to help date the wooden beam. After crossdating the sample from the Carriage House against the master chronology, it was found that the wood for this beam was cut in 1857. This suggests that the structure was likely built in 1857 or 1858.

Introduction

Situated next to the Government House is the Carriage House. This structure has an ambiguous history, although map makers accounted for it in the late 1800s, there is no definite age of construction established for this structure. To help determine the age, a 16" long section of major floor beam was saved by T.E. Smith-Lamothe and sent to the MAD Lab for dendrochrological assessment on April, 23 2011. By using the abilities of the MAD Lab, the hope is to date the floor beam, and help pin-point the date at which this structure was likely built.

Methods

The Carriage House is located in Halifax, Nova Scotia at 1451 Barrington St. beside the Government House. The project was assigned the MAD Lab code of 11BD000. In the lab, two disks were cut out of original sample to analyze (labeled 11BD001 and 11BD002) (Figure 1 and 2).

Figure 1. Taping up samples in order to cut out disks. Areas of the sample that contained perimeter wood edges were selected to be used.

Figure 2: Utilizing the band saw to cut out disk samples.

In the lab two disks were sanded with progressively finer sanding paper (40-600 grit) to bring out the cellular structures and annual rings of the wood (Figure 3). Rings were counted and measured along two paths from the pith (middle) of each disc sample using a program called WinDENDRO. Measurement paths were run through the most structurally sound portions of the samples.

Figure 3: Sanding of the disks took place in the MAD Lab. Sanding allows the details within the ring structures to become visible.

A time series of measurements from the samples were correlated to each other thereby creating floating chronologies (chronologies that are not attached to a specific period of time). The floating chronologies were then crossdated to a previously established master chronology that was locked in time from the area. Crossdating is the practice of taking the pattern of growth from one sample and comparing it to that of another (Figure 4).

To assist in the cross-dating procedure we used the statistical crossdating program COFECHA (Holmes, 1986a). COFECHA uses correlation values to assist in accurately dating samples. Higher correlation values indicate that the floating chronology corresponds well to the master chronology. Lower correlation values can indicate a variety of things such as ecological or climatic variation from the norm or that the sample is inaccurately dated. The floating chronologies were run against a red spruce (*Picea rubens*) master chronology available from the MAD Lab archive. This insured that the patterns found in the floating samples could be referenced to one of the chronologies locked in time.

Each of the floating and master chronologies was standardized to have a mean of one by using a negative exponential curve in the program ARSTAN (Holmes, 1986b). This standardization was completed to allow samples of different ages to be compared.

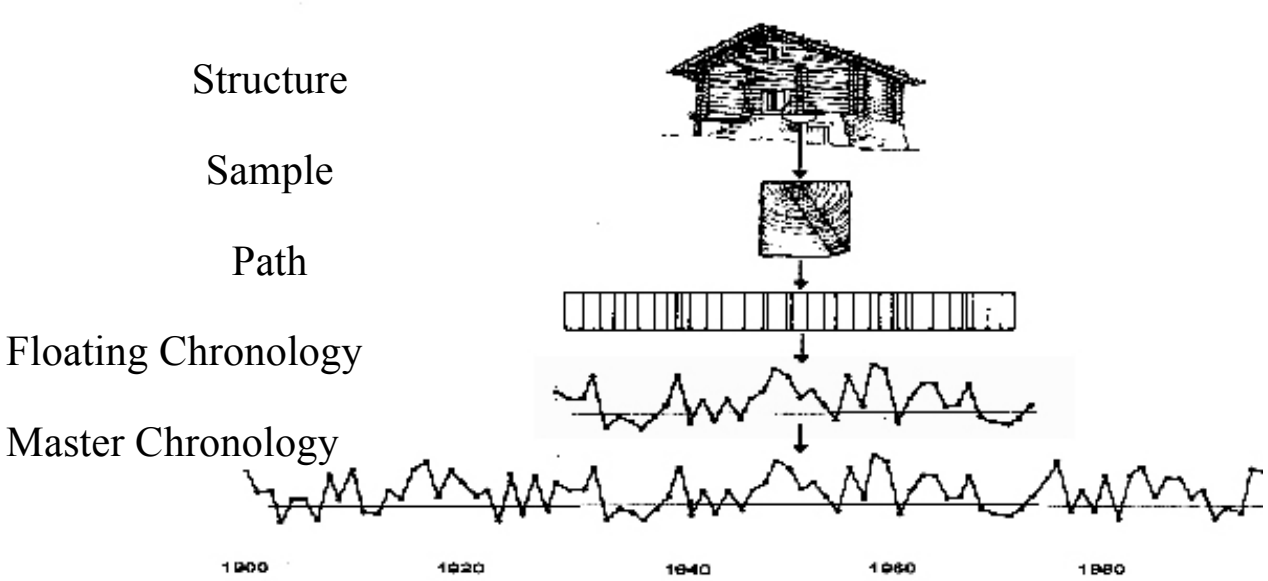

Figure 4 - Example of crossdating by using patterns from a structure (floating chronology) compared to a master chronology.

Results and Discussion

Using the program WinDENDRO, the sanded disks of the sample taken from Carriage House had the rings counted and rings widths measured to help create a times series of measurements. Four paths were drawn on the two disks taken from the sample to help the

assessment. These four paths created floating chronologies, that were then crossdated with the master red spruce master chronology.

The correlation of all four paths and the master red spruce chronology was strong as shown in the graph below (Table 1 and Figure 5). The correlation was strongest between all of the paths and the master chronology when the end date was 1857; both path 1 and 2 demonstrate this. The one path that strayed the furthest from the rest, dating its end date at 1847, was missing bark and therefore missing rings, so cannot be as accurate as other paths. These paths have been graphed against the master chronology to help visually demonstrate the correlation between the sample and the time period roughly between 1723-1857 (Figure 5a, 5b, 5c).Table 1 helps illustrate the correlations of the different paths to the master chronology and the estimated age of the spruce for each path.

Table 1 – Path/Sample, species, time span, number of years in chronology, presence or absence of bark, and the wood condition of each path assessed in the analysis.

Path	Species	Time Span	# of Years	Bark	Condition
11BD001a	red spruce	1723-1857	134	Yes	broken up
11BD001b	red spruce	1723-1857	134	Yes	Good
11BD002a	red spruce	1722-1855	133	No	Good
11BD002b	red spruce	1722-1847	125	No	Good

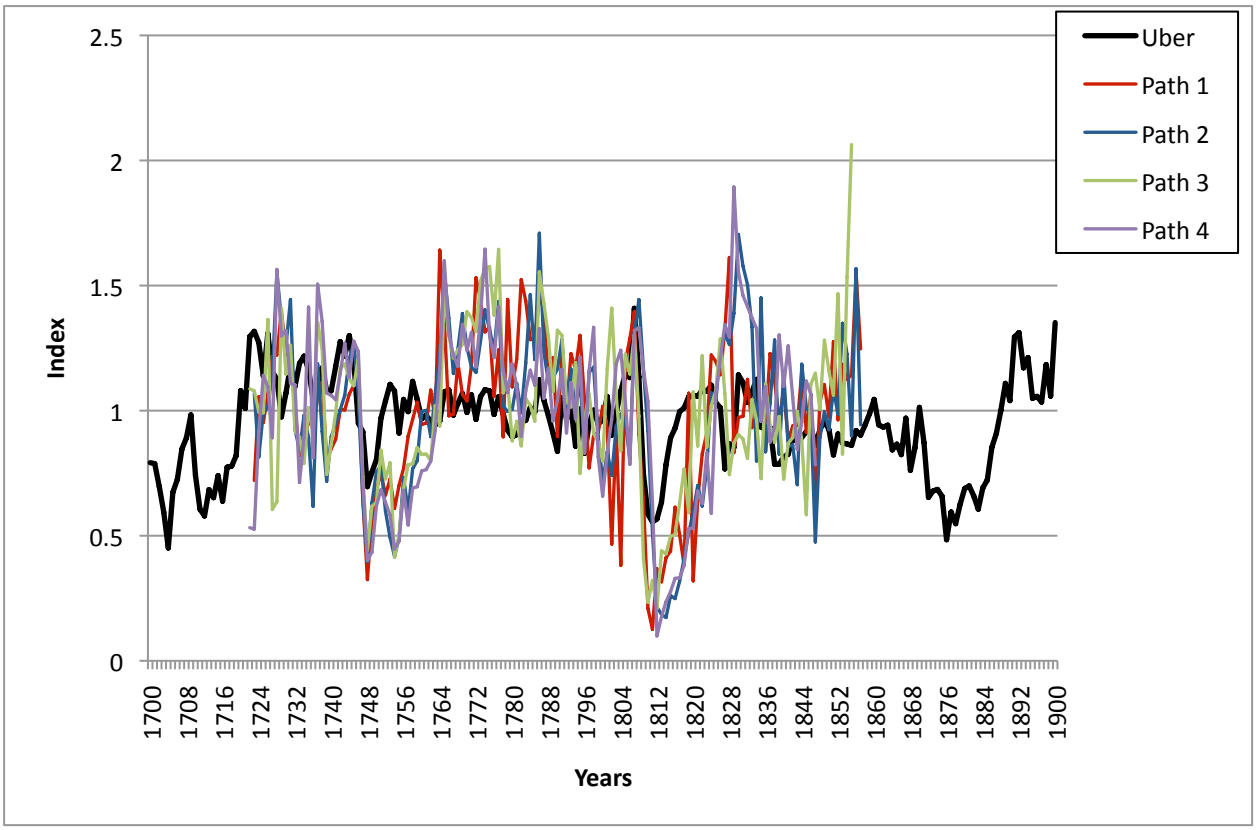

Figure 5a - The standardized master red spruce chronology, and four paths taken from Carriage House sample.

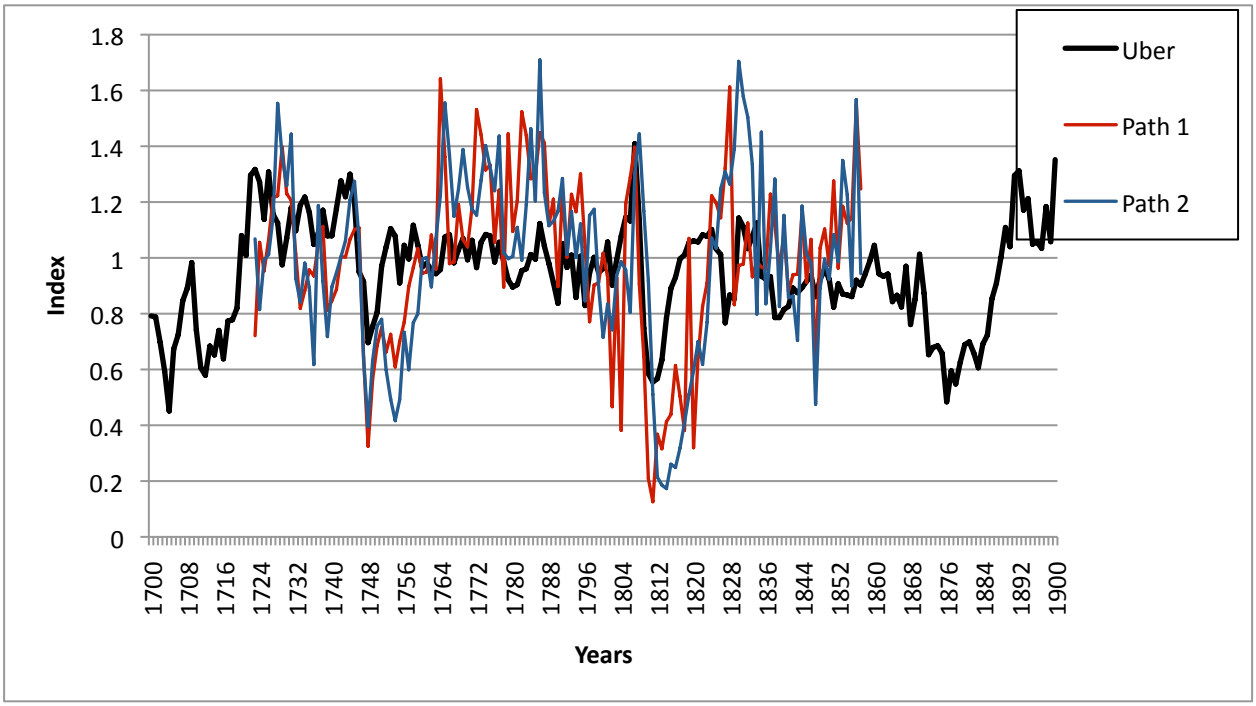

Figure 5b – The standardized master red spruce chronology, against 11BD001 (path 1 and 2).

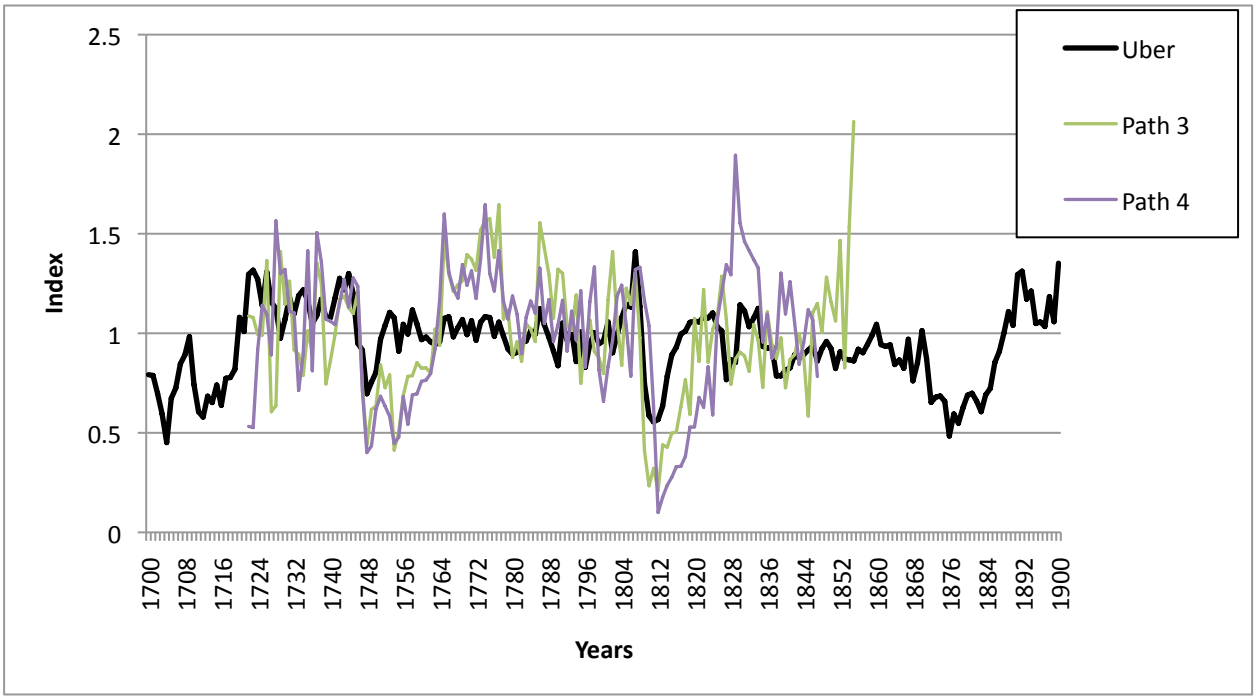

Figure 5c – The standardized master red spruce chronology, against 11BD002 (path 3 and 4).

Conclusions

The dendrochronological analysis of the sample taken from Carriage House indicates that the wood was cut in 1857. This means that the Carriage House was built anytime after this tree was cut down, most likely in the year of cutting, or in many cases a year afterwards, so likely 1857 or 1858.

References

Holmes, R.L. (1986a). Users manual for program COFECHA. In *Tree-ring chronologies of western North America: California, eastern Oregon, and northern Great Basin* (eds R.L. Holmes, R.K. Adams & H.C. Fritts), pp. 41-49. Laboratory of Tree-Ring Research, University of Arizona, Tucson.

Holmes, R.L., Adams, R.K., & Fritts, H.C. (1986b) Users Manual for Program ARSTAN. In *Tree-ring chronologies of western North America: California, eastern Oregon, and northern Great Basin* (eds R.L. Holmes, R.K. Adams & H.C. Fritts), pp. 50-65. Laboratory of Tree-Ring Research, University of Arizona, Tucson.

Appendix I – Image of sample disk.

This is the first disk sawed up; it was renamed 11BD001. Two paths (path 1 and 2) were drawn from the center to areas where bark was found around the periphery; this allowed the most rings/years to be accounted for and measured. These paths were then analized in WinDENDRO and helped create the floating chronolgy that was then crossdated with the red spruce master chronology to date this sample of red spruce taken from the Halifax House Carriage Shed.